

The Policy of Separate R&D Expense Allocation and Capital Market Stability: Empirical Evidence Based on Stock Liquidity

Sihan Fan*

School of Accounting, Dongbei University of Finance and Economics, Dalian 116000, China

**Corresponding author: Sihan Fan.*

Abstract

Taking the 2018 revision by the Ministry of Finance regarding the “separate listing of R&D expenses” as the research context, this study employs a difference-in-differences (DID) model to examine the impact of separate R&D expense listing on stock liquidity fluctuations in the capital market. The results indicate that the separate R&D expense listing policy significantly improves corporate stock liquidity, and this conclusion remains valid after robustness tests. Mediating mechanism tests show that the policy enhances stock liquidity through two pathways: improving the comparability of accounting information and alleviating corporate financing constraints. Heterogeneity analysis reveals that the policy effect is more pronounced in small and medium-sized enterprises (SMEs) and enterprises with lower levels of external media supervision. This study provides empirical evidence for understanding the impact of accounting information disclosure policies on capital market stability, and offers references for policy optimization and corporate decision-making.

Keywords

separate listing of R&D expenses, stock liquidity, difference-in-differences model, accounting information, financing constraints

1. Introduction

Under the background of innovation-driven development strategy, enterprise innovation has become a key source of enterprise core competitiveness. Increasing R&D investment can enhance a firm's innovation performance and positively affect its market value [1, 2]. This effect is observed in both traditional and emerging enterprises, where increased R&D investment significantly promotes innovation [3]. Sustained investment in R&D ensures long-term high performance and maintains firm value [4]. Furthermore, key R&D and innovation information influences investors' decisions in the capital market. As the core indicator of the stable operation of the capital market, the level of stock liquidity can directly reflect market efficiency and resource allocation effect; while accounting information disclosure is an important bridge between enterprises and the capital market. It remains unclear whether the reporting position of this information can improve the information environment and thus affect the stock liquidity of enterprises.

Existing research indicates that accounting information on R&D expenses is not fully incorporated into the capital market, leaving investors with limited knowledge of firms' R&D activities [5]. Consequently, stock prices often fail to capture the true value created by these R&D investments, leading to an underestimation of their contribution to firm value [6, 7]. First of all, some listed firms may strategically manipulate R&D investment in response to industrial policies, and the increased R&D input through manipulation cannot increase the innovative output of the enterprise, which further weakens the ability of stock prices to accurately reflect R&D investment or misreact the R&D input information of the enterprise. Secondly, before 2018, the accounting information of R&D expenses was included in the “management expenses” and reported in the profit statement, which would lead to a large number of R&D-oriented enterprises to generate higher management expenses due to high R&D investment, which was considered low management efficiency, which would not be conducive to the capital market and investors' correct estimation of the real value of the enterprise, and thus affecting the capital market performance and stock liquidity of the enterprise.

From the firm's perspective, stock liquidity may be influenced by whether the enterprise has implemented standardized processes. Standardization enhances market vitality and can improve stock liquidity by facilitating the flow of resources from the factor market to the capital market [9]. Additionally, digital transformation can further enhance stock liquidity by reducing information asymmetry in accounting disclosures [10]. From the perspective of the stock trading system and accounting policies in the capital market, after the restrictions on the rise and fall of the stock trading market has been relaxed, investors have reduced herd behavior and excessive speculation, and the stock liquidity in the capital market has been improved; under the background of digitalization, investors will also take the data assets disclosed by enterprises in financial statements as an important basis for investment decision-making. At the same time, data assets also enhance investor confidence, thus improving the stock liquidity of enterprises.

In June 2018, the Ministry of Finance issued the Notice on the Revision and Issuance of the Format of the 2018 General Enterprise Financial Statement, which stipulates that the expensed R&D expenditure should be separated from the “management expenses” and listed separately in the profit statement as “R&D expenses”, so that investors can directly read the profit statement to understand the amount of R&D expenses (hereinafter referred to as the “R&D Expense Separate Policy”). However, after the release of the policy, there is no conclusion on whether the implementation of the policy will improve the comparability of accounting information of enterprises and thus improve the liquidity of stocks. Therefore, this study examines the separate policy of R&D expenses as the scenario and employs a difference-in-differences (DID) approach to explore the impact of the separate policy of R&D expenses on stock liquidity. The main findings of this study are as follows: First, the implementation of the policy of listing R&D expenses will lead to a significant improvement in the liquidity of enterprise stocks. This study uses the double difference method to draw this conclusion using the financial statement data of listed companies from 2012 to 2018 and the stock liquidity data. After the robustness test, the conclusion is still valid, and this study finds that the separate policy of R&D expenses has a more significant effect on improving the stock liquidity of small-scale enterprises and enterprises with low media supervision. Second, this study conducted an intermediary mechanism test and found that the implementation of the separate R&D cost policy improves stock liquidity by improving the comparability of accounting information between enterprises and easing the financing constraints of enterprises.

The main contributions of this study are as follows. Theoretically, it extends the literature on the economic consequences of accounting policies by conducting a quasi-natural experiment using the 2018 R&D expenditure separate reporting policy. This study systematically examines, for the first time, the impact of changing the accounting project listing position on stock liquidity. It also addresses a gap in the literature regarding the relationship between policy efficiency and the capital market and enriches the understanding of the underlying transmission mechanism. Furthermore, it opens the “policy implementation – intermediary – policy effect” black box, providing new insights into how the quality of accounting information affects capital market efficiency. At the practical level, this study provides an empirical basis for the financial department to optimize the accounting information disclosure policy, standardize the R&D information disclosure format, and promote the reform of the accounting system. At the same time, this study also provides a path reference for high-tech enterprises to improve financing efficiency through R&D information. Enterprises can improve the asymmetry of accounting information and alleviate financing constraints by strengthening R&D information disclosure, so as to optimize the external information environment to enhance their recognition in

the capital market. This study also provides a basis for investors to use R&D cost data to reduce information interpretation and reduce investment risks.

2. Institutional Background and Research Hypotheses

2.1 Institutional Background

Enterprise Accounting Standard No. 6 - Intangible Assets issued by the Ministry of Finance in 2006 clearly defines the accounting treatment of enterprise research and development expenditure, dividing it into two categories: research stage expenditure and development stage expenditure. Among them, there is high uncertainty about whether the expenditure in the research stage will bring economic benefits to the enterprise in the future because it involves exploratory knowledge acquisition activities. Articles 7 and 8 of the guidelines clearly require that such expenditures should be fully expensed, directly included in profits and losses in the current period, and reported through the “management expenses” items in the profit statement. Expenditure in the development stage specifically refers to targeted expenditure on the transformation of early research results into design, improvement, etc. before commercial production. Only if the five capitalization conditions stipulated in Article 9 of the guidelines are met at the same time can they be recognized as intangible assets. If the capitalization conditions are not met, they still need to be treated as expenses and classified as “management expenses”.

Under this specification, the R&D expenses are nested in the “management expenses” item for a long time for profit listing, and the specific amount is only disclosed separately in the secondary detailed account of management expenses notes in the financial statements. This reporting model blurs the essential difference between R&D expenses and management expenses, resulting in the obscuring of the informational value of R&D expenses. It is difficult for investors to identify the scale and intensity of enterprise R&D investment directly from the main table, which is not conducive to its accurate assessment of enterprise innovation potential. China Accounting News launched a special analysis of this issue as early as 2016. By comparing the accounting logic and economic connotation of R&D expenses and management expenses, it proved the rationality and necessity of listing R&D expenses separately as expenses for the independent period.

In order to solve the dilemma of the above information disclosure and adapt to the needs of the national innovation-driven development strategy, the Ministry of Finance issued the Notice on the Revision and Issuance of the Format of 2018 General Enterprise Financial Statements in 2018, which made major adjustments to the format of enterprise financial statements. One of the core requirements is to separate R&D expenses from “management expenses” and list them separately as independent projects in the profit statement. The core goal of this system reform is to improve the transparency and availability of R&D information, strengthen the information transmission of R&D investment, and then guide capital market resources to innovative enterprises. The introduction of this policy has built a natural quasi-natural experimental scenario, which provides a research opportunity for the empirical test of this article.

2.2 Theoretical Analysis and Hypothesis Proposal

2.2.1 Accounting Information and Capital Market

Since it is difficult for the capital market and investors to correctly understand and recognize the R&D investment of enterprises and include it in the stock price information, the quality of accounting information disclosure and the fit of investors' information needs are particularly important. Studies have shown that high-quality accounting information can improve the phenomenon of market failure and “inferior currency expels good currency” under the scenario of information asymmetry. To improve the problems of inefficient resource allocation, insufficient investment or excessive investment of listed companies in the capital market, the infrastructure of the financial reporting and disclosure system should be improved, so as to better play the role of accounting information in capital allocation. At the same time, the accounting information voluntarily disclosed by executives of listed companies can alleviate the information asymmetry between small and medium-sized investors and institutional investors. This voluntary disclosure can improve stock liquidity. The R&D incentive policy formulated by the government will cause executives of listed companies to have the right behavior of “R&D manipulation”, which will not only reduce the R&D performance of enterprises, but also inevitably make investors fall into the trap of “R&D manipulation”

Since the implementation of the separate policy of R&D expenses in 2018, listed companies need to adjust R&D expenditure from note disclosure to separate reporting in the profit statement, which has significantly changed the efficiency of R&D information dissemination and market access. According to the theory of limited attention of investors, for technology-intensive enterprises, this change will also attract investors' attention, which will affect their investment behavior. Judging from the research results of the existing academic community, the separate reporting of R&D expenses can guide investors to pay more attention to R&D information, suppress the manipulation of R&D expenses by enterprises, improve the information value of R&D expenses, and effectively alleviate the market's misevaluation of the value of technology-intensive enterprises. So whether this change will lead to fluctuations in stock liquidity in the capital market is still unknown, so this article puts forward the following assumptions:

H1: The implementation of the R&D Expense Separate Policy will significantly improve the stock liquidity of the enterprise.

2.2.2 Accounting Information Comparability and Financing Constraints

If the above assumption H1 is established, it means that the R&D Expense Separate Policy will significantly improve the stock liquidity of the enterprise. So what is its mechanism? This study continues to study its mechanism of action. Studies have confirmed that the comparability of accounting information of enterprises will be affected by the external environment and internal governance. However, the macroeconomic system and industry environment of various enterprises in the domestic market are basically the same, so the comparability of accounting information is more affected by the enterprise level. For example, in recent years, the rapid development of digital transformation of enterprises in China has significantly improved the comparability of accounting information. So whether the comparability of accounting information is affected by the external accounting disclosure policy, and it is not yet known whether it affects stock liquidity as a transmission mechanism. This article proposes accordingly:

H2: The comparability of accounting information plays an intermediary role between the R&D Expense Separate Policy and the liquidity of enterprise stocks, that is, the "R&D Expense Separate Policy promotes the improvement of stock liquidity by improving the comparability of accounting information.

Myers and Majluf (1984), who proposed the theory of preferential financing, believe that the difference in the external financing cost of enterprises will generate financing constraints, which will hinder the innovative output of enterprises. The research of Lu Xin et al. (2013) also proposed that the financing constraints in China's high-tech industries are not conducive to R&D investment within enterprises. After the implementation of the policy of listing R&D expenses alone, this study speculates that this will reduce the information friction between technology-intensive enterprises and capital providers, thereby improving stock liquidity and promoting the efficient allocation of capital market resources. Based on the above analysis, the following assumptions are put forward:

H3: Financing constraints play an intermediary role between the R&D Expense Separate Policy and the liquidity of enterprise stocks, that is, the R&D Expense Separate Policy promotes the improvement of stock liquidity by alleviating the financing constraints of enterprises.

2.2.3 Heterogeneity Analysis

The difference in the characteristics of the enterprise itself will lead to significant heterogeneity in the implementation effect of accounting policies and regulatory systems. In terms of enterprise scale, Luo Zhengying and Duan Jiaguo (2006) pointed out that small and medium-sized enterprises face more severe financing constraints, and insufficient information disclosure is an important reason for their financing difficulties, which makes small and medium-sized enterprises more sensitive to mandatory information disclosure policies, and the marginal improvement effect brought by the policy is also more prominent. The single list of research and development expenses can effectively make up for the shortage of information disclosure of small and medium-sized enterprises, provide investors with previously missing key innovative information, more significantly alleviate market doubts, and improve their stock trading activity.

In terms of external supervision, the research of Zhang Qunzhi et al. (2025) shows that the perfection of the external governance environment will regulate the market response of enterprise behavior. Enterprises with

weak external supervision have a less perfect information environment, and the information improvement space brought by policies is more significant 错误!未找到引用源。. As a mandatory information disclosure system, the single listing of research and development costs can provide standardized information transmission channels for low-media supervision enterprises, effectively make up for the information gap caused by insufficient external supervision, and have a stronger effect on stock liquidity. These studies provide an important theoretical basis and research ideas for this article to explore the heterogeneity of policy effects from the two dimensions of enterprise scale and external media supervision. Based on this, this paper puts forward the following assumptions:

H4: The R&D Expense Separate Policy has a more significant effect on enhancing stock liquidity in small and medium-sized enterprises.

H5: The effect of the R&D Expense Separate Policy on enhancing stock liquidity is more significant in enterprises with a lower level of external media supervision.

3. Research Design

3.1 Sample Selection

The initial sample of this study comes from A-share listed companies, and the six years after the R&D expenses are listed, that is, 2018-2023, as the processing window, and the six years before the R&D expenses are listed, that is, 2012-2018 as the comparison window, and the samples are selected, and the following are excluded: (1) listed companies in the financial industry; (2) ST and *ST listed companies. After deleting the missing values, 28,425 samples were finally obtained.

In the data adopted by the institute, the data of R&D expenses from 2012 to 2017 is taken from the detailed items of management expenses in the notes of the financial statements, from the China Research Data Service Platform (CNRDS); the data of R&D expenses from 2018-2023 is taken from the profit statement, from the CSMAR database. The rest of the financial data comes from the CSMAR database. In order to avoid the influence of extreme values, this study carried out upper and lower 1% reduction treatment for all continuous variables; in order to alleviate the impact of heterovariance, this study used robust standard error to test the significance of variable coefficients; in order to alleviate the correlation impact of variables on the time series, this study also carried out company-level clustering.

3.2 Variable Definition

3.2.1 Explained Variable

Stock liquidity (Liquidity). This article draws on the research methods of Amihud and Mendelson (1986) to account for stock non-liquidity indicators (ILLIQ) according to Formula (1):

$$ILLIQ = \frac{1}{D_{i,t}} \sum_{d=1}^{D_{i,t}} \sqrt{\frac{|r_{i,t,d}|}{V_{i,t,d}}} \quad (1)$$

In the above formula, $|r_{i,t,d}|$ the rate of return of enterprise i considering cash dividend reinvestment on the d trading day of year t ; $|V_{i,t,d}|$ represents the transaction amount of enterprise i on the d trading day of year t , in units of millions of yuan, $D_{i,t}$ is the number of trading days of enterprise i in year t . Therefore, intuitively, $\frac{|r_{i,t,d}|}{V_{i,t,d}}$ represents the change in the yield caused by the transaction amount per unit of stock i on the d trading day of the t -year, after adding the total average value to it, it is an illiquidity measure. $ILLIQ_{i,t}$, The larger the value, the greater the impact of the unit transaction amount on the stock price, the higher the investor's transaction cost, the lower the stock liquidity, and vice versa. In order to make the empirical results simple and easy to read, referring to the practice of Wu Fei et al. (2021), the *Liquidity* of the stock liquidity indicator in this article is measured by the inverse of the illiquidity measure. The calculation method is as follows:

$$\text{Liquidity} = -ILLIQ \quad (2)$$

The larger the *Liquidity* value, the higher the liquidity of the enterprise's stocks.

3.2.2 Explain the Variable

(1) The treatment dummy variable (*Treat*) is used to judge whether the enterprise is a technology-intensive enterprise. If the value is 1, otherwise it is 0. This variable follows the official standard of Article 11 of the Measures for the Recognition and Administration of High-tech Enterprises, and is screened based on the core condition of the proportion of R&D expenses. Calculate the total R&D expenses and total sales revenue of each sample in the past three years through panel data rolling, R&D intensity is defined as the ratio of total R&D expenditure to total sales revenue in the same period. For firms with an operating history of less than three years, the ratio is calculated based on the actual operating period. Specifically, firms are classified as technology-intensive ($Treat = 1$) if they meet the following criteria: (1) for firms with annual sales revenue ≤ 50 million yuan, $R\&D\ intensity \geq 5\%$; (2) for firms with annual sales revenue between 50 million and 200 million yuan, $R\&D\ intensity \geq 4\%$; (3) for firms with annual sales revenue > 200 million yuan, $R\&D\ intensity \geq 3\%$. Otherwise, *Treat* is set to 0.

(2) Time dummy variable (*Post*) equals 1 for the years 2018 and thereafter, and 0 otherwise.

(3) Difference-In-Differences (*DID*), following Beck and Wen Zhonglin, is constructed to capture the net effect of the R&D expense separate reporting policy. The calculation method is:

$$DID = Post \times Treat \quad (3)$$

This paper will focus on examining the regression coefficients of the crossover term $Treat \times Post$.

3.2.3 Control Variable

Controls_{i,t}, referring to existing authoritative literature, in order to improve the research accuracy, this study selected 10 control variables, including the scale of the enterprise (*Size*), Leverage Ratio (*Lev*), Degree of Financial Leverage (*DFL*), Institutional Ownership (*INST*), Return on Assets (*ROA*), Largest Shareholder Ownership (*Top1*), Revenue Growth Rate (*Growth*), Institutional Ownership (*Institution*), State Ownership (*SOE*), Tobin's Q (*TobinQ*).

The specific variable definitions are shown in the Table 1.

Table 1: Variable definition

| Variable Name | Symbol | Description |
|-------------------------------|--------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------|
| Stock Liquidity | <i>Liquidity_{i,t}</i> | The Amihud illiquidity index is obtained by taking the negative value of the original index. |
| The time dummy variable | <i>Post_t</i> | After the policy shock year (2018), the value of t is taken as 1; otherwise, it is taken as 0 |
| The treatment dummy variable | <i>Treat_i</i> | Whether the enterprise is a technology-intensive one or not, if it is, take 1; otherwise, take 0 |
| Difference-In-Differences | <i>DID</i> | $DID = Post_t \times Treat_i$ The crossover term captures the net effect of the "single-column" policy shock |
| Scale of the enterprise | <i>Size</i> | The total assets of an enterprise are taken as the natural logarithm |
| Leverage Ratio | <i>Lev</i> | Total liabilities/total assets |
| Degree of Financial Leverage | <i>DFL</i> | (Net profit + income tax expense + Financial Expense)/(Net profit + Income tax expense) |
| Firm Ownership | <i>SOE</i> | Virtual variables: If it is a state-owned enterprise, take 1; otherwise, take 0 |
| Return on Assets | <i>ROA</i> | Net profit/total assets |
| Institutional Ownership 1 | <i>INST1</i> | The proportion of the total number of shares held by all institutional investors to the tradable A-shares of the listed company. |
| Institutional Ownership 2 | <i>INST2</i> | The proportion of the total number of shares held by all institutional investors to the total share capital of the listed company. |
| Largest Shareholder Ownership | <i>Top1</i> | The ratio of the number of shares held by the largest shareholder to the total number of shares of the company |
| Firm Growth | <i>Growth</i> | The growth rate of an enterprise's current year's operating income relative to the previous year's operating income |
| Tobin's Q | <i>TobinQ</i> | Measure whether the enterprise value of an enterprise is overvalued or underestimated |
| Error Term | $\varepsilon_{i,t}$ | Including all other factors that affect the liquidity of the enterprise's stocks but were not included in the experiment or have not yet been observed |

3.3 Model Construction

Referring to the practice of Beck and Wen Zhonglin, this paper constructs the following difference-in-differences (DID) model to study the impact of the separate policy of R&D costs on the liquidity of enterprise stocks.

$$Liquidity_{i,t} = \beta_0 + \beta_1 \times Post_t + \beta_2 \times Treat_i + \beta_3 \times DID_{i,t} + \gamma Controls_{i,t} + Year_t + Firm_i + \varepsilon_{i,t} \quad (4)$$

In model (4), in addition to the above-mentioned variables, in order to improve the persuasiveness of the results, this study also processed it as follows: first, $\varepsilon_{i,t}$ is added as random error terms, which includes all other factors that affect the liquidity of enterprise stocks but are not included or have not been observed in the experiment; second, in all regression equations, the t statistic mis-adjusted by the robustness standard of Cluster clustering is default; finally, this study controls the virtual variables of time (*Year*) and enterprise (*Stkcd*) at the same time to absorb the fixed effect as much as possible.

When further studying the impact mechanism of the R&D Expense Separate Policy on the stock liquidity of enterprises, drawing on the intermediary effect test method proposed by Baron and Kenny (1986) and Wen Zhonglin et al., this paper studies the information transmission mechanism of the single policy to improve stock liquidity and the mechanism of easing financing constraints, that is, assuming H2 and H3. The model setting for testing the intermediary effect is as follows:

$$Compacc_{i,t} = \beta_0 + \beta_1 \times DID_{i,t} + \gamma Controls_{i,t} + Year_t + Firm_i + \varepsilon_{i,t} \quad (5)$$

$$FC_{i,t} = \beta_0 + \beta_1 \times DID_{i,t} + \gamma Controls_{i,t} + Year_t + Firm_i + \varepsilon_{i,t} \quad (6)- (1)$$

$$SA_{i,t} = \beta_0 + \beta_1 \times DID_{i,t} + \gamma Controls_{i,t} + Year_t + Firm_i + \varepsilon_{i,t} \quad (6)- (2)$$

The difference between model (5) and (6) is that the explained variables are different. In model (5), the interpreted variable is the comparability of accounting information (*Compacc*). The larger the *Compacc*, the higher the comparability of the accounting information of the enterprise. This study uses the research methods of De Franco and Tang Xuesong (2019) to estimate the comparability of accounting information, and measure the annual accounting information comparability of enterprises compared with other companies in the same industry, including the top four means (*Compacc1*) and the top ten means (*Compacc2*). In model (6), the explained variable is the degree of financing constraint of the enterprise. This study uses the FC index constructed by Hadlock and Pierce (2009) and the SA index constructed by Ju Xiaosheng et al. (2013) to measure the degree of financing constraint of the enterprise. The larger the index, the higher the degree of financing constraint faced by the enterprise.

If the coefficients before DID in models (4), (5) and (6) are significant, continue to carry out the following regression to test the intermediary effect:

$$Liquidity_{i,t} = \beta_0 + \beta_1 \times DID_{i,t} + \beta_2 \times Compacc_{i,t} + \gamma Controls_{i,t} + Year_t + Firm_i + \varepsilon_{i,t} \quad (7)$$

$$Liquidity_{i,t} = \beta_0 + \beta_1 \times DID_{i,t} + \beta_2 \times FC_{i,t} + \gamma Controls_{i,t} + Year_t + Firm_i + \varepsilon_{i,t} \quad (8)- (1)$$

$$Liquidity_{i,t} = \beta_0 + \beta_1 \times DID_{i,t} + \beta_2 \times SA_{i,t} + \gamma Controls_{i,t} + Year_t + Firm_i + \varepsilon_{i,t} \quad (8)- (2)$$

By examining the coefficients before DID in models (4) to (6) and the coefficients before the comparability of accounting information *Compacc*, the financing constraint FC index and the SA index in models (7) and (8), we can test whether there is an intermediary effect (Wen Zhonglin et al., 2004). By further examining the coefficients before DID in models (7) and (8), we can judge whether this mediation effect is a complete mediation effect.

4. Empirical Results

4.1 Descriptive Statistics

Table 2 shows the descriptive statistics of the main variables. As shown in Table 2, the mean value of Liquidity is -0.203 , with a standard deviation of 0.989 . The minimum and maximum values are -8.378 and -0.002 , respectively, indicating substantial variation in stock liquidity across firms. The average value of *DID* is 0.399 , indicating that 39.9% of the samples are affected by the R&D Expense Separate Policy; the average value of *Post* is 0.638 , and the proportion of samples before and after the implementation of the response

policy is nearly half, which is in line with the time node characteristics of this study; the mean value of *Treat* is 0.605, indicating that technology-intensive enterprises account for a relatively high proportion of the sample.

In terms of control variables, the average value of *Size* is 22.226 and the standard deviation is 1.279, indicating that the scale distribution of sample enterprises is relatively uniform and the degree of dispersion is relatively high; the average value of *Lev* is 0.385, indicating that the debt repayment capacity of most sample enterprises is relatively stable. The average value of *SOE* is 0.282, indicating that the proportion of Chinese enterprises in the sample is about 28.2%, and the proportion of non-state-owned enterprises is higher.

Table 2: Descriptive statistics

| Variable | Observations | Average value | Standard deviation | Minimum | 25 th percentile | Median | 75 th percentile | Maximum |
|--------------------------------|--------------|---------------|--------------------|---------|-----------------------------|--------|-----------------------------|---------|
| <i>Liquidity_{i,t}</i> | 28425 | -0.203 | 0.989 | -8.378 | -0.059 | -0.030 | -0.015 | -0.002 |
| <i>Post_i</i> | 28425 | 0.638 | 0.481 | 0.000 | 0.000 | 1.000 | 1.000 | 1.000 |
| <i>Treat_i</i> | 28425 | 0.605 | 0.489 | 0.000 | 0.000 | 1.000 | 1.000 | 1.000 |
| <i>DID</i> | 28425 | 0.399 | 0.490 | 0.000 | 0.000 | 0.000 | 1.000 | 1.000 |
| <i>Size</i> | 28425 | 22.226 | 1.279 | 20.030 | 21.305 | 22.016 | 22.928 | 26.331 |
| <i>Lev</i> | 28425 | 0.385 | 0.188 | 0.053 | 0.232 | 0.374 | 0.524 | 0.828 |
| <i>DFL</i> | 28425 | 1.294 | 0.899 | 0.336 | 0.973 | 1.043 | 1.240 | 7.189 |
| <i>SOE</i> | 28425 | 0.282 | 0.450 | 0.000 | 0.000 | 0.000 | 1.000 | 1.000 |
| <i>ROA</i> | 28425 | 0.059 | 0.046 | 0.001 | 0.024 | 0.049 | 0.082 | 0.232 |
| <i>INST1</i> | 28425 | 78.774 | 94.318 | 0.534 | 30.449 | 54.339 | 80.817 | 617.360 |
| <i>INST2</i> | 28425 | 42.500 | 25.468 | 0.317 | 19.858 | 43.610 | 63.582 | 91.523 |
| <i>Top1</i> | 28425 | 34.100 | 14.546 | 8.650 | 22.820 | 32.080 | 43.670 | 73.560 |
| <i>Growth</i> | 28425 | 0.135 | 0.540 | -0.907 | -0.075 | 0.068 | 0.229 | 3.765 |
| <i>TobinQ</i> | 28425 | 2.578 | 1.785 | 0.829 | 1.405 | 2.019 | 3.081 | 10.505 |

4.2 The R&D Expense Separate Policy and Stock Liquidity

The result of using the model (4) to check whether the R&D Expense Separate Policy will affect the stock liquidity of listed companies is shown in Table 3. Column (1) is the regression result that does not include control variables, column (2) adds control variables at the enterprise level, and column (3) further controls the enterprise and annual fixed effect. All three regressions are adjusted by mistake by the company-level cluster robust standard. Across all three specifications, the coefficient of *DID* is significantly positive at the 1% level. The results are consistent, indicating that the policy significantly improves stock liquidity for technology-intensive firms in 2018, the stock liquidity of technology-intensive enterprises is more significant than that of non-technology-intensive enterprises, and H1 has been verified.

Table 3: The impact of the policy of listing research and development expenses separately on stock liquidity

| Variable | Liquidity (1) | Liquidity (2) | Liquidity (3) |
|--------------|------------------------|------------------------|------------------------|
| <i>DID</i> | 0.3480*** (11.25) | 0.3583*** (11.77) | 0.4145*** (10.19) |
| <i>Post</i> | 0.1562*** (9.85) | 0.0749*** (4.75) | -0.4117*** (-10.24) |
| <i>Treat</i> | -0.3826*** (-12.49) | -0.2311*** (-8.37) | -0.2507*** (-7.67) |
| <i>Size</i> | | 0.1134*** (16.80) | 0.1711*** (6.87) |
| <i>Lev</i> | | -0.4620*** (-11.71) | 0.3404*** (3.74) |
| <i>DFL</i> | | 0.0081** (2.22) | -0.0321*** (-5.65) |
| <i>SOE</i> | | -0.0474*** (-4.05) | -0.1243*** (-3.09) |
| <i>ROA</i> | | -1.0535*** (-6.07) | -1.1701*** (-4.65) |
| <i>INST1</i> | | -0.0020*** (-16.45) | -0.0029*** (-14.82) |

| Variable | Liquidity (1) | Liquidity (2) | Liquidity (3) |
|---------------------------|------------------------|------------------------|------------------------|
| <i>INST2</i> | | 0.0052*** (14.43) | 0.0061*** (6.96) |
| <i>Top1</i> | | -0.0020*** (-4.12) | 0.0000 (0.02) |
| <i>Growth</i> | | 0.0185*** (3.18) | 0.0205*** (2.98) |
| <i>TobinQ</i> | | -0.0702*** (-10.01) | -0.1265*** (-10.23) |
| <i>Constant</i> | -0.2097*** (-13.36) | -2.3454*** (-15.89) | -3.4755*** (-6.64) |
| <i>Control</i> | NO | YES | YES |
| <i>Company</i> | NO | NO | YES |
| <i>Year</i> | NO | NO | YES |
| <i>N</i> | 28425 | 28425 | 27921 |
| <i>F</i> | 172.463*** | 68.684*** | 43.759*** |
| <i>R²</i> | 0.043 | 0.119 | 0.299 |
| <i>Adj. R²</i> | 0.043 | 0.118 | 0.174 |

Note: The t-statistic is in parentheses. ***, ** and * indicate significance at the 1%, 5%, and 10% levels. Unless otherwise specified, the same applies below.

4.3 Robustness Test

4.3.1 Parallel Trend Test

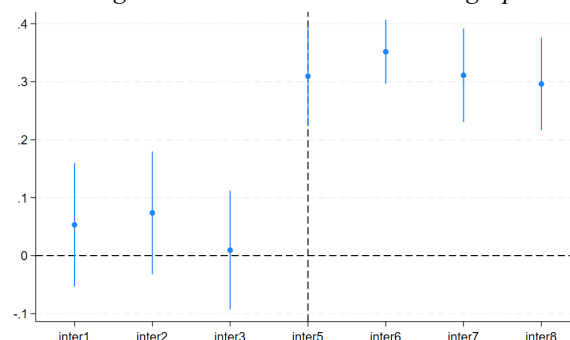
In order to ensure the validity of the estimated results of the double differential model, the key premise of “parallel trend” must be met, that is, before the policy shock occurs, the result variables of the treatment group and the control group should have the same trend of change. In order to verify this hypothesis, this paper refers to the idea of the event research method and constructs a model (9):

$$Liquidity_{i,t} = \alpha + \sum_{\tau \neq inter4} \beta_{\tau} (Treat_i \times D_t^{\tau}) + \gamma Controls_{i,t} + \mu_i + \lambda_t + \varepsilon_{i,t} \quad (9)$$

In order to make the research more convincing, this paper groups the years and sets the previous group of policy implementation (inter4) as a reference period to avoid multiple collinearity. Among them, D_t^{τ} is the year virtual variable. When the year is τ , the value is 1, otherwise it is 0. The coefficient β_{τ} captures the difference in mobility between the treatment group and the control group in the τ year relative to the reference period.

The results of the parallel trend test using Stata are shown in Figure 1. It can be seen that before the implementation of the policy (before 2018), the estimated values of all β_{τ} were statistically not significant, and their confidence intervals included zero values. This shows that there is no systemic difference in the trend of liquidity change between the processing group and the control group before the policy intervention, which satisfies the parallel trend hypothesis. After the implementation of the policy, the estimated value of β_{τ} became significantly positive, indicating that the R&D Expense Separate Policy did have a significant positive effect on stock liquidity, and the effect was continuous. The passing of the parallel trend test provides key support for the unbiasedness and reliability of the estimated results of the DID model in this paper.

Figure 1: Parallel trend test result graph



4.3.2 Placebo Test

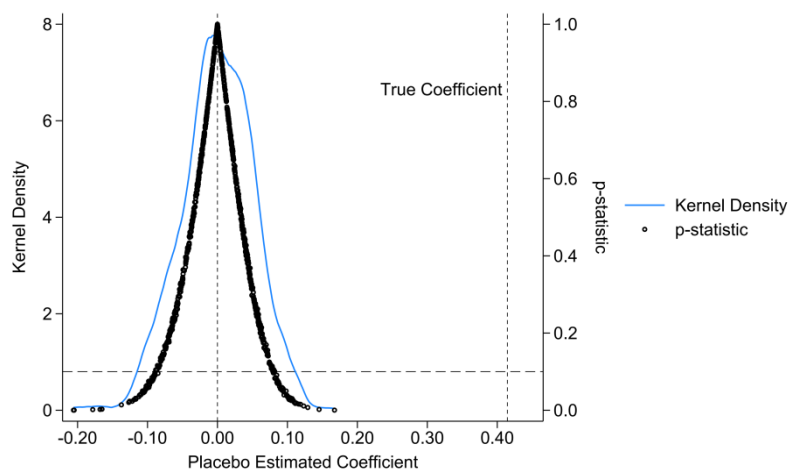
(1) Time placebo

The impact of time changes on the liquidity of stocks in the capital market needs to be tested. The signal of the gradual improvement of the R&D cost-alone policy and the gradual progress of the Ministry of Finance's overall planning and publicity may have a certain impact on the liquidity of stocks in the capital market, so it is not easy to identify the direct effect of the policy. In order to avoid the interference of the time expectation effect, the implementation time of the R&D Expense Separate Policy is advanced by 2 years, forming a false policy the time dummy variable. The regression result is shown in column (1) of Table 4. The DID coefficient is not significant at the level of 10%, indicating that the expectation of the R&D Expense Separate Policy has not had a significant impact on the high-quality development of the local economy.

(2) Fictional processing group

Although the time placebo test suggests that changes in stock liquidity are driven by the policy, further tests are conducted to rule out potential confounding factors. Following La Ferrara et al. (2012), a placebo test is performed using randomly assigned treatment groups. (2021) for placebo testing. Specifically, the false experimental group and control group are constructed by random sampling method, so as to construct a false processing variable $Treat_False$ and the corresponding interaction item $Treat_False \times Post$. In order to improve the credibility of the placebo test, this article repeats the above operation 1,000 times. Theoretically speaking, if the result of the benchmark regression is indeed brought about by the R&D Expense Separate Policy, the estimated coefficient of the false interaction item $Treat_False \times Post$ should not be significantly different from 0. The estimated coefficient nuclear density and p-value distribution diagram of the 1000 randomly selected control group are shown in Figure 2. It can be seen that the estimated coefficient distribution is near 0, and the mean is far away from the real value obtained from the benchmark regression, and the vast majority of the estimated coefficients are not significant. They passed the placebo test.

Figure 2: Kernel density map of 1000 random regression coefficients



4.3.3 Eliminate the Impact of the Epidemic

Considering that the global COVID-19 pandemic in 2020 has seriously affected the performance of China's capital market and may affect the results of this article, after removing the sample in 2020, this paper re-runs the above empirical analysis. The results are shown in Table 4. Columns (2)-(4) show that after excluding the 2020 sample, the DID coefficient is significantly positive at the 1% level, and with the addition of control variables and fixed effects, the direction and significance of the coefficient have not changed substantially, indicating that the results of this article are robust.

4.3.4 Shorten the Sample Period

In order to avoid the long sample period leading to data deletion and data distortion that interferes with the empirical results, the sample period is adjusted from 2012-2023 to 2015-2020 for regression. The results are in Table 4 (5)-(7). It can be seen from column (5) of Table 4 that the sample size was reduced from 28425 to

13612, and the data was reduced but the accuracy and concentration were improved. At this time, the DID regression result was still significantly positive, and the coefficient was increased from 0.3480 to 0.5663, indicating that after shortening the sample period, the results of this article are still robust.

4.3.5 Replace the Explanatory Variable

In order to ensure the robustness of the benchmark regression conclusion, this paper further replaces the explained variable - the measurement index of stock liquidity for re-estimation. In benchmark regression, the non-liquidity indicator of Amihud (2002) is used to measure stock liquidity. In this test, the annual average daily turnover rate (Turnover) is used as an alternative indicator of liquidity. The larger the value, the higher the trading activity of the stock, the stronger the liquidity.

The regression results are shown in column (8) of Table 4. The coefficient of DID is still significantly positive at the level of 1%, which is exactly the same as the baseline regression results in Table 2. This shows that the improvement effect of the R&D Expense Separate Policy on stock liquidity will not change due to changes in the way of measuring liquidity, and the results of this article are still robust.

Table 4: Regression results of the robustness test

| Variable | Time placebo test | Eliminate the impact of the epidemic | | | Shorten the sample period | | | Replace the explanatory variable |
|----------|-------------------------|--------------------------------------|------------------------|-----------------------|---------------------------|------------------------|-----------------------|----------------------------------|
| | Liquidity (1) | Liquidity (2) | Liquidity (3) | Liquidity (4) | Liquidity (5) | Liquidity (6) | Liquidity (7) | Turnover (8) |
| DID | 0.0224 (0.7032) | 0.3464*** (11.15) | 0.3511*** (11.50) | 0.4245*** (10.03) | 0.5663*** (11.45) | 0.5902*** (12.08) | 0.5651*** (8.92) | 0.2125*** (5.91) |
| Constant | -3.8826*** (-7.3080) | -0.2097*** (-13.36) | -2.4140*** (-14.75) | -3.1691*** (-5.82) | -0.3028*** (-11.32) | -4.8566*** (-15.99) | -8.5241*** (-5.82) | 6.0664*** (9.80) |
| Control | YES | NO | YES | YES | NO | YES | YES | YES |
| Company | YES | NO | NO | YES | NO | NO | YES | YES |
| Year | YES | NO | NO | YES | NO | NO | YES | YES |
| N | 27921 | 25583 | 25583 | 25064 | 13612 | 13612 | 13103 | 25064 |
| F | 43.819*** | 166.785*** | 66.791*** | 43.935*** | 178.391*** | 66.828*** | 50.730*** | 212.969*** |
| R2 | 0.293 | 0.041 | 0.214 | 0.321 | 0.064 | 0.186 | 0.405 | 0.550 |
| Adj.R2 | 0.166 | 0.041 | 0.214 | 0.183 | 0.064 | 0.185 | 0.233 | 0.459 |

5. Further Analysis

5.1 Intermediary Mechanism Test

The above results show that the implementation of the R&D Expense Separate Policy will significantly improve the stock liquidity of enterprises and this result is robust, but what mechanism does the policy use to affect the stock liquidity of enterprises? This study has not further studied the mechanism black box between the two. This article draws on the mediation effect test model discussed by Baron and Kenny (1986) and Wen Zhonglin (2004).

5.1.1 Comparability of Accounting Information

As the basis for investors to compare the value of enterprises horizontally, the comparability of accounting information is the key carrier for the R&D expenditure single policy to improve the information environment. Whether the single policy reduces the cost of information processing and information asymmetry by enhancing the comparability of enterprise accounting information with companies in the same industry is the purpose of this part of the study. The results of the mediation mechanism test conducted in this study are shown in Table 5.

Following the methods of De Franco and Tang Xuesong (2019) to estimate the comparability of accounting information, and use the variable of the company's annual accounting information comparability level relative to other companies in the same industry. This study uses the top 4 means (Compacc1) and the top 10 means (Compacc2) to measure the comparability of accounting information. The coefficients in models (4), (5) and (7) are estimated. The key regression results are recorded in Table 5. In order to facilitate the presentation of coefficients, this study expands both Compacc1 and Compacc2 by 1000 times for regression.

Table 5: Regression results of the mediating effect based on the comparability of accounting information

| variable | The four companies with the most similar accounting systems | | | The 10 companies with the most similar accounting systems | | |
|------------------------|-------------------------------------------------------------|---------------------|---------------------|-----------------------------------------------------------|---------------------|---------------------|
| | Liquidity (1) | Compacc1 (2) | Liquidity (3) | Liquidity (4) | Compacc2 (5) | Liquidity (6) |
| DID | 0.0037*** (2.49) | 0.6839*** (4.27) | 0.0026*** (2.79) | 0.0026* (1.84) | 0.7570*** (4.19) | 0.0026*** (2.80) |
| Compacc1 | | | 0.0002** (2.25) | | | |
| Compacc2 | | | | | | 0.0002** (2.13) |
| Control, Company, Year | YES | YES | YES | YES | YES | YES |
| N | 14697 | 14697 | 14697 | 14697 | 14697 | 14697 |
| Adj.R ² | 0.557 | 0.507 | 0.569 | 0.569 | 0.543 | 0.569 |

Column (1) of Table 5 presents the regression result of model (4). In this test, the regression coefficient of DID is still significantly positive; column (2) is the regression result of model (5), and the regression coefficient of DID is still significantly positive, indicating that the implementation of the R&D Expense Separate Policy can improve the comparability of accounting information of enterprises; column (3) is the regression result of model (7), and it can be seen that the coefficients of DID and Compacc are both significantly positive, indicating that the improvement of the comparability of accounting information can promote the improvement of enterprise stock liquidity, and the coefficient of DID in model (7) is slightly lower than the coefficient of DID in model (4), indicating that the comparability of accounting information plays a partial intermediary role. After replacing the top ten means (Compacc2) to measure the comparability of accounting information, the regression results are shown in column (4)-column (6) of Table 5, and the conclusion obtained is consistent with the above conclusion.

It can be seen that the R&D Expense Separate Policy can indirectly promote the improvement of stock liquidity by improving the comparability of accounting information and improving the information asymmetry environment. The improvement of the comparability of accounting information is an intermediary channel for the R&D Expense Separate Policy to improve the liquidity of enterprise stocks, which proves the previous hypothesis H2.

5.1.2 Financing Constraints

The continuous promotion of research and development activities depends on stable financial support, and the financing constraints caused by information asymmetry are important factors restricting the market performance of enterprises. Whether the single-list policy of R&D expenses can reduce the external financing cost of enterprises, alleviate financing constraints (measured by FC index and SA index) by transmitting more innovative signals to investors, inject vitality into enterprise operations and enhance the attractiveness of stocks, is the research purpose of the market. For this reason, the second mediation mechanism test was carried out in this study, and the test results are shown in Table 6.

Table 6: Regression results of the mediating effect based on financing constraints

| Variable | FCindex | | | SA index | | |
|------------------------|---------------------|-----------------------|------------------------|---------------------|-----------------------|------------------------|
| | Liquidity (1) | FC (2) | Liquidity (3) | Liquidity (4) | SA (5) | Liquidity (6) |
| DID | 0.3030*** (7.75) | -0.0170*** (-5.41) | 0.1697*** (6.28) | 0.3030*** (7.75) | -0.0223*** (-8.89) | 0.1175*** (4.45) |
| FC | | | -0.8563*** (-11.73) | | | |
| SA | | | | | | -2.9937*** (-13.63) |
| Control, Company, Year | YES | YES | YES | YES | YES | YES |
| N | 23307 | 23307 | 23307 | 23307 | 23307 | 23307 |
| Adj.R ² | 0.193 | 0.903 | 0.198 | 0.193 | 0.972 | 0.212 |

Column (1) of Table 6 is the regression result of the model (4), and the DID coefficient is still significantly positive, which is the same as the conclusion of the main test. Column (2) is the regression result of the model (6)-(1), and the DID coefficient is significantly negative, indicating that the single-list policy of research and development expenses can significantly reduce the financing constraints of enterprises; Column (3) is the regression results of model (8)-(1). The coefficient of DID is significantly positive and the coefficient of FC is significantly negative, indicating that the relief of enterprise financing constraints can promote the improvement of stock liquidity in the capital market, and the DID coefficient in model (8)-(1) is slightly lower than the DID coefficient in model (4), which shows that the financing constraints play the role of some intermediaries. After replacing the FC index with the SA index, the above conclusion is still valid.

It can be seen that the R&D Expense Separate Policy can indirectly improve stock liquidity by easing the financing constraints of enterprises and improving the fundamentals of enterprises. The easing of financing constraints is an intermediary mechanism for the R&D Expense Separate Policy to improve stock liquidity, which proves the previous hypothesis H3.

5.2 Heterogeneity Analysis

In order to further identify the impact of the R&D Expense Separate Policy on the changes in stock liquidity in the capital market, the sample enterprises are based on the scale of the enterprise and external media supervision, construct group variables and use their cross-multiplication terms with DID to conduct heterogeneous regression analysis to explore the different impacts on the conclusions of this article.

Table 7: Regression results of heterogeneity analysis

| Variable | Liquidity (1) | Liquidity (2) |
|------------------------|------------------------|-----------------------|
| DID | 0.7047*** (15.23) | 0.3359*** (10.72) |
| DID×Size Group | -0.8305*** (-17.97) | |
| DID×Media Group | | -0.1357*** (-5.68) |
| Control, Company, Year | YES | YES |
| N | 27921 | 27921 |
| Adj.R ² | 0.192 | 0.172 |

5.2.1 Enterprise Scale

Taking the median of the total assets of the enterprise as the boundary, the whole sample is divided into large-scale enterprise groups and small-scale enterprise groups, and the regulatory effect of enterprise scale on the policy effect is tested through interaction. The test results are shown in column (1) of Table 7. The regression results show that the coefficient of “*DID×Size Group*” is significantly negative, indicating that compared with large-scale enterprises, the R&D Expense Separate Policy in small-scale enterprises has a stronger increase in stock liquidity. This is because the information disclosure of large-scale enterprises is more complete, the awareness of investors is higher, and the marginal value of information brought by policies is diluted. Therefore, the promoting effect of policies on stock liquidity weakens with the expansion of enterprises. On the contrary, the information transparency of smaller enterprises is inherently lower, and they usually face more serious information asymmetry and financing constraints. The “information increment” brought about by the change of R&D expenses from note disclosure to a profit list is more significant, which can effectively reduce the degree of information asymmetry of investors, thereby improving stock liquidity to a greater extent.

It can be seen that the effect of the R&D Expense Separate Policy on the improvement of stock liquidity is more significant in smaller enterprise groups, which is in line with expectations and proves the above assumption H4.

5.2.2 External Media Supervision

Taking the median number of media news reports as the boundary, the sample is divided into high-media supervision group and low-media supervision group, and the regulating effect of external media supervision on policy effects is tested through interaction. The test results are shown in column (2) of Table 7.

The regression results show that the coefficient of “DID×Media grouping” is significantly negative, indicating that compared with enterprises with higher level of media supervision, among enterprises with lower level of media supervision, the R&D Expense Separate Policy has a stronger increase in stock liquidity. This is because when the level of media supervision is high, the market has obtained more enterprise information through the media, and the “incremental value of information” brought by the policy is diluted, so the effect of the policy on improving stock liquidity is weakened; on the contrary, when the level of media supervision is low, the transparency of enterprise information is poor, and the information increment brought by the policy through the “separate reporting of research and development expenses” is more significant. Therefore, the policy of separate R&D expenses has a stronger effect on the improvement of stock liquidity.

It can be seen that the effect of the R&D Expense Separate Policy is more significant for enterprises with poor external supervision, which further shows that the policy has a significant effect on the improvement of the external information environment of enterprises, thus proving the above hypothesis H5.

6. Research Conclusion and Significance of the Study

This study takes 28,425 samples of A-share listed companies from 2012 to 2023, and uses a difference-in-differences (DID) model to explore the impact of the separate policy of R&D expenses on stock liquidity. It confirms that the separate policy of R&D expenses significantly improves the stock liquidity of enterprises, and the effect of the separate policy is clear; the single policy plays a role by improving the comparability of accounting information and alleviating financing constraints; the effect of the separate policy is heterogeneous, and the role of improving relatively small enterprises and enterprises with low media supervision is more prominent.

This research expands the research boundaries of accounting policy and economic consequences, enriches the theoretical chain of “accounting standards-information environment-capital market”; deepens the research on the mechanism of information disclosure affecting stock liquidity, makes up for the insufficient discussion of the transmission mechanism, and provides a reference perspective for follow-up research.

At the same time, this study provides empirical support for regulatory authorities to optimize the information disclosure system and formulate differentiated policies; provides a path to improve liquidity with standardized disclosure for small and medium-sized enterprises with imperfect information environment; helps investors to make accurate decisions using single R&D cost data to reduce risks; proves the practical value of the accounting system reform service innovation-driven strategy, and helps enterprise resources to lean towards the field of innovation.

References

- [1] Chan, S. H., Martin, J. D., & Kensinger, J. W. (1990). Corporate research and development expenditures and share value. *Journal of Financial Economics*, 26(2), 255-276.
- [2] Belderbos, R., Carree, M., & Lokshin, B. (2004). Cooperative R&D and firm performance. *Research Policy*, 33(10), 1477-1492.
- [3] Ma, W. C., Hou, Y., & Zhu, G. L. (2013). Mechanism of the impact of R&D investment and personnel incentive on innovation performance: A comparative study based on emerging and traditional industries. *Science of Science and Management of S. & T.*, 34(3), 58-68. (in Chinese). <https://doi.org/10.20201/j.cnki.ssstm.2013.03.007>
- [4] Wang, Y. M., & Yang, M. (2017). The relationship between enterprise innovation investment, performance and market value: Based on data of Chinese listed companies. *On Economic Problems*, (4), 1-5. (in Chinese). <https://doi.org/10.16011/j.cnki.jjwjt.2017.04.001>

- [5] Chan, L. K., Lakonishok, J., & Sougiannis, T. (2001). The stock market valuation of research and development expenditures. *The Journal of Finance*, 56(6), 2431-2456.
- [6] Lev, B., Sarath, B., & Sougiannis, T. (2005). R&D reporting biases and their consequences. *Contemporary Accounting Research*, 22(4), 977-1026.
- [7] Hirshleifer, D., Hsu, P. H., & Li, D. (2013). Innovative efficiency and stock returns. *Journal of Financial Economics*, 107(3), 632-654.
- [8] Yang, G. C., Liu, J., Lian, P., & Rui, M. (2017). Tax reduction incentives, R&D manipulation and R&D performance. *Economic Research Journal*, 52(8), 110-124. (in Chinese).
- [9] Zhang, Q. Z., Liu, Y. W., & Geng, C. X. (2025). Research on enterprise standardization construction and stock liquidity. *Journal of Financial Research*, (11), 152-169. (in Chinese).
- [10] Wu, F., Hu, H. Z., Lin, H. Y., & Ren, X. Y. (2021). Enterprise digital transformation and capital market performance: Empirical evidence from stock liquidity. *Management World*, 37(7), 130-144, 10. (in Chinese). <https://doi.org/10.19744/j.cnki.11-1235/f.2021.0097>
- [11] Zhao, J. Y., Lu, R., Liu, J. H., & Cao, J. (2024). Price limit system reform, stock liquidity and capital market performance. *Journal of Financial Research*, (3), 113-131. (in Chinese).
- [12] Zhang, R., & Zhang, Y. T. (2025). Information disclosure of data assets and stock liquidity. *Finance and Economy*, (11), 1-12. (in Chinese). <https://doi.org/10.19622/j.cnki.cn36-1005/f.2025.11.001>
- [13] Li, Q. Y. (2009). Accounting information quality and corporate capital allocation efficiency: Empirical evidence from listed companies in China. *Nankai Business Review*, 12(2), 115-124. (in Chinese).
- [14] Balakrishnan, K., Billings, M. B., Kelly, B., & Ljungqvist, A. (2014). Shaping liquidity: On the causal effects of voluntary disclosure. *The Journal of Finance*, 69(5), 2237-2278.
- [15] Xie, D. R., Song, Z. W., & Zheng, D. J. (2022). Does the separate presentation of R&D expenses in financial statements matter? *Accounting Research*, (8), 30-44. (in Chinese).
- [16] Zhang, Y. (2018). Can tax collection and administration improve the comparability of corporate accounting information? Based on the perspective of related party transactions. *Journal of Guangdong University of Finance & Economics*, 33(4), 75-88. (in Chinese). <https://doi.org/10.20209/j.gcx.441711.2018.04.011>
- [17] Nie, X. K., Wang, W. H., & Pei, X. (2022). Does corporate digital transformation affect accounting information comparability? *Accounting Research*, (5), 17-39. (in Chinese).
- [18] Yu, M. G., Zhong, H. J., & Fan, R. (2019). Privatization, financing constraints and enterprise innovation: Evidence from Chinese industrial enterprises. *Journal of Financial Research*, (4), 75-91. (in Chinese).
- [19] Lu, X., Zheng, Y. F., & Li, J. M. (2013). Study on the impact of financing constraints on corporate R&D investment: Empirical evidence from Chinese high-tech listed companies. *Accounting Research*, (5), 51-58, 96. (in Chinese).
- [20] Hall, B. H. (2002). The financing of research and development. *Oxford Review of Economic Policy*, 18(1), 35-51.
- [21] Xiong, J. C., & Su, D. W. (2014). Stock liquidity and corporate capital allocation efficiency. *Accounting Research*, (11), 54-60, 97. (in Chinese).
- [22] Luo, Z. Y., & Duan, J. G. (2006). Study on endogenous constraint model of financing structure choice for SMEs. *Accounting Research*, (8), 67-72. (in Chinese).
- [23] Wen, Z. L., Zhang, L., Hou, J. T., & Liu, H. Y. (2004). Testing and application of the mediating effects. *Acta Psychologica Sinica*, (5), 614-620. (in Chinese).
- [24] Tang, X. S., Jiang, X. Y., & Lei, X. (2019). Accounting information comparability and the effectiveness of executive compensation contracts. *Accounting Research*, (1), 37-44. (in Chinese).
- [25] Ju, X. S., Lu, D., & Yu, Y. H. (2013). Financing constraints, working capital management and the sustainability of enterprise innovation. *Economic Research Journal*, 48(1), 4-16. (in Chinese).

Funding

This research received no external funding.

Conflicts of Interest

The authors declare no conflict of interest.

Acknowledgment

This paper is an output of the science project.

Copyrights

Copyright for this article is retained by the author (s), with first publication rights granted to the journal. This is an open-access article distributed under the terms and conditions of the Creative Commons Attribution license (<http://creativecommons.org/licenses/by/4.0/>).