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The Impact of Sino-us Trade Frictions on Corporate Debt Default Risk

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Abstract

In recent years, the process of globalization has not only promoted the cross-border flow of production factors and the optimal allocation of resources, but also significantly improved the sensitivity and transmission efficiency of countries' economies to external shocks. Sino-us trade frictions, which have been comprehensively escalated since 2018, have become a hot issue in the field of international economy and trade as a strategic game between the world's two largest economies. The tariff sanctions and technology blockade of the United States have directly damaged the global supply chain layout formed by Chinese enterprises for a long time, squeezed the profit margin of enterprises through both price and demand, and led to a significant tightening of financing constraints of enterprises. However, the existing research mainly focuses on the analysis of the overall impact of trade frictions on China's economy and the impact on capital market and financial risks, and lacks systematic discussion on the risk of corporate debt default. Therefore, based on the reality of the continuous escalation of Sino-US trade frictions, this paper takes the A-share listed companies in Shanghai and Shenzhen from 2006 to 2024 as the research samples, and through multi-stage industry matching, the goods in the US tax list are corresponding to the Chinese industries, so as to define the companies under sanctions in the experimental group, so as to reveal how it affects the debt default risk of enterprises. This paper provides theoretical support for the risk prevention and control of Chinese enterprises affected by trade frictions.

Keywords

Sino-us Trade Friction; Debt Default Risk; Cash Holding Level; Financing Constraints.

1. Introduction

At present, the world economic recovery is weak and unilateralism and protectionism are on the rise. The trade frictions between China and the US, which have been comprehensively escalated since 2018, have spread from the simple field of commodity trade to multiple dimensions such as science and technology, finance and investment, showing a development trend of "normalization and expansion". The US has imposed high tariffs on Chinese goods and implemented strict technology blockade and export control, which has seriously disrupted the existing global supply chain layout and market expectations of Chinese enterprises. This huge impact at the macro level is bound to be transmitted through corporate cash flow, financing environment and business activities at the micro level, and ultimately reflected in the accumulation of corporate financial risks, especially the rise of debt default risk.

Corporate debt default risk is not only the core indicator to measure its individual financial health, but also may evolve into regional or systemic financial risk through industrial chain transmission and association with the financial system. Therefore, under the realistic background of the continuous evolution of Sino-US trade frictions, it is of great theoretical and practical significance to systematically evaluate its impact on the debt default risk of Chinese enterprises, and clarify the transmission path and heterogeneity characteristics, for

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maintaining market stability, preventing financial risks and formulating precise response policies.

In view of this, this paper aims to remedy the above deficiencies. The marginal contributions of this paper are as follows: first, from the perspective of research, it directly relates macro trade policy shocks to corporate micro financial risks, and expands the research in the cross field of international trade and corporate finance. Second, in terms of research design, the sanctioned enterprises are identified by refined industry matching and the multi-time DID model is adopted, which effectively alleviates the endogeneity problem and provides more reliable evidence for causal inference.

2. Literature Review and Research Hypotheses

2.1. Literature Review

The section headings are in boldface capital and lowercase letters. Second level headings are typed as part of the succeeding paragraph (like the subsection heading of this paragraph). All manuscripts must be in English, also the table and figure texts, otherwise we cannot publish your paper. Please keep a second copy of your manuscript in your office. When receiving the paper, we assume that the corresponding authors grant us the copyright to use the paper for the book or journal in question. When receiving the paper, we assume that the corresponding authors grant us the copyright to use the paper for the book or journal in question. When receiving the paper, we assume that the corresponding authors grant us the copyright to use.Sino-us trade friction refers to the trade imbalance and trade between China and the United States in the process of international trade,policy differences, market access restrictions, intellectual property protection, industrial competition and other factors caused by a series of phase

Conflicting and contradictory economic and trade phenomena. Sino-us trade frictions will affect import and export, corporate investment and corporate financing on the macro level. Amiti and M., Redding (2019) [1]found that with the increase of trade frictions, Chinese and US consumers, importers and exporters will be affected by tariff fluctuations, and the trade war will reduce the real income of the country. Existing studies have found that when enterprises face trade frictions, they will use OFDI to reduce trade costs (Eicher and Kang, 2005[2]; Cole and Davies, 2009[3]; Fujiwara, 2017[4]; Sun and Lee, 2017[5]). Some studies believe that technical barriers to trade caused by trade frictions will force enterprises in target countries to increase innovation investment and meet technical standards (Allen and Sriram, 2000[6]; Gao and Miyagiwa, 2005[7]). Other studies believe that trade frictions worsen the terms of trade of the target country and intensify the operational risks of enterprises in the target country, which in turn causes enterprises to lose innovation motivation and inhibit enterprise innovation (Maskus et al., 2005[8]). Furthermore, some scholars believe that trade frictions have heterogeneous impacts on enterprises, and the promotion or inhibition effects depend on the tolerable dumping margin set by the government (Kao and Peng, 2016[9]) and the market size of the two countries (Miyagiwa et al, 2016 [10]). The trade frictions suffered by enterprises have a strong signal effect, which will trigger negative attention from investors (Li et al., 2014 [11]), thus increasing the cost of equity capital of enterprises.

In the context of the increasingly fierce anti-globalization in the world, the research on debt default risk is more meaningful. Based on the financial risk theory, Minsky (1978)[12] believed that local bonds would trigger financial risks through internal and external factors, and the imperfect local market would lead to asset price fluctuations. Therefore, the debt default risk is divided into external perspective and internal perspective. From the internal perspective, a strong corporate governance mechanism can effectively restrain the opportunistic behavior of the management and protect the interests of creditors, thus directly reducing the probability of

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default (Goncharov et al., 2007[13]; Hsu et al., 2015[14]). In terms of financial health and asset profitability, the solvency of an enterprise ultimately depends on the ability of its assets to generate stable cash flow. The core logic of classical financial distress prediction models, such as Altman's (1968)[15] Z-score model, is to identify signs of deterioration of corporate financial conditions through financial ratios. Campbell et al. (1983) [16]also confirmed that improving cash flow, profitability and asset liquidity is the fundamental way to reduce default risk. In addition, the enterprise's market competitiveness and customer relationship also constitute an important risk cushion. Kroll et al. (1999)[17] believed that enterprises committed to improving product quality essentially made proprietary investment aimed at obtaining long-term competitive advantage, which helped to enhance the strength of enterprises, reduce the fluctuation of earnings, and thus enhance the reliability of debt performance. Similarly, Anderson et al. (2009)[18] showed that deep customer loyalty and high customer satisfaction can bring more predictable future income streams to enterprises, thus stabilizing operations and reducing default risks.

From an external perspective, a large number of studies have confirmed that there is a significant negative correlation between macroeconomic prosperity and corporate default rate. Based on the long-term data of US corporate bonds, Giesecke et al. (2011)[19] proved that the growth rate of gross domestic product (GDP) is an important macro indicator to predict the default risk, and the economic recession is often accompanied by a sharp rise in the default rate of enterprises. As for the financial market, the classical model of Merton (1974)[20] and the subsequent development of Bharath et al. (2008)[21]show that market indicators such as the market value of equity, the book value of debt and the volatility of stock returns contain rich default risk information. In addition to the overall economic situation, structural leverage is also a concern. The rise of trade protectionism (Tam, 2019)[22]and the resulting trade frictions between major countries will not only directly impact the import and export orders and profits of relevant enterprises, but also pose a broad and far-reaching threat to a country's financial stability and corporate debt security by changing the layout of the global industrial chain, undermining investor confidence and aggravating exchange rate fluctuations.

In terms of the impact of Sino-US trade frictions on the cost of corporate debt default, Lu et al.(2013)[23]believed that the Sino-US trade frictions reduced the endogenous and exogenous capital supply of the enterprises involved, which led to their cash flow problems, and the shortage of cash flow led to the increase of corporate debt default risk. Feng et al.(2021)[24] found that international trade frictions would increase the debt financing cost of enterprises and generate liquidity risks. Vandenbussche & Viegelahn(2018)[25] showed that Sino-US trade frictions easily lead to the misallocation of production resources, thus reducing the output efficiency of enterprises.

2.2. Theoretical Hypothesis

The theory of financing constraints shows that the survival and development of enterprises cannot be separated from the support of funds, and the sources of funds generally come from three channels: internal retained funds, equity financing and debt financing. In the early research on investment and financing, Modigliani and Miller argued that in a perfect capital market, a company's investment decision has nothing to do with its capital structure, that is, the company's value is not affected by its capital structure; At the same time, in this environment, investment decisions and financing methods of enterprises are independent of each other, and enterprises can freely choose financing methods in the market. On this basis, Fazzari, Hubbard and Petersen proposed the concept of financial constraints and quantified the indicators.

The theory of information asymmetry, formally proposed by Joseph E. Stiglitz, George A. Akerlof and A. Michael Spence in the 1970s, is A classic theoretical framework to explain the problem

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of market incompleteness. According to the theory, due to the differences in the ability of market participants to obtain information, it is difficult for them to understand complete information, so the two parties in the market are asymmetric in information, that is, the party with more information will be in the information advantage in the transaction process, while the other party will be in the information disadvantage. At the same time, the differences in risk preference and trading objectives between the two parties may further lead to the occurrence of behaviors such as moral hazard and adverse selection.

2.3. Research Hypotheses

Based on this, this paper puts forward the core hypothesis:

The formation mechanism of corporate debt default risk has the characteristics of multi-dimension and multi-level.

In terms of cash flow, sino-US trade friction has led to increased uncertainty in sales revenue and a decline in gross margin, seriously weakened the stability of internal cash flow of enterprises, and significantly reduced the ability to guarantee debt repayment. At the same time, the strategic adjustment taken by enterprises to cope with the shock, such as exploring new markets, adjusting product structure and rebuilding supply chain, usually requires a large amount of additional capital expenditure, which increases the financial burden and raises the leverage risk in the short term.

In terms of financing, in the credit market, due to information asymmetry, there is a natural and difficult to eliminate uneven distribution of information between lenders and borrowing enterprises. Specifically, when assessing corporate credit risks, financial institutions tend to adopt more prudent credit strategies because it is difficult to timely and comprehensively grasp the real impact of trade policy changes on the actual operation, cash flow and solvency of enterprises.

In terms of operation, first, the Sino-US trade friction has caused a sudden increase in the uncertainty of market demand, especially for those export-oriented enterprises highly dependent on a single export market, the decline in orders and customer loss have directly impacted their revenue base. Second, the stability of the supply chain is severely challenged. The supply of key raw materials and intermediate products may be delayed or even stopped due to tariffs or logistics disruptions, resulting in the simultaneous rise of production costs and inventory risks; Third, the price competitiveness of products is damaged.

H1: Sino-US trade frictions will significantly increase the debt default risk of Chinese enterprises.

Cash holding level: According to the precautionary savings theory, enterprises hold cash to cope with future uncertainties (Opler et al., 1999)[26]. However, when the impact of trade friction occurs, its profit erosion effect and financing constraint tightening effect may lead to the passive consumption of corporate cash reserves. On the one hand, declining profitability reduces the internal "source" of cash; On the other hand, external financing difficulties limit the external "replenishment" of cash.

H2: Sino-US trade frictions will reduce the cash holdings of enterprises, thus increasing their debt default risk.

Financing constraints channel: The uncertainty caused by trade frictions intensifies the information asymmetry between capital supply and demand. It is difficult for banks to distinguish between short-term troubled enterprises and long-term failed enterprises. The deterioration of the external financing environment, that is, the intensification of financing constraints, will force enterprises to turn to "desperate financing" with higher costs, or have to give up valuable investment opportunities, or even distort investment decisions to ease liquidity pressure, and ultimately increase the probability of financial crisis and default.

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H3: Sino-US trade frictions will aggravate corporate financing constraints, thus increasing their debt default risk.

Operational risk channel: Operational risk is the core reflection of corporate fundamentals. Sino-us trade frictions directly affect the product market of enterprises, weakening price competitiveness through tariffs, resulting in both market share and profit margin decline. At the same time, the impact on the global supply chain, such as the interruption of the supply of key intermediate products, directly interferes with the normal production and operation activities of enterprises, increasing the risk of production interruption and out-of-control costs (Pierce, 2011)[27]. These factors together lead to a significant increase in the volatility of future cash flows of enterprises and an increase in operational risks.

H4: Sino-US trade frictions will aggravate the business risks of enterprises and further increase their debt default risks.

Government subsidy: As a direct resource injection and indirect signal transmission mechanism, government subsidy can play the role of risk "cushion". On the one hand, subsidy funds can directly supplement the cash flow of enterprises damaged by trade frictions and relieve liquidity pressure. On the other hand, obtaining government subsidies can send a positive signal of "government support" to the market, help repair corporate credit, ease financing constraints, and thus weaken the driving effect of trade frictions on default risk.

H5: Government subsidies can weaken the driving effect of Sino-US trade frictions on corporate debt default risk.

Market competition: The degree of market competition determines a firm's ability to internalize external costs. In the highly competitive industry, the pricing power of enterprises is weak, and the profit margin is already meager. When trade frictions lead to rising costs, it is difficult for enterprises under fierce competition to pass on costs through price increases, and profits will be eroded more seriously. At the same time, fierce market competition also intensifies the risk of enterprises losing market share due to supply chain disruption, which leads to higher operational risks and worse financial flexibility, thus strengthening the negative impact of trade frictions.

H6: The degree of market competition will strengthen the driving effect of Sino-US trade frictions on corporate debt default risk.

3. Research Design

3.1. Sample Selection and Data Sources

This paper selects A-share listed companies in Shanghai and Shenzhen from 2006 to 2024 as the initial sample. 2006 is the starting point to ensure the standardization and availability of data, and 2024 is the latest complete year available for the current study. Sample selection is as follows: (1) excluding companies in the financial industry; (2) Excluding ST, *ST and PT companies; (3) Eliminate the samples with missing key financial data. Finally, 4890 companies were obtained, with a total of 51408 "firm-year" observations. In order to eliminate the influence of extreme values, all continuous variables are winsorized at the 1% and 99% quantiles. Corporate financial data are mainly from the CSMAR database, R&D and patent data are from the CNRDS database, trade data are from the customs database, and macro data are from the National Bureau of Statistics.

3.2. Selection of Variables

3.2.1. Explained Variable

Referring to the research of ZHANG et al. (2010)[28], this study adopts the improved Z-score Model (Z_China-score Model) to measure corporate debt default risk. On the basis of the classic

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Altman Z-score, this model is modified in combination with the financial characteristics of Chinese listed companies.

$$Z_{China} - score = 0.517 - 0.460X_6 + 0.930X_7 + 0.388X_8 + 1.158X_9 \quad (1)$$

Where, asset-liability ratio (X6) is equal to total liabilities/total assets; Return on assets (X7) is equal to net profit/average total assets, and average total assets is the average of total assets of the current year and total assets of the previous year; Working capital to total assets ratio (X8) is equal to working capital/total assets, working capital is the difference between current assets and current liabilities; The retained earnings to total assets ratio (X9) is equal to retained earnings/total assets, and retained earnings are the sum of surplus reserves and undistributed profits. This model comprehensively reflects the debt paying ability, profitability and accumulated retained earnings of enterprises through a number of financial ratios. This index has better risk identification effect in the context of China's capital market, and can match the financial statement system of Chinese enterprises.

3.2.2. Core Explanatory Variables

Impact of Sino-US trade friction (Treat×Post). Referring to the method of Xie et al. (2024), this paper classifies the enterprises whose industries are included in the list of tariffs imposed on China (HTS code) published by the Office of the United States Trade Representative in 2018 as the treatment group (Treat=1) through multi-stage matching (HTS→SITC→ISIC→GB). Otherwise, it is the control group (Treat=0). Taking 2018 as the time point of the policy shock, Post=1 in 2018 and after, and 0 otherwise.

3.2.3. Mediating Variable

Cash holding level (CH), measured by cash and cash equivalents/total assets; Financial constraints (FC), measured by KZ index, the greater the value is, the stronger the financial constraints are; Operating risk (BR), measured by the rolling standard deviation of a firm's industry-adjusted profit margin before interest, tax, depreciation and amortization (EBITDA margin) over the past five years, where a higher value indicates higher operating risk.

3.2.4. Moderating variables

Table 1. Variable selection and definition

Variables of interest Type	Variable Name	Variables Symbols	Way of defining
Dependent variable	Corporate debt violation Approximate risk level	ZCS	-score calculated by ZHANG et al. (2010)Z_{China}
Core Explained variable	Experimental group Dummy variable	Treat	To be included in the list of levies, is 1 If not included in the list, it is 0
	Experimental period Dummy variables	Post	For 2018 and beyond, it's 1 Before 2018, it is 0
Mediating variable	Financing constraints	FC	Kaplan-Zingales index
	Level of cash holdings	CH	Cash and cash equivalents/total assets
	Operating risk	BR	Cumulative distribution probability of standard deviation of EBITDA margin
Moderating variables	Government grants	Sub	Ratio of government grants to sales revenue
	Level of market competition	HHI	The Herfindahl index
Control Variables	Company size	Size	Total assets
	Current ratio	Liquid	Current assets/current liabilities
	Capital intensive	CAP	Total assets/income from principal operations
	Two roles in one	Dual	Chairman and general manager concurrently, is 1 If the chairman and the general manager do not concurrently hold the post, it is 0
	Book-to-market ratio	BM	Shareholders' equity/total market capitalization
	Regional economic development	GDP	Annual growth rate of regional GDP

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Government subsidy (Sub), which is measured by government subsidy/operating income; Market competition (HHI), measured by the Herfindahl index, the smaller the value, the more intense the market competition.

3.2.5. Control Variables

Referring to the influencing factors of corporate debt default risk, the following series of variables that may affect corporate debt default risk are controlled. Specifically, it includes: company Size (Size), liquidity ratio (Liquid), capital intensity (CAP), Dual (Dual), market value ratio (BM), regional economic development (GDP), etc.

The selection and definition of variables are shown in Table 1.

3.3. Model Setting

3.3.1. Basic Regression Model

The data used in this paper are panel data, so the Hausman test is needed to determine the final model. The p-value of the test result is 0, so this paper should choose the fixed effect model for research.

In order to test the impact of China-US trade frictions on corporate debt default risk, this paper constructs the following DID model:

$$ZCS_{it} = \alpha_0 + \beta_0 Treat_i \times Post_t + \gamma_0 Ctrl_{it} + \mu_{0i} + \delta_{0t} + \varepsilon_{0it} \quad (2)$$

ZCS_{it} it is the debt default risk level of individual i in period t, which is also the explained variable of the model. Z_{China} − Score measure, jointly proposed by Ling ZHANG, Edward I. ALTMAN and Jerome YEN in 2010, is a Chinese improvement based on the traditional Z-score measure, which is more suitable for the business practices of Chinese enterprises. $Treat_i$ is the dummy variable of the experimental group of whether the listed company is included in the tax list, which is 1 if the listed company is included, and 0 if it is not. $Post_t$ is the dummy variable of the impact of Sino-US trade frictions in the experimental period, which is 1 in 2018 and after and 0 before 2018. $Treat_i \times Post_t$ is the interaction term of external shocks, β is the core parameter to be estimated of the model, and a positive estimated coefficient indicates that Sino-US trade frictions increase the level of corporate debt default risk. $Ctrl_{it}$ is the control variable, μ_i and $\delta_t$represent the enterprise individual fixed effect and year fixed effect respectively, ε_{it} is the random disturbance term, and the standard errors are clustered at the enterprise individual level.

3.3.2. Mechanism Checking Model

In order to investigate the impact path of Sino-US trade frictions on corporate debt default risk, this paper introduces the mediating effect model. On the basis of Equation (2), it is required to verify Equations (3) and (4):

$$MV_{it} = \alpha_1 + \beta_1 Treat_i \times Post_t + \gamma_1 Ctrl_{it} + \mu_{1i} + \delta_{1t} + \varepsilon_{1it} \quad (3)$$

$$ZCS_{it} = \alpha_2 + \beta_2 Treat_i \times Post_t + \theta_2 MV_{it} + \gamma_2 Ctrl_{it} + \mu_{2i} + \delta_{2t} + \varepsilon_{2it} \quad (4)$$

Among them, MV_{it} is the intermediary variable, including cash holdings, financing constraints and operational risk. Under the premise that β_1 is significant, if the significance or coefficient value of β_2 is less than β_0, it indicates that the treatment effect brought by $Treat_i \times Post_t$ is transmitted to the explained variable ZCS_{it} through MV_{it} to a certain extent, that is, MV_{it} is the intermediary factor of trade friction increasing the level of corporate debt default risk.

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3.3.3. Moderating Test Model

In order to verify the impact of government subsidy and the degree of market competition on Sino-US trade friction and corporate debt default risk, this paper adds government subsidy (Sub) and the degree of market competition (HHI) as moderating variables in the regression model, and constructs Model (5) and Equation (6):

$$ZCS_{it} = \alpha_0 + \beta_0 Treat_i \times Post_t + \beta_1 Treat_i \times Post_t \times Sub_{it} + \beta_2 Sub_{it} + \gamma_0 Ctrl_{it} + \mu_{0i} + \delta_{0t} + \varepsilon_{0it} (5)$$

$$ZCS_{it} = \alpha_0 + \beta_0 Treat_i \times Post_t + \beta_1 Treat_i \times Post_t \times HHI_{it} + \beta_2 HHI_{it} + \gamma_0 Ctrl_{it} + \mu_{0i} + \delta_{0t} + \varepsilon_{0it} (6)$$

Models (5) and (6) focus on the coefficients of interaction terms ($Treat_i \times Post_t \times Sub_{it}$) and ($Treat_i \times Post_t \times HHI_{it}$).

4. Empirical Results and Analysis

4.1. Benchmark Regression

Table 2. Baseline regression results

Variables	Model 1:ZCS	Model 2:ZCS	Model 3:ZCS
Treat×Post	-0.085***	-0.086***	-0.209***
	(0.030)	(0.015)	(0.031)
Size		0.192***	0.273***
		(0.008)	(0.016)
Liquid		0.119***	0.085***
		(0.004)	(0.004)
CAP		-0.085***	-0.098***
		(0.004)	(0.005)
TobinQ		-0.010	0.015**
		(0.010)	(0.007)
Dual		0.036**	0.034**
		(0.015)	(0.016)
BM		-0.000***	-0.000***
		(0.000)	(0.000)
GDP		0.949***	0.177
		(0.191)	(0.384)
Constant	0.963***	-3.209***	-4.883***
	(0.013)	(0.188)	(0.356)
Year	Y	N	Y
Firm	Y	N	Y
N	51,408	51,408	51,408
R-squared	0.537	0.231	0.594

Note: The values in brackets in the table are t values, ***, ** and * are significant at the 1%, 5% and 10% levels respectively, the same below.

Based on the panel data of A-share listed companies in Shanghai and Shenzhen from 2006 to 2024, this paper uses the DID method to systematically test the direct impact of Sino-US trade frictions on corporate debt default risk. Through the multi-stage industry matching method, the goods in the US tax list are accurately corresponding to Chinese listed companies, so as to define the experimental group of companies subject to sanctions. Furthermore, taking the overall

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escalation of trade frictions in 2018 as the policy impact point, this paper constructs the interaction term (Treat×Post) of "whether under sanctions" and "whether in the post-friction period" as the core explanatory variable.

The benchmark regression is validated by setting up a progressive model, as shown in Table 2. Model 1 only introduces core explanatory variables, and after controlling year and individual fixed effects, it is found that the coefficient of the interaction term is significantly negative. Model 2 adds a series of control variables, but does not fix time and individual, and the negative effect is still robust. Model 3 introduces both core explanatory variables and control variables, and the coefficient of the interaction term is − 0.209 under two-way fixed effects, which passes the significance test at the level of 1%. This shows that compared with the unsanctioned enterprises, the debt default risk of the listed enterprises increases significantly after the outbreak of the friction, which strongly verifies the core hypothesis 1 that the Sino-US trade friction will exacerbate the debt default risk of enterprises.

4.2. Parallel Trend Test

Parallel trend testing is a prerequisite and key step for policy or event effect assessment using the DID method. Figure 1 shows the results of the parallel trend test. The horizontal axis is the time point of impact, and the point 0 represents the impact year of Sino-US trade frictions. The vertical axis is the regression coefficient, that is, the estimated value of the cross-multiplication term in each period. The test is based on time point -1 and is therefore not plotted in the figure. The results show that before the impact (from time point -5 to time point -2), the coefficient estimates of each period fluctuate slightly around the zero value, and their confidence intervals (shown by error bars) all contain zero, indicating that there is no statistically significant difference between the treatment group and the control group in each period before the impact, that is, the hypothesis of parallel trend is met. However, the coefficients of the current period and after the impact (from time 0 to time 6) are significantly not 0, indicating that Sino-US trade frictions have a causal impact on corporate debt default risk, and the impact is continuous. Given the cyclical changes in the US political environment, the coefficient changes could come from the long tail of shocks or from trade policy adjustments due to a presidential transition

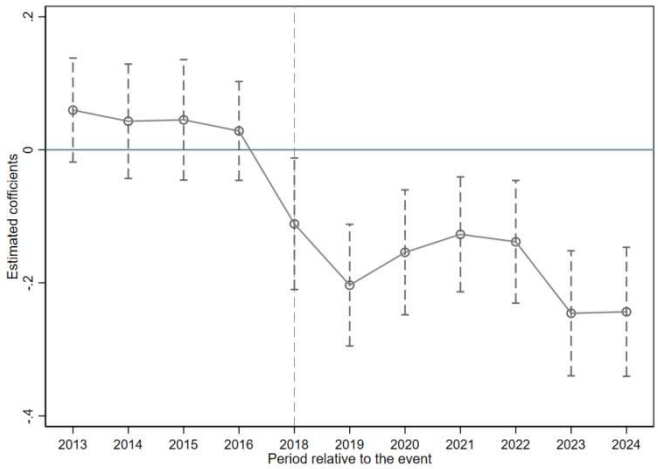

Figure 1. Results of the parallel trend test

4.3. Placebo Test

The core logic of placebo test is to test whether the treatment effect is caused by some unobservable confounding factors or randomness. In this paper, 500 individuals are randomly selected from the years of trade friction and set as the pseudo-treatment group, and the remaining individuals are set as the pseudo-control group, and the DID estimation is carried

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out again. Figure 2 plots the scatter plot of the kernel density curves of the estimated coefficients superimposed on the p-values for 1000 self-sampling regressions. In the results of the 1000 bootstrap placebo test, the horizontal axis is the estimated coefficient, and the double vertical axis is the p-value and kernel density, respectively. In terms of statistical significance, the vast majority of scatter points are above the horizontal dotted line (P=0.1), which means that these "treatment effects" based on randomization are not statistically significant. The vertical dotted line represents the position of the true estimated coefficient (− 0.207) in the benchmark regression, which is far away from the concentrated region of the random coefficient distribution and is significant at the level of 1%. This result clearly indicates that when the assignment to the treatment group is generated randomly, the so-called "shock effect" is not statistically present and its estimated coefficient fluctuates randomly around the zero value.

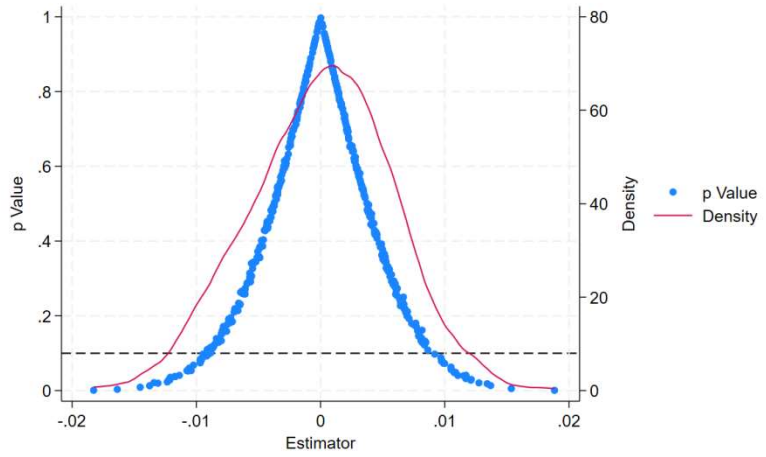

Figure 2. Placebo test results

4.4. Other Robustness and Endogeneity Tests

4.4.1. Replace the Explained Variable

The research further tests the robustness of the benchmark regression results by replacing the explained variables, and re-estimates the benchmark model by using corporate debt default probability (EDF) and asset-liability ratio (LEV) as alternative measurement indicators respectively.

Model 1 reports the regression results with corporate debt default probability (EDF) as the explained variable. The results show that the coefficient estimate of the core explanatory variable (Treat×Post) is 0.004, which is significantly positive at the statistical level of 1%. Model 2 reports the regression results with the asset-liability ratio (LEV) as the explained variable. The estimated coefficient of the core explanatory variable is 0.033, which is significantly positive at the level of 1%. As a direct indicator to measure the capital structure and financial leverage of enterprises, the increase of asset-liability ratio usually means the increase of corporate debt burden and financial risk.

4.4.2. Change the Standard Error Clustering Level

In order to test the sensitivity of the benchmark regression results to the standard error clustering level setting, the study further changes the clustering dimension of the standard error. In the DID model, the choice of the clustering level of the standard error will affect the estimation of the standard error of the coefficient, which in turn may affect the reliability of the statistical inference. In order to avoid statistical errors caused by improper setting of standard errors, on the basis of controlling enterprise fixed effects and year fixed effects, this paper adds

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industry-level clustering, provincial-level clustering and industry-region interaction clustering respectively.

Under different clustering dimensions, the sign direction of the coefficient estimate of the core explanatory variable Treat×Post remains consistent, and the numerical magnitude is similar to the benchmark regression results, and all of them are significantly negative at the statistical level of 1%. This result shows that the significant impact of trade frictions on corporate debt default risk in the benchmark regression does not depend on the specific standard error clustering setting.

Table 3. The results are tested for robustness and endogeneity

	(1) EDF	(2) LEV	(3) ZCS	(4) ZCS	(5) ZCS	(6) ZCS	(7) ZCS×W
Treat×Post	0.004***	0.033***	-0.209***	-0.209***	-0.209***	-0.090***	-0.142***
	(0.001)	(0.006)	(0.070)	(0.030)	(0.066)	(0.034)	(0.032)
Controls	Y	Y	Y	Y	Y	Y	Y
Id FE	Y	Y	Y	Y	Y	Y	Y
Year FE	Y	Y	Y	Y	Y	Y	Y
Ind FE	N	N	N	N	N	N	N
Pro FE	N	N	N	Y	N	N	N
Ind×Pro	N	N	N	N	Y	N	N
N	40,174	51,408	51,408	51,408	51,408	51,408	51,408
R-squared	0.113	0.814	0.594	0.594	0.594	0.594	0.594

4.4.3. PSM-DID

In order to alleviate the selection bias caused by the systematic differences of samples, this study uses the propensity score matching method to rebalance the samples of the treatment group and the control group, so as to enhance the robustness of the benchmark regression results. Due to the relatively limited samples of enterprises directly affected by the tax list in the treatment group, in order to fully retain information and avoid the elimination of too many samples due to the failure of matching, this study selects 1:4 nearest neighbor matching and kernel matching, which have good matching effect and small sample loss, to construct matched samples respectively.

Based on the balanced samples obtained by these two matching methods, the study re-conducts the DID estimation, and the results are reported in Model 6 and Model 7 in Table 3. The results show that no matter 1:4 nearest neighbor matching or kernel matching is adopted, the direction and significance level of the coefficient of the core explanatory variable are consistent with the benchmark regression, and are significantly negative at the statistical level of 1%.

5. Analysis of Action Mechanism

5.1. Cash Holdings

Table 4 Model 1 takes enterprise cash holding level (CH) as the explained variable, and the variable Treat×Post coefficient is − 0.014 and passes the significance test at the level of 1%. In Model 2, where Treat×Post and CH are introduced at the same time, the estimated coefficient of Treat×Post is − 0.193, which is close to 0 compared with the benchmark regression result, indicating that Sino-US trade frictions will increase the debt default risk level of enterprises by reducing their cash holdings.On the one hand, by directly squeezing the profit space and operating cash flow of enterprises, the Sino-US trade friction may lead to the decline of the cash holding level of enterprises and weaken their liquidity buffer. On the other hand, the reduction of corporate cash holdings will directly weaken their short-term solvency and risk response

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elasticity, and intensify financing difficulties through the signal effect, thus significantly increasing the level of debt default risk.

Table 4. Results of mediating mechanism test

	(1) CH	(2) ZCS	(3) FC	(4) ZCS	(5) BR	(6) ZCS
Treat×Post	-0.014***	-0.193***	0.347***	-0.146***	0.005**	-0.152***
	(0.004)	(0.030)	(0.058)	(0.025)	(0.002)	(0.031)
CH		1.123***				
		(0.051)				
FC				-0.181***		
				(0.003)		
BR						-0.899***
						(0.200)
N	51,408	51,408	51,408	51,408	51,408	51,408
R-squared	0.648	0.605	0.697	0.677	0.439	0.614

5.2. Financing Constraints

In Model 3 of Table 4, the degree of corporate financial constraints (FC) is taken as the explained variable, and the variable Treat×Post coefficient is 0.347 and passes the significance test at the level of 1%. In Model 4 where Treat×Post and CH are introduced at the same time, the estimated coefficient of Treat×Post is − 0.146, which is close to 0 compared with the benchmark regression result, indicating that Sino-US trade frictions will increase the level of debt default risk by worsening the degree of corporate financing constraints.On the one hand, Sino-US trade frictions systematically worsen the internal and external financing constraints of enterprises through three core channels: intensifying information asymmetry, increasing operational risk expectations and changing the risk preference of financial institutions. On the other hand, the deterioration of financing constraints will significantly increase the debt default risk of enterprises through multiple paths such as liquidity shortage, debt structure imbalance and investment efficiency decline.

5.3. Business Risks

Model 5 takes the enterprise's operating risk level (BR) as the explained variable, and adopts the standard deviation of the rolling value of the profit margin before interest, tax, depreciation and amortization (EBITDA) of the enterprise to measure the operating risk. The coefficient of variable Treat×Post is 0.005 and passes the significance test at the level of 5%; In Model 6, where Treat×Post and CH are introduced at the same time, the estimated coefficient of Treat×Post is − 0.152, which is close to 0 compared with the benchmark regression result, indicating that Sino-US trade frictions will increase the level of debt default risk by pushing up the operating risk of enterprises.On the one hand, Sino-US trade frictions systematically increase business risks through the triple mechanism of increasing market uncertainty, compressing profit space and destroying supply chain stability. On the other hand, the increase of operational risk will directly or indirectly increase the risk of corporate debt default by weakening debt paying ability, aggravating agency conflict and triggering restrictive clauses.

6. Moderating Effect

6.1. Government Subsidies

In order to test the moderating role of government subsidies in the process of Sino-US trade frictions increasing the risk of corporate debt default, this paper draws on the research of Wang

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et al. (2017) and uses the ratio of government subsidies to sales revenue to measure the intensity of government subsidies. The results are shown in Table 5, and the coefficient of the interaction term Treat×Post×Sub in Model 1 is significantly negative, indicating that government subsidies play a partial moderating role in the process of China-US trade frictions increasing the risk of corporate debt default. Specifically, government subsidies can effectively buffer the negative impact of Sino-US trade frictions, thus significantly weakening its role in promoting corporate debt default risk. Further analysis shows that government subsidies provide key financial guarantee for enterprises, which can significantly improve the profitability, asset quality and debt paying ability of enterprises under the trade friction, and stabilize the risk-bearing ability of enterprises.

6.2. Degree of Market Competition

In order to test the moderating role of market competition in the process of Sino-US trade friction increasing corporate debt default risk, the Herfindahl index (HHI) is used to measure the market competition environment for empirical analysis. As shown in Table 5, the coefficient of the interaction term Treat×Post×HHI in Model 2 is significantly negative, which confirms the moderating effect of the degree of market competition. Specifically, when market competition intensifies, it will strengthen the negative impact of Sino-US trade frictions on corporate debt default risk. When the market competition is eased, this strengthening effect is weakened. Fierce market competition compresses the profit margin of enterprises, making them more vulnerable to the impact of trade frictions, and forcing them to carry out more risky financial behaviors, which will accelerate their debt risks.

Table 5. Moderating effect test results

	(1) ZCS	(2) ZCS
Treat×Post	-0.154***	-0.164***
	(0.032)	(0.035)
Treat×Post×Sub	-4.584***	
	(0.617)	
Sub	1.406***	
	(0.378)	
Treat×Post×HHI		-0.540***
		(0.210)
HHI		0.193
		(0.125)
N	47,994	51,408
R-squared	0.604	0.595

7. Analysis of Heterogeneity

7.1. Heterogeneity Test based on the Nature of Property Rights

In order to explore whether the impact of Sino-US trade frictions on the debt default risk of enterprises varies due to the different ownership nature of enterprises, the study divides the whole sample into two sub-sample groups of state-owned enterprises and non-state-owned enterprises according to the ownership nature, and conducts regression analysis respectively. The results are presented in Model 1 (state-owned) and Model 2 (non-state-owned) in Table 6. In the subsamples of state-owned enterprises, the coefficient of the core explanatory variable Treat×Post is − 0.088, which is significantly negative at the level of 1%. In the sub-samples of non-soes, the coefficient of Treat×Post is − 0.168, which is also significantly negative at the level

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of 1%. The P value of the difference test between the two groups of coefficients is 0.000, indicating that the impact of trade frictions on the debt default risk of the two types of enterprises is significantly different, and the impact on non-state-owned enterprises is significantly greater.

Table 6. Heterogeneity test results (property rights and industries)

	(1) ZCS	(2) ZCS	(3) ZCS	(4) ZCS
Treat×Post	-0.088***	-0.168***	-0.067	-0.387***
	(0.031)	(0.056)	(0.478)	(0.050)
Controls	Y	Y	Y	Y
FE	Y	Y	Y	Y
Cluster id	Y	Y	Y	Y
P-Value	0.000		0.000	
N	18,381	33,027	34,056	17,352
R-squared	0.655	0.608	0.643	0.593

7.2. Heterogeneity Test based on Industry

In order to explore whether the impact of Sino-US trade frictions on corporate debt default risk varies due to different industry characteristics, the study divides the whole sample into two sub-sample groups, manufacturing and non-manufacturing, according to industry attributes, and conducts regression analysis respectively. In the manufacturing sample group, the coefficient of the core explanatory variable Treat×Post is − 0.067, and its p value is greater than 0.1, which fails the statistical significance test. In the non-manufacturing sample group, the coefficient of Treat×Post is − 0.387, which is significantly negative at the significance level of 1%. The P value of the difference between the two groups of coefficients is 0.000, indicating that the impact of trade frictions on the debt default risk of manufacturing and non-manufacturing enterprises is significantly different, and the negative impact on non-manufacturing enterprises is more prominent.

7.3. Heterogeneity Test based on Enterprise Size

Table 7. Heterogeneity test results (size and region)

	(1) ZCS	(2) ZCS	(3) ZCS	(4) ZCS	(5) ZCS
Treat×Post	-0.168***	-0.003	-0.238***	-0.078	-0.177***
	(0.025)	(0.075)	(0.038)	(0.082)	(0.061)
Controls	Y	Y	Y	Y	Y
FE	Y	Y	Y	Y	Y
Cluster id	Y	Y	Y	Y	Y
P-Value	0.000		0.000		
N	25,704	25,704	36,413	8,274	6,721
R-squared	0.663	0.650	0.590	0.647	0.624

In order to explore whether the impact of Sino-US trade frictions on the debt default risk of enterprises varies with the size of enterprises, the study divides the whole sample into two sub-sample groups of large-scale enterprises and small-scale enterprises according to the attribute of enterprise size, and conducts regression analysis respectively, see Table 7. In the large-scale enterprise sample group (Model 2), the coefficient of the core explanatory variable (Treat×Post) is − 0.003, and the corresponding P value is greater than 0.1, showing no statistical significance. However, in the sample group of small-scale enterprises (Model 2), the coefficient is − 0.168, which is significantly negative at the significance level of 1%. The P value of the difference

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between the two groups of coefficients is 0.000, indicating that the impact of trade frictions on the debt default risk of enterprises of different sizes is significantly different, and the negative impact on small-scale enterprises is more prominent.

7.4. Heterogeneity Test based on Region

In order to explore whether the impact of Sino-US trade frictions on the debt default risk of enterprises varies according to the regions where enterprises are located, the study divides the whole sample into three sub-sample groups, namely, eastern, central and western regions, according to the geographical location of enterprises, and conducts regression analysis respectively, see Table 7. In the sample group of the eastern region (Model 3), the coefficient of the core explanatory variable Treat×Post is − 0.238, which is significantly negative at the statistical level of 1%. In the sample group of the western region (Model 5), the coefficient is − 0.177, which is also significantly negative at the level of 1%. However, in the sample group of the central region (Model 4), the coefficient is − 0.078, which fails the statistical significance test at the level of 10%. The P value of the coefficient difference test is 0.000, indicating that the impact of trade friction on corporate debt default risk is significantly different among different regions, and the negative impact on the eastern and western regions is particularly prominent, while the impact on the central region is not significant.

8. Conclusion and Implications

8.1. Main Research Conclusion

Using A sample of Chinese A-share listed companies from 2006 to 2024, this paper empirically examines the impact of Sino-US trade frictions on corporate debt default risk. The results show that: first, Sino-US trade frictions significantly increase the debt default risk of sanctioned enterprises, which is robust. Second, its mechanism is that trade frictions ultimately transmit to debt default risk by reducing corporate cash holdings, intensifying financing constraints and increasing operational risks. Third, government subsidies can effectively alleviate the negative impact, while fierce market competition will exacerbate the risk. Fourth, there are significant structural differences in the impact, with non-state-owned enterprises, non-manufacturing enterprises, small-scale enterprises, and enterprises in the eastern and western regions being more vulnerable.

8.2. Policy Suggestions

Based on the above conclusions, this paper puts forward the following suggestions.

8.2.1. At the Enterprise Level

build a financial and strategic management system oriented by perseverance.

Strengthen cash flow management: establish dynamic cash flow early warning mechanism, set up multi-level cash reserve warning line, avoid falling into liquidity exhaustion under external shocks. Optimize working capital management and speed up turnover.

Broaden diversified financing channels: Actively optimize the financing structure, in addition to traditional bank credit, actively explore bond market, equity financing, supply chain finance and other ways to reduce dependence on a single financing channel, so as to cope with the tightening financing environment.

Enhance the ability to resist operational risks: promote the diversification of market and customer structure, reduce dependence on a single market. Strengthen supply chain management, assess risks at key nodes, and establish a "spare tire" plan when necessary to enhance supply chain resilience. We will incorporate geopolitical risks into regular risk assessments and conduct stress tests.

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Special attention should be paid to vulnerable groups: non-state-owned enterprises and small and medium-sized enterprises should pay more attention to strategic research and judgment and information communication, actively establish regular contact with financial institutions and government departments, alleviate information asymmetry, and strive for more support.

8.2.2. At the Government Level

implement precise, coordinated and structured support policies.

Implementation of targeted relief policies: To avoid "one size does not cut all" and to provide targeted liquidity support for severely hit industries (such as electronics and textile) and vulnerable groups (small and medium-sized enterprises and private enterprises) by setting up special relief funds, improving the efficiency of export tax rebates, and expanding the coverage of credit insurance.

Optimize the financial and tax environment: guide financial institutions to increase credit support to affected enterprises through policy tools such as fiscal discount interest and financing guarantee. We will implement and optimize preferential tax policies such as additional deductions for research and development expenses, reduce the burden on enterprises, and encourage them to respond to external pressure through technological upgrading.

Build a regional collaborative risk mitigation mechanism: establish a cross-departmental risk monitoring and information sharing platform in the eastern and western regions with high risks. We will encourage leading enterprises in the region to play the role of "stabilisers", drive smes upstream and downstream of the industrial chain to tide over difficulties together, and prevent local risks from spreading into systemic risks.

Maintain the market order of fair competition: Maintain the continuity and predictability of trade policies, and provide a stable institutional environment for enterprises. At the same time, we will resolutely crack down on unfair competition, create a healthy and orderly market atmosphere, and provide a sound soil for enterprise innovation and development.

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