

The Effect of Delisting Reform on Financial Risk Decision-making Behavior of Listed Companies in China: The Progressive Did Test Based on Empirical Data

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Abstract: In recent years, the Stock Exchange carried out a new round of delisting system reform under the background of marketization in China. Compared with the previous delisting rules, new delisting rules execute more strict and specific standards for the listing enterprises. It is sense to investigate the effect of delisting reform on the financial risk decision-making behavior of listed companies in China. Based on the progressive Difference in Difference (DID) model and theory of psychological reaction, this paper studies the impact of the new round of delisting reform on the financial risk decision-making behavior of listed companies, using data of A-share non-financial listed companies from 2017 to 2022. More than 26,466 panel data reclassified into two groups, the experimental group and the control group, according to different policy implementation time, using time fixed effect and individual fixed effect. It reveals that listed companies have higher Z-Score and liquidity ratio under the new stricter delisting rules, which indicates that the reform can motivate listed companies to take action to reduce their financial risks under the effects of the positive and negative feedback mechanism. It shows that the delisting reform has a more significant impact on non-state-owned listed enterprises than state-owned listed enterprises under the effects of self-interest maximization or the sense of social responsibility. It tells that the delisting reform has a more significant impact on main board listed enterprises than non-main board listed enterprises under the effects of information transmission mechanism. This empirical analysis shows that the main body of listed companies in China can make a positive reaction to the reform of the delisting system, tells that the policy goals of China's delisting system reform can be achieved to improve the quality of listed companies and establish a mechanism for the survival of the fittest. It has research value in theory and practical guiding significance for improving the delisting system of the stock market.

1. Introduction

Delisting system is an important link to ensure the stable operation of the listed companies system under the background of marketization in China. It has the function of eliminating the weak one, keeping the good one and purifying the market. In 2001, China Securities Regulatory Commission

(CSRC) issued the Measures for Suspending and Terminating the Listing of loss-making Companies, which marked the beginning of the delisting system of listed companies in China. In 2002, the CSRC formally handed over the procedures of suspension, resumption and termination of listed companies to the Stock Exchanges. In 2012, the Shanghai and Shenzhen Stock Exchanges issued a new delisting plan to improve the delisting procedures, and the risk warning board and re-listing system were established for the first time. After 20 years of development, the A-share delisting system as a whole has formed a delisting system based on voluntary delisting and compulsory delisting system.

The Shanghai and Shenzhen Stock Exchanges decided to implement a new round of delisting system reform, and issued new delisting regulations for different sectors in 2019, 2020 and 2021 respectively, in order to promote the healthy development of China's capital market. The new rules are more reasonable, detailed, and stricter, especially focusing on the improvement of financial delisting indicators, in order to form a positive and effective capital market with the survival of the fittest. The three new delisting rules in different periods provide a natural experimental group (listed companies that have implemented the new rules) and a control group (listed companies that have not implemented the new rules) for this study. The existing research has paid great attention to the impact of delisting reform on information supervision. Most of the relevant literatures mention the impact of new delisting rules on capital market efficiency and investors' rights and interests, but less involves specific research on the financial risk decision-making behavior of listed companies from the perspective of psychological response.

Human psychological reactions involve multiple aspects such as cognition, emotions, behavior, and will [1]. When a situation seems controllable it usually provokes active responses and produces adaptive strategies, while, on the other hand, avoidance strategies are distanced from the problem helping to minimize the gravity of the phenomenon [2]. For delisting reform, the psychological response of enterprises includes two strategies: positive response and negative response. The positive response strategy refers to actively taking financial risk decision-making behavior to improve the adaptability of enterprises, while the negative coping strategy is to adopt the avoidance strategy of enterprise delisting.

This paper systematically examines that how the new rules affect the financial risk decision-making behavior of listed companies based on the policy event of delisting reform by using the progressive Difference in Difference (DID) model[3,4], and from the perspective of healthy psychological reaction theory[1,2].The main work of this paper is as follows: Firstly, The policy effects of delisting reform on financial risk decision-making behavior from the perspective of psychological response, were investigated by taking advantage of the progressive DID model. Secondly, these above effects were examined under different control rights and securities sectors, to provide references for delisting reform to adopt targeted policies for different entities.

2. Evolution of Rules and Literature Review

In 2019, the Science and Technology Innovation Board officially opened, marking the beginning of a new round of delisting reform. Its delisting rules are in line with international standards, and more stringent than the rules of the main board. Among them, the financial provisions "deduction of non- net profit for two consecutive years is negative, and the operating revenue is less than 100 million" are more stringent than the main board provisions "the net profit for three consecutive years is negative, the operating revenue is less than 10 million" in terms of the amount and the number of years. At the same time, the new standard of "300 million market value delisting" was included. In 2020, the Shanghai and Shenzhen stock exchanges issued new rules for delisting covering the whole market, which are in line with the Science and Technology Innovation Board, known as the "most stringent new rules for delisting". On one hand, reduce the life of financial indicators to two years,

while requiring the deduction of non-core business income; On the other hand, the requirement for the stock market value was added, and the delisting and consolidation period was reduced from the previous 30 trading days to 15 trading days, and the suspension and resumption of listing were cancelled. In 2021, the Beijing Stock Exchange officially opened, and its supporting delisting policy remained strict. In the past three years, the Shanghai and Shenzhen Stock Exchanges have updated their delisting systems several times, hoping to speed up the clearing of "empty shell zombie" enterprises, in order to promote the sound operation of the capital market, and eventually improve the efficiency of resource allocation.

The key exploration of this paper is to investigate the impact of delisting rules of the Science and Technology Innovation Board in 2019, and the new delisting rules of the whole market in 2020, and the listing rules of the North China Stock Exchange in 2021 as policy variables, and to examine whether there are significant differences in the impact between different control rights and different securities sectors.

On the issue of delisting system, the previous literatures have proved that delisting system has played a positive role in the protection of minority shareholders' rights and interests based on theoretical analysis. Studies found that compared with the protection law of small and medium investors, the delisting system played a greater role in protecting the interests of small and medium investors from the perspective of jurisprudence [5,6]. Among empirical researches, many scholars have discussed the regulation effect of the new delisting rules on the market supply and demand mechanism. The new policy is good for companies with good performance and can realize the function of survival of the fittest of listed companies [7] (Shi et al., 2014). The new delisting rules can effectively inhibit the financial fraud of enterprises [8] (Tan & Zhang, 2022). Other scholars examined the impact of the system from the perspective of market investment. For example, with the stricter delisting standards, institutional investors preferred to make prudent investment [9]. Stricter listing policies could regulate the market link, but also restricted the overall investment level of enterprises so as to limit their business activities [10].

To sum up, the existing literatures mainly study the impact of the new delisting rules from the perspective of capital market efficiency and investors' rights and interests. However, there are relatively few discussions about the impact of the new delisting rules on the financial risk decision-making of enterprises. The reason for this phenomenon may be that researchers believe that the more important role of delisting system is to screen out high-quality enterprises and improve the transparency of market information. However, since the stricter delisting system will react to the management decisions of companies, which may affect the financial level of existing listed companies, it is difficult to scientifically measure the economic consequences of the reform if only considering the impact of delisting reform on the overall market efficiency. It is worth noting that the current period is the transitional period of China's comprehensive registration system reform, and the supporting systems are still being explored and improved. In this case, as one of the important links of delisting system, the financial risks of enterprises may be particularly prominent. Therefore, it is necessary to consider the impact of stricter delisting system on the financial risk decision-making of enterprises under the background of the registration system.

3. Theoretical Analysis and Hypothesis

According to the survey of [11], over half of the delisting in China due to financial problems, so it can be seen that financial delisting is the main risk faced by listed companies. Therefore, this paper chooses to measure the impact of the new delisting regulations from the perspective of financial risks.

First of all, the background of the implementation of the registration system means the strengthening of the law enforcement of the supporting delisting mechanism. The new delisting

system has formulated more stringent and diversified risk warning standards than the previous one, and especially strengthened the four major cases of illegal compulsory delisting, trading compulsory delisting, financial compulsory delisting and normative compulsory delisting. According to the research of [6], among the delisting enterprises, the companies that trigger the financial delisting standard account for the absolute majority, which provides a warning signal to the existing listed enterprises. There exist a behavioral economic theory which called framing effect. It means that people's decision-making depends on the way information is presented, and it emphasizes that people's cognition and behavior are dependent on the environment, and timely facing the same decision information will have a great impact on subsequent behaviors due to different objective links. In other words, changes in the external market environment can touch the nerves of enterprises [12]. On the one hand, when the delisting policy is more stringent, enterprises have to adjust to adapt to the market changes, and avoid negative publicity or even delisting treatment, which is considered to be the Negative Feedback Mechanism for avoiding punishment [13]. The influence of this mechanism depends on the loss aversion of listed enterprises. The greater the degree of loss aversion, the stronger the negative feedback mechanism [14]. On the other hand, the promulgation of the new policy is relatively favorable for listed companies with good performance, which can be seen from the existing literatures [7]. This has a positive impact on the stock price of the company, making listed companies pay more attention to improve the performance of the company, which is considered to be the Positive Feedback Mechanism for approval and motivation. Based on the above analysis, this paper proposes the following hypothesis H-1a:

Hypothesis 1a: With other conditions remain unchanged, the value of financial risks index for decision-making behavior of listed companies will decrease significantly after delisting reforms.

However, compared with the approval system, the issuance threshold of the registration system is decreased. The regulatory authorities no longer judge the investment value and the risk of the applicant, but leave it to the market to decide. At the same time, the requirements on the net profit of the enterprise are reduced, so that more companies can obtain the qualification of applying for stock issuance. This may lead to the situation that enterprises flock to the market and the quality of listed company declines, which means that the overall financial risk of listed companies will face rising pressure. Based on this consideration, this paper puts forward the following hypothesis H-1b which is opposite to the previous one:

Hypothesis 1b: With other conditions remain unchanged, the value of financial risks index for decision-making behavior of listed companies will increase significantly after delisting reforms.

3.1. Sample Selection and Data Processing

This paper selects all ST and non-ST listed companies in A-shares of Shanghai, Shenzhen and North China as the original samples. Considering that some newly listed companies only provide data for the first three years of listing, this paper selects the observation period from 2017 to 2022. The observation data come from the Wind database. In order to ensure the rationality and reliability of the data, this paper makes the following processing: (1) Eliminate financial companies in order to avoid the deviation of the results due to the special asset and liability structure of financial companies; (2) Eliminate the samples with missing major financial variables; (3) Carry out 1% quantile "Winsorize processing" for all continuous variables to control the influence of extreme values. After the above processing, we finally obtained 4,411 sample companies with 26,466 data observations.

3.2. Measurement Model and Variable Selection

As a common method of policy evaluation, Difference-in-difference model (DID) has been widely used [3,4]. By comparing the relative distance between the treatment group and the control group

before and after the policy shock, the DID model eliminates the interference of unobservable factors and time trend, and then separates the net effect of exogenous policy shock. Since some of them will adopt the strategy of "pilot first and gradually expand capacity", there are differences in the processing time of the research objects, thus the Progressive DID model is necessary to be introduced.

In view of the delisting reform is implemented in batches in different sectors, this paper sets up the following Progressive DID equation to test the impact of the new delisting regulations on the financial risk under the action of enterprises, refers to [3] and [4]:

$$FR_{it} = \alpha + \beta * DID_{it} + \lambda Control_{it} + \sum Firm_i + \sum Year_t + \varepsilon_{it} \quad (1)$$

Where, FR_{it} represents the financial risk index of the enterprise i in year t . DID_{it} represents whether the subject i implemented the policy in period t . $Control_{it}$ represents a series of firm-level control variables that change over time and subjects. $\sum Firm_i$ is the individual fixed effect, and $\sum Year_t$ is the time fixed effect. ε_{it} is the random disturbance term that affects the financial risk index at the enterprise level. Since the explained variables selected in this paper are all in the same direction as the financial risk index, if β is significantly greater than (less than) zero, it indicates that the delisting reform reduced (improved) the value of financial risk index of the enterprise.

The panel data fixed effect model (FE) is used to estimate Equation (1). Because it involves multiple virtual variables, this paper chooses a high-dimensional fixed model for multi-dimensional clustering, that is, the “*reghdfe* instruction” of *stata* is used to filter the matching variables to improve the estimation efficiency.

3.2.1. Explained Variables

On one hand, financial risk under the action of enterprise is manifested as unexpected loss caused by unpredictable or uncontrollable factors. On the other hand, it may bring unexpected benefits to the enterprise. In reality, the possibility of the first aspect is more worthy of attention, because it may lead to financial distress. Therefore, the analysis in this paper is more inclined to the negative effect of financial risk, that is, the possibility that it leads to the financial distress of enterprises. Refer to [15] and [16], this paper measures the financial risk under the action of enterprises from two perspectives: Z-Score and Liquidity Ratio.

Z-score warning is usually used to comprehensively measure the financial health of a company, and diagnose and predict the possibility of bankruptcy of the company within two years [17] (Z-score warning: Created by financial economist Edward Altman, it is also known as the "Z-Score Formula", and practical applications have shown that the model's prediction accuracy is as high as 72% to 80%). The main reasons for choosing this index are as follows: Firstly, Z-Score has a strong comprehensive and widely adopted degree; Secondly, this index can be accurately measured and has strong availability; thirdly, this index is a traditional indicator that the market pays attention to, and the research conclusions based on it are more acceptable.

Z-Score is calculated as follows:

$$Z = \gamma_1 X_1 + \gamma_2 X_2 + \gamma_3 X_3 + \gamma_4 X_4 + \gamma_5 X_5 \quad (2)$$

Where X_1 represents working capital/total assets, X_2 represents retained earnings/total assets, X_3 represents eBIT/total assets, X_4 stands for total market value/total liabilities, X_5 stands for operating income/total assets. The higher the Z-Score value, the more proactive the enterprise entity is in controlling financial risks and is more inclined to make positive psychological responses.

According to [17] and [13],

$$\gamma_1 = 1.2, \gamma_2 = 1.4, \gamma_3 = 3.3, \gamma_4 = 0.6, \gamma_5 = 0.999.$$

In order to make the conclusions of this paper more rigorous, this paper also uses the current ratio

representing the company's short-term solvency, as a validation variable for Z-Score. To a certain extent, the current ratio is directly proportional to the financial risk.

3.2.2. Explanatory Variable

The explanatory variable DID_{it} is used to indicate whether the sector of enterprise i in year t has implemented the delisting reform. If the sector where enterprise i is located has implemented delisting reform in year t , the value of DID_{it} is 1, otherwise it takes 0.

3.2.3. Control Variables

Referring to the research of [18] and [19], this paper sets up a group of control variables that may affect the financial risk under the action of enterprises where “Age” stands for Company Age, “Growth” stands for Operating Income Growth Rate, “Lev” stands for Financial Leverage, “Size” stands for Company Size, “Top 1” stands for Shareholding Ratio of the Largest Shareholder, “Industry” stands for Industry dummy variable, “Year” stands for Year dummy variable, “State” stands for Organizational Form dummy variable, “Board” stands for Affiliated Sector dummy variable, “O_System” stands for Offering System dummy variable. Table 1 shows a detailed definition of these variables.

Table 1: Definition of variables

Variable type	Variable symbol	Variable description
Corporate financial risk	<i>Z-score</i>	Z-value warning
	<i>Liquidity_Ratio</i>	Current ratio: current assets/current liabilities
Delisting reform	<i>DID_{it}</i>	Individual i implements the policy in period t , taking 1, otherwise taking 0
Control variable	<i>Growth</i>	Growth rate of operating income: (operating income at the end of next year - operating income at the end of last year)/operating income at the end of last year
	<i>Lev</i>	Financial leverage: Total Liabilities/total assets
	<i>Size</i>	Enterprise size: natural logarithm of total assets
	<i>Age</i>	The company's listing period is accurate to ten thousand
	<i>Top1</i>	Shareholding ratio of the largest shareholder
	<i>Industry</i>	A set of industry virtual variables generated according to the 2012 industry classification standard of the Securities Regulatory Commission
	<i>Year</i>	Annual dummy variable
	<i>State</i>	Ownership nature dummy variable
	<i>Board</i>	Securities sector dummy variable
	<i>O_System</i>	Dummy variable of issuance system

4. Empirical Results and Robustness Test

4.1. Empirical Results

4.1.1. Descriptive Statistics

The descriptive statistics of the main variables, as shown in Table 2.

Table 2: Descriptive statistics of variables

Variables	N	Mean	Sd	Min	Max
<i>Z-score</i>	26,466	5.925	7.333	-0.718	45.930
<i>Liquidity_Ratio</i>	26,466	2.497	2.262	0.340	13.970
<i>DID</i>	26,466	0.475	0.499	0.000	1.000
<i>Lev</i>	26,466	0.415	0.201	0.062	0.934
<i>Size</i>	26,466	22.01	1.453	18.930	26.300
<i>Age</i>	26,466	9.198	8.969	-4.000	28.750
<i>Top1</i>	26,466	34.61	15.74	8.480	79.730
<i>Growth</i>	26,466	23.83	362.0	-130.900	40,853

It can be seen from the table that the average Z-Score of the sample companies is 5.925, which is greater than the good standard of 2.675, indicating that the average financial status of the sample companies is in a relatively healthy state. In addition, the mean value of the dummy variable *DID* of delisting reform is 0.475, indicating that about 47.5% of the company-year observations are samples of delisting reform enterprises.

4.1.2. Benchmark Regression Results

Table 3 shows the estimated results of regression model (1) for panel data from 2017 to 2022.

Table 3: Benchmark regression

Variables	<i>Z-score</i>		<i>Liquidity_Ratio</i>	
	(1)	(2)	(3)	(4)
<i>DID</i>	2.954*** (9.61)	2.183*** (7.91)	0.816*** (9.39)	0.587*** (8.32)
<i>Age</i>		-0.786*** (-3.34)		-0.151** (-2.21)
<i>Growth</i>		-0.000 (-0.36)		-0.000* (-1.67)
<i>Lev</i>		-23.490*** (-38.07)		-7.270*** (-39.08)
<i>Size</i>		1.690*** (8.42)		0.422*** (8.86)
<i>Top1</i>		-0.079*** (-8.00)		-0.021*** (-8.00)
<i>Constant</i>	4.523*** (30.99)	-12.559** (-2.56)	2.110*** (51.10)	-1.930 (-1.56)
<i>Firm</i>	Yes	Yes	Yes	Yes
<i>Year</i>	Yes	Yes	Yes	Yes
<i>N</i>	26,466	26,466	26,466	26,466
<i>R²</i>	0.650	0.733	0.737	0.817
<i>r²_a</i>	0.580	0.680	0.683	0.780
<i>F</i>	92.28	262.20	88.08	281.90

Notes: ***, ** and * indicate significance at the 10%, 5% and 1% levels, respectively, with corresponding t-values are in parentheses.

Columns (1) and (3) do not include control variables, while columns (2) and (4) include control variables to verify the robustness of regression results. The results show that the *DID* coefficients of *Z-Score* and *Liquidity_Ratio* are significantly positive at the level of 1% regardless of whether control variables are added. Therefore, Hypothesis 1a cannot be rejected, indicating that delisting reform significantly reduces the financial risk under the action of the company.

4.2. Robustness Test

4.2.1. Parallel Trend Test

The premise of the application of the *DID* method is to meet the hypothesis of parallel trend, that is, there is no systematic difference in the development trend of financial risk under the action of corporate between the "treatment group" and the "control group" before the policy is affected, or even if there is a difference, it is different from the difference after the policy is affected. Due to the differences in the time points of "processing group" events in this paper, referring to [20], the following dynamic equation (3) is set to test the parallel trend hypothesis:

$$FR_{it} = \alpha + \beta_1 * DID_{it}^{-2} + \beta_2 * DID_{it}^{-1} + \beta_3 * DID_{it}^0 + \beta_4 * DID_{it}^1 + \beta_5 * DID_{it}^{\geq 2} + \lambda Control_{it} + \sum Firm_i + \sum Year_t + \varepsilon_{it} \quad (3)$$

Where DID_{it}^k stands for a set of dummy variables reflecting the delisting reform event.

This paper takes the three years before the delisting policy and earlier years as the benchmark group. Specifically, DID_{it}^{-2} , DID_{it}^{-1} , DID_{it}^0 , DID_{it}^1 respectively represent the first two years, the previous year, the current year and the next year of delisting reform. And $DID_{it}^{\geq 2}$ represents the second and subsequent years of delisting reform. When those variables are true, the value is 1, otherwise, the value is 0.

There is a graphical presentation of the panel data fixed effects results of Equation (3), see Figure 1.

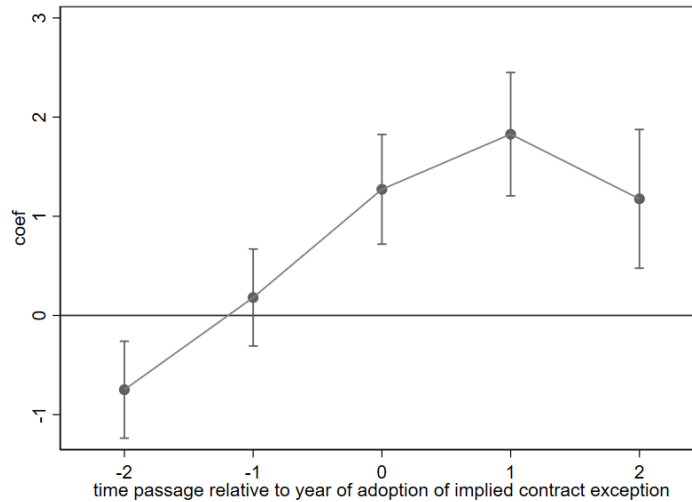


Figure 1: Parallel trend chart

The horizontal bar in Figure 1 represents the year, and the vertical bar represents the impact coefficient of delisting reform. It can be seen from the figure that in the first two years of the delisting reform system, the policy is not significant, but the policy is significant in the treatment period. At the same time, it is noted that the impact coefficient of the policy in 2022 is lower than that of the previous year, indicating that this positive impact may have a decreasing trend with the extension of time.

4.2.2. Placebo Test

In addition to the delisting and restructuring event, some other policies or random factors may also cause differences in the financial risks under the action of enterprises, which makes the above conclusions untenable. In order to exclude the influence of these factors, this paper conducts a placebo

test. Firstly, the pseudo processing group and pseudo policy time were randomly selected according to the company, and then progressive DID regression of Z-Score was carried out. The results of the nuclear density distribution of repeated random sampling 500 times, as shown in Figure 2.

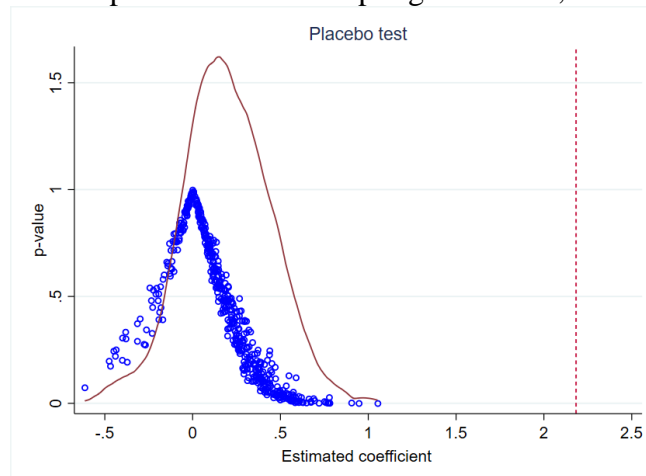


Figure 2: Distribution of nuclear density

Figure 2 shows the density distribution of random sampling is close to the normal distribution, the estimated coefficients are concentrated around the point 0, and the p values of most coefficients are greater than 0.1. Therefore, it can be concluded that the model in this paper is less likely to be affected by other policies. The actual estimated value of 2.183 of the model is significantly different from the coefficient estimated value obtained in the placebo test, which further proves that the impact of delisting reform on financial risk under the action of corporate is significant.

4.2.3. PSM-DID Analysis

There may be endogenous problems due to self-selection bias between delisting reform and financial risk under the action of corporate, therefore propensity matching Difference in Difference (*PSM-DID*) analysis method is used in this paper, refer to [21]. The PSM method can match a specific control group for the treatment group, making the quasi-natural experiment approximately random, thus eliminating the selection bias. Here, the "psestimate instruction" is used to filter the matching variables, and the matching variables are *Age*, *Size*, *Lev* and *Top1*, the four variables are used as matching variables to estimate the propensity score. The panel data is matched phase by phase, and then the matching panel data is used to estimate equation (1) in this paper, refer to the methods of [22] and [23]. Figure 3 shows the balance test results of this matching.

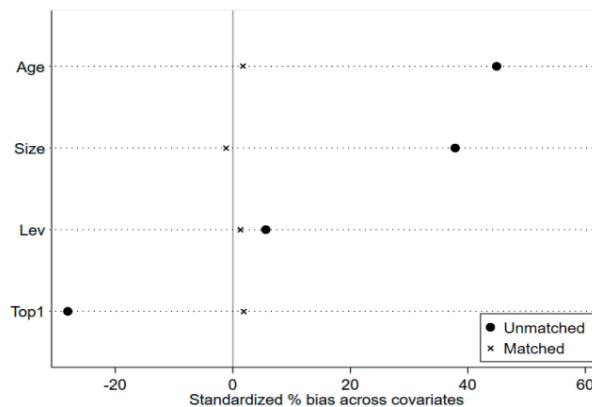


Figure 3: Standardized deviations of covariates before and after propensity score matching

The vertical axis in Figure 3 represents the matching variable, and the horizontal axis represents the deviation between the control group and the treatment group before and after matching. If the deviations were all within 10%, the match quality was good. From Figure 3, it is easy to see that the deviation of the control group and the treatment group is significantly reduced and close to 0 before and after matching, indicating that the matching quality is good. Table 4 shows the regression results based on the PSM model.

Table 4: PSM-DID regression

Variables	Z-score	Liquidity_Ratio
<i>DID</i>	2.312*** (8.41)	0.617*** (8.48)
<i>Age</i>	-0.725*** (-3.02)	-0.148** (-2.09)
<i>Growth</i>	-0.000 (-0.82)	-0.000** (-2.31)
<i>Lev</i>	-23.490*** (-37.80)	-7.246*** (-38.74)
<i>Size</i>	1.679*** (8.33)	0.418*** (8.74)
<i>Block</i>	-0.077*** (-7.74)	-0.020*** (-7.81)
<i>Constant</i>	-13.016*** (-2.63)	-1.925 (-1.53)
<i>Firm</i>	Yes	Yes
<i>Year</i>	Yes	Yes
<i>N</i>	26,337	26,337
<i>R²</i>	0.734	0.818
<i>r²_a</i>	0.680	0.781
<i>F</i>	256.7	277.9

Notes: ***, ** and * indicate significance at the 10%, 5% and 1% levels, respectively, with corresponding t-values are in parentheses.

Table 4 tells that the regression coefficients of *DID* are significantly positive in *Z-Score* and *Liquidity_Ratio*, which are not significantly different from the regression results of the whole sample, further indicating the reliability of the regression results. It shows that the results are robust and delisting reform significantly reduces the value of financial risk index of listed companies.

5. Heterogeneity Analysis

5.1. The Influence of the Nature of Control Rights

In order to further investigate whether there is a difference in the impact of delisting reform on the nature of control rights, this paper divides the samples into two sub-samples of state-owned enterprises and non-state-owned enterprises, and performs the regression of Equation (1) on the two sub-samples, the results are shown in Table 5.

Table 5: Subsample regression of control rights

Variables	Z-score		Liquidity_Ratio	
	(1)	(2)	(3)	(4)
<i>DID</i>	-0.128 (-0.15)	2.576*** (8.59)	0.251 (1.35)	0.622*** (8.14)
<i>Age</i>	-0.216 (-0.68)	-0.907*** (-2.75)	-0.101 (-0.95)	-0.132 (-1.49)
<i>Growth</i>	0.001 (0.48)	-0.000 (-0.46)	-0.001** (-2.13)	-0.000 (-1.60)
<i>Lev</i>	-17.573*** (-13.82)	-24.675*** (-35.65)	-5.641*** (-13.50)	-7.655*** (-37.23)
<i>Size</i>	0.004 (0.01)	1.964*** (8.44)	0.154** (2.10)	0.449*** (7.94)
<i>Block</i>	-0.040*** (-2.95)	-0.087*** (-6.28)	-0.009** (-2.10)	-0.024*** (-7.18)
<i>Firm</i>	Yes	Yes	Yes	Yes
<i>Year</i>	Yes	Yes	Yes	Yes
<i>N</i>	7,548	18,918	7,548	18,918
<i>R</i> ²	0.777	0.721	0.845	0.806
<i>r</i> ² _a	0.732	0.665	0.813	0.767
<i>F</i>	37.53	233.7	33.14	258.1

Notes: ***, ** and * indicate significance at the 10%, 5% and 1% levels, respectively, with corresponding t-values are in parentheses.

Columns (1) and (3) in Table 5 report the regression results of state-owned enterprises, while columns (2) and (4) show the regression results of non-state-owned enterprises. It can be seen from Table 5 that the regression coefficients of *Z-Score* and *LiquidityRatio* of state-owned enterprises are also insignificant at the level of 10%, while the regression coefficients of non-state-owned enterprises are significantly positive at the level of 1%. It shows that in samples with different control rights, the impact of delisting reform on the value of financial risk index of listed enterprises is significantly different. Delisting reform mainly affects the financial risk index of non-state-owned enterprises. It is considered that, on one hand, the state-owned enterprises generally pay close attention to sense of social responsibilities and the stability of economy, which means they have a higher loss aversion level, and will be more proactive to control financial risks. The financial risk is deeply related to the benefit of minority shareholders and individual investors. So that they tend to hold a lower financial risks originally compared with non-state-owned enterprises. On the other hand, non-state-owned enterprises mainly focus on self-interest maximization and short-term plan which results in a more volatility under the changes of rules.

5.2. The Impact of the Securities Sector

Here the sample is divided into two groups of sub-samples: enterprises listed on the main board and enterprises not listed on the main board, and investigates whether delisting reform has different impacts on different securities sectors. The subsample regression results of securities sector, as shown in Table 6.

Table 6: Subsample regression of securities sector

Variables	Z-score		Liquidity_Ratio	
	(1)	(2)	(3)	(4)
<i>DID</i>	2.034*** (3.27)	0.111 (0.10)	0.316** (2.16)	0.210 (0.98)
<i>Age</i>	0.177 (0.59)	-4.694*** (-2.94)	-0.033 (-0.33)	-0.895 (-1.47)
<i>Growth</i>	0.001 (0.64)	0.002 (0.84)	-0.001** (-1.99)	-0.000 (-0.11)
<i>Lev</i>	-14.556*** (-12.10)	-26.517*** (-6.79)	-4.782*** (-12.45)	-8.977*** (-6.96)
<i>Size</i>	-0.648* (-1.69)	1.009 (1.40)	0.085 (1.12)	-0.186 (-0.90)
<i>Block</i>	-0.016 (2.20)	-0.085 (1.08)	-0.003 (1.05)	-0.038** (2.92)
<i>Firm</i>	Yes	Yes	Yes	Yes
<i>Year</i>	Yes	Yes	Yes	Yes
<i>N</i>	6,630	918	6,630	918
<i>R²</i>	0.814	0.678	0.850	0.829
<i>r²_a</i>	0.777	0.608	0.820	0.792
<i>F</i>	31.25	14.10	28.60	12.54

Notes: ***, ** and * indicate significance at the 10%, 5% and 1% levels, respectively, with corresponding t-values are in parentheses.

Columns (1) and (3) in Table 6 report the regression results of enterprises listed on the main board, while columns (2) and (4) report the regression results of enterprises listed on the non-main board. It can be seen from Table 6 that the regression coefficients of *Z-Score* and *LiquidityRatio* of main board listed companies are significant at the level of 1% and 5%, respectively, while the regression coefficients of non-main board listed companies are not significant at the level of 10%. This shows that in the samples of different securities sectors, the impact of delisting reform on the financial risk decision-making behavior of listed enterprises is significantly different. Delisting reform mainly affects the value of financial risk index of enterprises listed on the main board. It is considered that, the main board companies receive more attention universally compared with the non-main board listed companies, so they have more enthusiasm to make positive psychological responses to control financial risks.

6. Conclusions

Based on the sample of China's listed companies from 2017 to 2022, this paper examines the effects of China's delisting reform on the financial risk decision-making behavior of listed companies from the perspective of psychological responses. The empirical results confirm that delisting reform helps to reduce the value of financial risk index of listed companies in China. This indicates that the main body of listed companies in China can make a positive and healthy psychological response to the reform of the delisting system. A stricter delisting system can make listed companies pay more attention to their own financial risks, thereby indirectly protecting the rights and interests of investors. The empirical research in the paper also demonstrates that the policy goals of China's delisting system reform to improve the quality of listed companies and establish a mechanism for the survival of the fittest, can be successfully achieved. Further, this paper subdivides the sample into state-owned enterprises and non-state-owned enterprises, main board listed enterprises and non-main board listed enterprises for investigation. The test results indicate that the delisting reform mainly has a significant positive impact on and reduce the value of financial risk index of non-state-owned enterprises and

mainboard listed enterprises.

The reasons why the delisting reform can reduce the value of financial risk index of listed enterprises are mainly considered in this paper. First of all, the strict constraints of external policies will encourage listed companies to pay attention to the financial risk status in order to avoid negative information and suffer delisting. In particular, the new delisting regulations have stricter requirements on financial indicators, which guides listed companies to focus on their main business, pay more attention to the changes of their financial indicators and how to improve their operating ability. Secondly, the registration system reduces the financing cost of enterprises. In the past, due to the restriction of China's capital market, most of the new financing of enterprises is bonds, which forms corporate debt. The long-term accumulated debt leads to high leverage of enterprises, while the registration system reduces the financing cost, thus affecting the the financial risk index of listed enterprises. The delisting reform achieves a closed-loop effect for the benign development between the market and listed companies, promotes listed companies to improve their ability, selects high-quality enterprises so that they can more conveniently and effectively obtain sufficient resources from the securities market to promote their own development, and further improves the efficiency of resource allocation in the securities market.

Delisting reform have a significant difference in the impact on the value of financial risk index of listed enterprises with different control rights. The considered reason is the sense of social responsibility or self-interest maximization. Compared with state-owned enterprises, non-state-owned enterprises have lower stability and pay less attention to the long-term plan, thus they are more significantly affected by the reform. Additionally, the delisting reform have a significant difference in the impact on the value of financial risk index of listed companies in different sectors. The considered reasons are the information transmission mechanism. Main board companies get more attention compared with non-main board companies, and they have more enthusiasm to make positive psychological responses to control financial risks.

This paper also notes that the new stricter delisting rules have a significant impact on the listed company's financial risk decision-making behavior in the first two years of implementation, but the long-term impact still needs further verification. Therefore, the long-term benefits and internal mechanism of delisting reform are still worthy of further discussion.

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