

# Does Strict Regulation of Capital Markets Enhance Firms' Ability to Spend on R&D?

-- An Empirical Analysis Against the Newly Enacted Securities Laws

Zhenna Huang, Lina Jiang, Weixin Hong\*

Faculty of Finance, City University of Macau, Macau, China

\* Corresponding author

**Abstract:** China's updated Securities Law aims to promote enterprise value creation, optimize resource allocation, and foster high-quality economic development, with a core focus on protecting small and medium-sized investors, strengthening information disclosure, and enhancing financial market stability. This study employs the Difference-in-Differences (DID) method to empirically analyze the impact of the new law on firms' R&D investment. Results show that stringent capital market regulation significantly boosts R&D expenditure, particularly in heavily polluting industries and non-manufacturing sectors. The mechanism analysis reveals that improved disclosure quality and reduced financing constraints (measured by the SA index) mediate this effect, while internal control quality and equity concentration moderate the relationship. These findings provide theoretical and empirical support for optimizing capital market regulations to stimulate corporate innovation.

**Keywords:** Securities Law; Difference-in-Differences (DID); Capital market regulations.

## 1. Introduction

China's latest Securities Law comprehensively regulates securities-related activities, including market fundamentals, foreign capital stock issuance, information disclosure, and penalties for unlawful behavior. Encompassing ten key areas of amendment, it serves as a pivotal policy tool to enhance capital market resource allocation, foster enterprise value creation, and drive high-quality economic growth. Central to this is R&D investment, which embodies enterprises' expenditures on scientific and technological advancement, directly impacting their core competitiveness and innovation capabilities. The law's stringent capital market regulations thus warrant investigation into their effects on corporate R&D and broader economic growth.

Scholarly inquiry into the new Securities Law has primarily focused on information disclosure and investor protection. The revised law strengthens the legal obligations of listed companies for disclosure, reducing the frequency of financial forecast announcements by private firms while enhancing forecast precision and risk warnings, particularly in firms with high agency costs or bankruptcy risks [1]. It has also improved the quality of earnings announcements and market reactions, with the law's informational effects—shaped by report type and enforcement rigor—influencing investor legal awareness [2]. State-owned enterprises exhibit heightened disclosure quality under the law. At the same time, a dedicated investor protection chapter safeguards small and medium-sized investors, particularly in firms with high goodwill or low product market competition [2-4].

The law's "zero-tolerance" stance on financial fraud is exemplified by penalties, such as the tens of millions of yuan fine imposed on Guangdong Rongtai, which surpasses the pre-revision maximum of \$600,000 [5]. It also reduces stock price crash risks by curbing managers' incentives to conceal bad news, with low-transparency annual reports being linked to a higher likelihood of crashes [6]. Firms with internal

control deficiencies exhibit reduced earnings management post-law, particularly when they are equipped with independent academic directors or high analyst coverage, reflecting improved internal controls and external regulation [7].

Tang et al. highlight the higher vulnerability of private firms to majority shareholder expropriation through financial manipulation and insider trading, thereby exacerbating ethical crises and legal risks. These firms rely on disclosure to mitigate information asymmetry, while the law's class action system—allowing protection organizations to sue for damages—lowers investor litigation costs. Ye et al. emphasize the law's role in stabilizing financial markets by reducing crash risks tied to information opacity [6].

Despite extensive research on disclosure and investor protection, fewer studies address the law's impact on R&D investment. Existing literature identifies government subsidies and tax breaks as catalysts for R&D [8], while family ownership correlates negatively with R&D intensity; however, family management involvement has the opposite effect [9]. Convertible bond issuances also boost R&D investment [10]. Financial leverage hurts R&D [15], whereas policy support and tax incentives help offset innovation-related income gaps and expand capital pools, thereby enhancing R&D capacity. In family firms, the CEO-chairman duality correlates inversely with R&D intensity due to risk aversion driven by the prioritization of family interests [17].

This study bridges the gap by examining how the Securities Law's regulatory framework influences R&D investment through the quality of disclosure, financing constraints, and corporate governance mechanisms. Analyzing heterogeneous effects across industries and firm types enhances our understanding of the law's role in shaping innovation-driven growth, complementing prior research on capital market reforms and corporate strategic behavior.

## 2. Policy Background and Theoretical Analysis

### 2.1. Policy and Institutional Background of China's New Securities Law

On December 29th, 1998, the Standing Committee of the 9th National People's Congress of China gave its blessing to the Securities Law, a cornerstone of the capital market, and it was put into effect on July 1st, 1999. Since its issuance, the text of the law has been subject to minor revisions in 2004, 2013, and 2014, respectively. In 2015, the content suffered an extensive overhaul. The Securities Law was finalised after three rounds of discussions, from the beginning of the text to the second overhaul. On 21 April 2015, the public was made aware of the draft's initial version, coinciding with the 14th and 14th assemblies of the Standing Committee of the National People's Congress - a sign that the draft had just started its pre-trial process. Then, on 24 April 2017, the 27th assembly of the Standing Committee of the 14th National People's Congress put the Securities Law amendments back on the agenda, thus initiating the second round of deliberation. At the 13th Tenth Session of the National People's Congress of the PRC, held on 20 April 2019, the main topics discussed were the suspension of the registration system, the strengthening of capital market oversight, stringent merger and acquisition regulations, increased transparency in information, and the strengthening of the protection of investors' legitimate interests. This was the third time the draft revised Securities Law was being reviewed. At the 15th Standing Committee Meeting of the 13th National People's Congress, on 28 December 2019, it was declared that the revised Securities Law would be effective on 1 March 2020 after a comparison to the 2005 version. This new version of the law had a decrease of 14 articles and two chapters on "Information Transparency" and "Protection of Investors' Interests" that addressed more than 100 regulations. These measures are designed to strengthen the legal protection network and ensure that investors' interests are substantially safeguarded, and their impact is significant and far-reaching.

An examination of how the new Securities Law has impacted enterprises' R&D investments is to be conducted.

Two main effects of the new Securities Law on corporate R&D are the performance and debt financing levels. In this paper, we will analyze these two channels in depth, taking into account the structural difference perspective.

### 2.2. Corporate Performance Channel

Stringent regulation improves corporate governance by reducing agency costs and enhancing operational transparency [12]. Better governance leads to more efficient resource allocation, higher profitability, and increased willingness to invest in R&D. For example, improved disclosure quality reduces information asymmetry, enhancing investor confidence and attracting long-term capital for innovation [13-14].

### 2.3. Level of Debt Financing

Wu found that firms with a greater financial flexibility expend substantially more on R&D than those with a greater financial limitation [16]. The more a firm spends on R&D, the more it tends to reduce its reliance on debt as a means of financing in order to avoid the greater cost of capital and economic risk, and instead makes greater use of internal company funds and attracts external equity funds [19-20]. It

is also suggested by [16] that the greater the intensity of R&D expenditures of small and medium-sized enterprises (SMEs) focusing on high technology, the lower the debt ratio they usually incur. However, the debt ratios of these firms increase if the R&D programme progresses smoothly, and the smooth progress of R&D can have an inverse moderating effect on the negative relationship between the intensity of R&D expenditures and the level of debt, i.e. the smoother the project progresses, the more the negative impact of R&D expenditures on the debt ratios is attenuated. The new Securities Law proposes zero-tolerance regulation of financial fraud, disclosure of a company's debt financing level, and lowering the level of debt financing to improve the R&D level of enterprises [21].

## 3. Data and Methods

### 3.1. Modelling

#### (1) DID model

This paper employs Ashenfelter and Card's Double Difference Difference (DID) technique to evaluate the influence of stringent capital market regulation on the magnitude of companies' R&D investment, utilizing the implementation of the new Securities Law as a quasi-natural experiment to validate the theoretical hypotheses [11]. The double difference method can test whether there is a significant difference in the level of R&D investment between firms in the experimental and control groups before and after the implementation of the new Securities Law. The experimental group in this paper is 563 non-state-owned enterprises, and the control group is 509 state-owned enterprises. Therefore, the econometric model is set as follows:

$$RDRatio_{ic_{it}} = \alpha_0 + \alpha_1 inter_{it} + \alpha_3 control_{it} + \delta_i + \rho_t + \varepsilon_{it} \quad (1)$$

The subscripts  $i$  and  $t$  denote county individuals and years, respectively, and the level of firms' R&D investment ( $RDRatio_{ic}$ ) is the explanatory variable.  $inter_{it}$  ( $inter_{at} = treatment_i \times post_t$ ) is the core explanatory variable.  $treatment_i$  denotes the experimental and control group dummy variables, referring to Tang Xuesong et al., based on the nature of property rights to distinguish the experimental group as non-state-owned enterprises, the variable takes the value of 1; the control group as state-owned enterprises, the variable takes the value of 0 [1].  $post_t$  is a policy year dummy variable, with the variable taking the value of 1 for the years 2020 and after, and 0 for the years before.  $\delta_i$  denotes individual fixed effects, and  $\rho_t$  denotes time effects, and to address potential serial correlation and heteroskedasticity, robust standard errors for individual clustering reported in the regression results in the latter section.

#### (2) Mediated effects model

Exploring the potential transmission mechanism or mediating variables of stringent capital market regulation on corporate R&D investment, this section applies the mediation effect model and empirically examines the SA index and the quality of disclosure ( $kv\_r$ ) as the mediating factor  $M$ . The model is constructed as follows [18]:

$$RDRatio_{ic_{it}} = \alpha_0 + \alpha_1 inter_{it} + \alpha_3 control_{it} + \delta_i + \rho_t + \varepsilon_{it} \quad (2)$$

$$M_{it} = \alpha_0 + \alpha_1 inter_{it} + \alpha_3 control_{it} + \delta_i + \rho_t + \varepsilon_{it}$$

$$RDRatio_{ic_{it}} = \alpha_0 + \alpha_1 inter_{it} + \alpha_2 M_{it} + \alpha_3 control_{it} + \delta_i + \rho_t + \varepsilon_{it}$$

To test the "core explanatory variables - mediating variables - explanatory variables" transmission, three equations similar to fixed effects models are used. They assess impacts of capital market regulation on R&D, mediating variables, and combined effects, with coefficient comparisons validating mediating variables.

### (3) Moderating effects

The presence of one or more moderating variables alters the relationship between the independent and dependent variables in a regression model, resulting in moderating effects. These moderating effects alter the strength or direction of the relationship between the independent and dependent variables. We refer to the moderating variable's significant impact on the independent and dependent

variables as either a positive or negative moderating effect, depending on the direction in which it influences the relationship.

The moderating effect model, which this paper constructs, is based on the fact that when a moderating variable has a moderating effect, the coefficient estimation in the regression model must not only consider the independent variable's direct effect on the dependent variable, but also its moderating effect on the relationship.

$$RDRatio_{ic_{it}} = \alpha_0 + \alpha_1 inter_{it} + \alpha_2 inter_{it} * W_{it} + \alpha_3 control_{it} + \delta_i + \rho_t + \varepsilon_{it} \quad (3)$$

Where W is the moderating variable, which in this paper is the internal control index (NK), media attention (Media), and equity Herfindahl index (HHI).

## 3.2. Description of Variables

**Table 1.** Description of variables

	VarName		
Explanatory variable	RDRatio_ic	R&D as a percentage	Ratio of R&D expenditure to current operating income
	Inter1		$treatment_i \times post_t$
Intermediary variable	SA	SA index	The larger the absolute value, the more severe the degree of financing constraints.
	kv_r	Quality of disclosure	KV index
Moderator variable	NK	Internal control	Natural logarithm of the Dibble internal control index
	Media	Media Focus	Total media coverage, plus one takes natural logarithm
	HHI	Equity Herfindahl Index	The sum of the squares of the shareholdings of the top 10 largest shareholders of the company
Control variable	Size	Company size	Natural logarithm of total assets for the year
	Lev	Financial leverage	Total liabilities at year-end divided by total assets at year-end
	ROA	Net profit margin on total assets	Net profit/average balance of total assets
	Cashflow	Cash flow levels	Net cash flows from operating activities divided by total assets
	FIXED	Fixed assets as a percentage	Due to the ratio of net fixed assets to total assets
	Growth	Growth rate of operating income	Current year's operating income/previous year's operating income - 1
	Indep	Proportion of independent directors	Independent directors divided by number of directors
TOP1	Shareholding ratio of the largest shareholder	Number of shares held by the largest shareholder/total number of shares	

For this paper, 1072 enterprises have been chosen as the research object for the period of 2017-2022, with a total of 16,678 observations. Three treatments have been implemented: (1) excluding financial categories; (2) excluding ST and \*ST enterprises; and (3) excluding enterprises with more missing values. To minimize the impact of extreme values, the continuous variables in this paper have been shrink-tailed in the upper and lower 1% quartiles.

## 3.3. Correlation Analysis

After obtaining relevant data, this paper conducts a correlation analysis to examine variable relationships. Simple correlation analysis is applied to variables including enterprise R&D investment, capital market regulation intensity, SA index, and disclosure quality. Results show a significant positive correlation coefficient of 0.102 (at the 1% level) between R&D investment and regulation, indicating a strong association. Other variables' coefficients range between -0.5 and 0.5, suggesting low interdependence and minimal covariance issues. This confirms data reliability, mitigates regression model concerns, and validates the feasibility of subsequent regression analyses.

## 4. Empirical Results

### 4.1. Benchmark Regression Results

The DID estimate shows that the new law increases R&D investment by 0.89 percentage points ( $p < 0.01$ ), indicating that stricter regulation enhances disclosure quality and reduces information asymmetry, thereby stimulating innovation. Control variables reveal that financial leverage (LEV), profitability (ROA), and fixed asset ratio (FIXED) negatively affect R&D, while revenue growth (GROWTH) has a positive effect.

### 4.2. Heterogeneity Analysis

#### 4.2.1. Industry Pollution Levels

Heavily polluting industries: inter coefficient = 0.0262 ( $p < 0.01$ ), driven by environmental regulations and public pressure to innovate cleaner technologies.

Non-heavily polluting industries: inter coefficient = 0.0014 (insignificant), due to weaker environmental incentives.

#### 4.2.2. Manufacturing vs. Non-Manufacturing Firms

Non-manufacturing firms: stronger positive effect (coefficient = 0.015), likely due to higher reliance on external

financing and market mechanisms.

Manufacturing firms: weaker effect (coefficient = 0.007), as they rely more on internal funds and traditional bank loans.

**4.2.3. High-Tech vs. Non-High-Tech Firms**

High-tech firms: inter coefficient = 0.0107 (p<0.05), reflecting their need for continuous R&D to maintain competitiveness.

Non-high-tech firms: inter coefficient = 0.0019 (p<0.05), with smaller effect size due to lower innovation dependency.

**4.3. Moderation Effects**

The interaction term  $inter \times NK$  is -0.0100 (p<0.05), indicating that strong internal controls weaken the positive effect of regulation on R&D, possibly due to redundant compliance costs. The interaction term  $inter \times Media$  is 0.0131 (p<0.01), showing that media scrutiny amplifies the regulatory effect on R&D by increasing public accountability and firm visibility. The interaction term  $inter \times HHI$  is -0.0006 (p<0.1), suggesting that concentrated ownership reduces R&D responsiveness to regulation, likely due to slower decision-making and risk aversion.

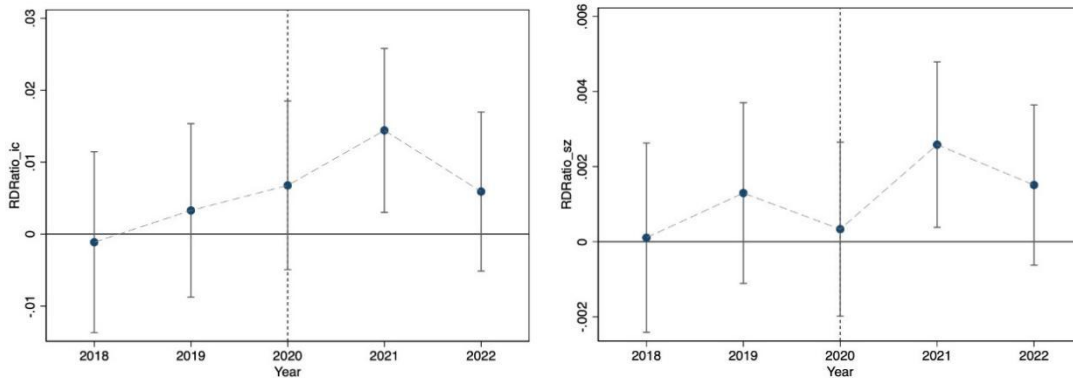


Figure 1. Parallel trend test

**4.4.2. Placebo Test**

The individual placebo test is the most frequent type of placebo test, where the treatment group is randomly chosen and repeated 500 or 1000 times to determine if the coefficients of the "pseudo-policy dummy variables" are statistically significant. To ensure the rigor of the research results and to test the robustness of the double-difference model constructed in the preceding section, we repeat the process 500 times, yielding 500 regression results (including the estimated coefficients of the pseudo-policy dummy variables, the standard error, and the p-value). Finally, we can plot the results of the 500. By plotting the estimated coefficients of the "pseudo-policy dummy variables," we can observe the results of the placebo test, depicted in Figure 2, with zero as the mean. Additionally, the coefficients of the random sample are seen to be normally distributed. This suggests that our estimates are unlikely to have been obtained by chance and, thus, are unlikely to have been influenced by other policy or randomness factors. The model, therefore, passes the placebo test.

**4.4. Inspection**

**4.4.1. Parallel Trend Test**

A dynamic effects test is essentially the introduction of a finite number of time dummy variables and cross-multiplying them with the treatment group dummy variables to examine the significance of the cross-multiplication term. A contrast exists between the dynamic effects assessment and the parallel trend assessment. In the parallel trend test, it is sufficient to examine whether the cross-multiplication term is significant before period 0. No significant difference between the treatment and control groups being present prior to the DID can be assumed. To do this, we first generate the interaction terms between the dummy variables and the treatment group dummy variables, and then regress them on the dummies as explanatory variables. The coefficients of the interaction terms then reflect the differences between the treatment and control groups. Figure 1 reveals that the coefficients of the interaction terms are not significantly different from 0 prior to the policy, with the 95% confidence interval including a value of 0, thus demonstrating that no noteworthy distinction exists between the treatment and control groups before the policy's time point. e., the assumption of parallel trends is satisfied.

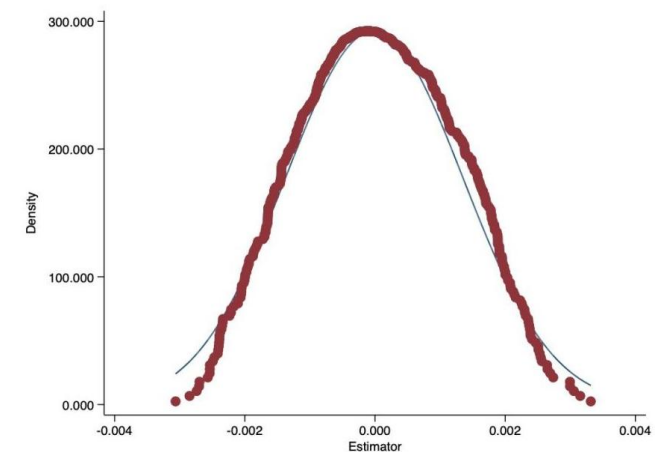


Figure 2. Placebo test for coefficient distribution

**5. Conclusion**

This study finds that China's new Securities Law significantly promotes corporate R&D investment by improving disclosure quality and reducing financing constraints. The effect is heterogeneous: stronger in heavily polluting industries, non-manufacturing sectors, and high-tech firms. Internal control quality and equity concentration weaken the effect, while media attention strengthens it. These

findings suggest that capital market regulation can effectively drive innovation by creating a transparent and stable environment, particularly for firms that rely on external financing and face environmental or technological pressures. Policymakers should prioritize industry-specific regulatory designs and leverage media oversight to maximize innovation incentives while avoiding excessive compliance burdens for firms with strong internal governance.

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