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The Influence of Registration-Based Reform on Innovation Investment Made by Listed Companies

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Abstract: The reform of the registration system, a pivotal transformation in China's securities market, signifies a substantial shift in the landscape of the country's capital market and has exerted a notable influence on the innovation endeavors of listed companies. Drawing on the data of A-share listed companies spanning during 2016-2023, this study adopts double differences (DID) model to carry out an empirical analysis on how the registration system influences innovation input and its mechanism. Research indicates that, comparison between the reform of the registration system and the approval system has significantly increased the intensity and amount of innovation and R&D investment by listed companies. Mechanism tests reveal that, due to financing constraints being the core transmission pathway, the registration system has led to a decrease in the SA index of listed companies, which in turn has increased their investment in technological and product innovations. The findings of this study not only provide micro-level evidence for the economic consequences of the registration-based system reform but also offer a theoretical foundation for the policy design of capital markets to support the innovative development of the real economy.

Keywords: Reform of the Registration System; Innovation Investment; Financial Constraints; Information Disclosure

1. Introduction

The share issue system is the core basic system of the capital market, significantly influences enterprise valuation, market transactions, and resource allocation efficiency. Compared with the registration system of mature capital market, China's approval system has inherent limitations, which restrict the function of capital market and weaken the ability to serve the real economy efficiently[1]. Therefore, the registration-based reform has become the necessary way for economic development. This reform has enhanced the competence of the capital market in catering to the real economy by improving information disclosure and simplifying issuance procedures, particularly by providing more convenient financing channels for technology innovation enterprises.

As market entities, the innovation vitality of enterprises is crucial for enhancing the country's overall competitiveness. It not only strengthens the organization's resilience to market changes but also provides a significant guarantee for the country to maintain a competitive edge in global technological competition through the spillover effect of the industrial chain[2]. With escalating Sino-US competition in 5G, AI, and semiconductors, coupled with China's shrinking demographic dividend, transitioning from factor-driven to innovation-driven growth via total factor productivity enhancement is imperative. In this context, exploring whether the registration-based system reform affects the innovation investment of listed companies has become a key measure of supply-side structural reform and holds significant policy implications for understanding the linkage mechanism between capital market system reform and micro-enterprise innovation decisions.

Investment in innovation serves as the linchpin for boosting an enterprise's competitiveness and driving its high-quality growth. However, due to the inherent characteristics of high return on investment uncertainty and long R&D project cycle, enterprise innovation often faces the challenge of difficult and expensive financing[3]. Under the approval system, enterprises may reduce their R&D investment[4] in order to meet listing requirements, while the registration system, which focuses on information disclosure, can alleviate this distortion. Jiang et al. (2024)[5]. Based on the competitive transmission path, the double difference model is used to find that the science and Technology Innovation Board will

force the main board enterprises to increase innovation investment. Regarding innovation investment, Kasych, A., et al. (2021) [6] argue that it plays a vital role as a factor in enhancing the competitiveness of enterprises. However, most studies on the impact of the registration system reform have focused on its effects on IPO pricing efficiency and audit quality[7][8][9]. The field of empirical research on how the registration system can influence corporate innovation investment by easing financing constraints remains insufficient.

This study, grounded in the financing constraint theory[10] , constructs an analytical framework for the impact of the registration system reform on innovation investment by listed companies. The registration mechanism has the potential to improve the revelation of information, manage financial hazards, and relieve the difficulties that SMEs encounter in obtaining financing[11]. The findings provide valuable insights for listed companies to navigate institutional changes, regulatory improvements, and the exploratory phase of reforms. For this purpose, this paper selects the companies listed in 2016-2023 A-action as data examples and adopts double differences (DID) model to explore the impact and mechanisms of the registration system reform on corporate innovation investment. Compared to existing literature, this paper's marginal contributions are primarily made known the under aspects: (1) Focusing on the impact of the registration system, an exogenous policy shock, on innovation investment. (2) Adapt the DID model to avoid the issue of mechanism mixing, considering the timing of the pilot program. (3) Using the mechanism of financing constraints as a mediating variable to reveal the impact of the registration system reform on innovation investment by listed companies. The registration mechanism has the potential to improve the revelation of information, manage financial hazards, and relieve the difficulties that small and medium-sized enterprises (SMEs) encounter in obtaining financing.

2. Theoretical Analysis and Research Hypotheses

2.1 Main Impact of the Registration-Based Reform on the Innovation Investment of Public Companies

From the perspective of institutional change, principal function of registration system is its focus on message release, replacing the substantive review of the traditional approval system. This shift has produced multiple positive effects: At first, through simplifying the IPO procedures and lowering entry barriers, the registration system allows more innovative companies with short-term profitability issues to enter the capital market. Next, the role of the China Securities Regulatory Commission (CSRC) has shifted from review to supervision, and the simplification and predictability of the review process have reduced the costs for companies to go public. Lastly, according to Barney's resource-based theory (1991)[12], the key to a company's competitive advantage lies in possessing valuable and irreplaceable resources, and innovation is one of these characteristics. The market-based pricing mechanism under the registration system enhances the productivity of allocating innovative resources. In light of the foregoing analysis, this research puts forward the following hypotheses:

H1: The registration-based IPO system promotes the innovation input from publicly traded companies.

2.2 The Mechanism Impact of the Registration-Based Reform on R&D Investment from Listed Companies

From a financing perspective, because the prolonged duration and inherent uncertainty of innovation endeavors, companies face significant financing limitations, heavily relying on internal funds. The execution of the registration-based mechanism effectively alleviates financing constraints for listed companies in three ways: First, by loosening IPO approval criteria, it streamlines fundraising for tech enterprises. This not only boosts financing efficiency but also substantially increases actual capital raised, efficiently expanding funding access for high-tech firms[13]. Second, it optimizes the refinancing mechanism, improving the utilization rate of funds. Third, it establishes a robust information disclosure mechanism, reducing information asymmetry and significantly enhancing the market's ability to identify and value innovative projects. Based on these points, this study puts forward the following hypotheses:

H2: By easing financing constraints, the registration-based system reform drives

innovation investment of listed companies.

3. Research Design

3.1 Sample Picking and Data Acquisition

The research background of this paper is full-scale promotion of the registration-based reform. Therefore, utilizing the data from A-share listed companies within China's A-share market during 2016-2023, the main research subjects are A-share listed companies on the STAR Market, the Growth Enterprise Market (GEM), and the Shanghai and Shenzhen main boards. All data are sourced from CSMAR. To address issues such as missing data and extreme values that could affect empirical results, the following adjustments were made: (1) excluding the financial industry; (2) excluding ST/*ST and delisted companies; (3) excluding observations with missing variables; (4) applying Winsorization at a 1% level to continuous variables. After these adjustments, a total of 23,448 observations were obtained.

3.2 Definition of Main Variables

3.2.1 Explained variable

Listed company innovation investment (Innovation). Look up the research of Li et al. (2021)[14], this paper selects enterprise innovation RD intensity (RD) as the measurement standard, and adopts the proportion of RD investment to operating income to measure the innovation investment of listed companies.

3.2.2 explanatory variable

The registration-based reform (Reform). Adhering to the procedures of Li et al. (2025) and Dong et al. (2025)[15][16], and considering the development of China's registration-based reform. The STAR Market has adopted the registration-based system since its listing on July 22, 2019. Meanwhile, the Growth Enterprise Market (GEM) and the Beijing Stock Exchange (BSE) have adopted IPO Approval System for companies go public before August 24, 2020, and before November 15, 2021, respectively. Therefore, this paper assigns a value of 1 to all STAR Market companies, GEM companies listed after August 24,2020, and BSE and Shanghai and Shenzhen main boards companies listed after November 15,2021. Companies listed before August 24, 2020, on the GEM, and before November 15,2021, on the BSE and all Shanghai and Shenzhen main boards are assigned a value of 0.

3.2.3Controlled variable

Based on the research findings of Zhang et al. (2017), Chen et al. (2025), and Garrido-Prada et al. (2024)[17][18][19], this paper selects control variables that may influence the innovation investment of listed companies, as follows: company size (Size), company age (Age), debt-to-equity ratio (Lev), Tobin Q (Tobin), the proportion of independent directors (RI), and industry concentration index (HHI). For the definitions of specific variables, please refer to Table 1.

Table 1. Variable-Definition

Classification	Variable	Name	Definition
Explanatory	Reform	Registration system reform	Companies listed on the Science and Technology Innovation Board after July 22,2019 and companies listed on the Growth Enterprise Market after August 24,2020
Explained variable	RD	The innovation and R&D intensity of listed companies	R&d investment/revenue
	Expend	The amount of innovative research and development of listed companies	Ln (Enterprise innovation and R&D amount)
Mechanism variables	SA	The intensity of financing constraints	A nonlinear combination of firm size and age
Controlled variable	Size	Enterprise size	Ln (Net fixed assets)
	Age	Enterprise age	Ln (Fiscal year-the year in which the enterprise was established)
	Lev	Asset-liability ratio	Total liabilities/total assets
	Tobin	Tobin Q	Market value/A total asset
	RI	Proportion of independent	Number of independent directors/director size

		directors	
	HHI	Industry competition	Sum of the ratio of each firm's core-business revenue to the overall core-business income of the industry
	Gsubsidy	Government subsidy	Ln (Government subsidy amount)
	ROE	Net asset liability ratio	Net profit/shareholders' equity balance
	Mown	Management shareholding ratio	The number of shares held by the board of directors as a percentage of the total number of shares

3.2.4Mechanism variables

Drawing on the financing constraint theory, this research employs the SA index proposed by Hadlock, C. J., & Pierce, J. R, 2010[20] as the key mediating variable. The SA index focuses on two variables, including enterprise and age that exhibit limited temporal variation and possess high exogeneity. The study is to explore the channels. Through what means does the registration system reform spur innovation investment? By easing capital restrictions.

The algorithmic equation of SA index is:

$$\text{SA Index}=-0.737*\text{Size}+0.043*Size^2-0.04*\text{Age} \quad (1)$$

In its RD, Size refers to the natural logarithm calculated from the company's total assets. The age of a company refers to the number of years that have elapsed since its founding. The SA index is often negative, and a marked increase in its absolute value signifies a significant escalation in companies' financing hardships.

3.3 Models

3.3.1 Baseline regression model

To test the hypothesis, DID is constructed:

$$\text{Innovation}_{it}=\alpha+\beta\text{Reform}_{it}+\gamma\text{Control}_{it}+\text{Year}_t+\text{Id}_i+\theta_{it} \quad (2)$$

Among these, Innovation_{it} shows the investment in innovation made by publicly-owned enterprises, measuring by intensity of enterprise R&D and innovation (RD_{it}); $Reform_{it}$ is a dummy variable, which represents the reform of the registration system. If the enterprise is listed through the approval system, $Reform_{it}$ take 0, otherwise take 1; Control_{it} is a controlled variable, θ_{it} is a residual term. In addition, industry (Id) fixed effects and year (Year) fixed effects were controlled. In addition, industry (Id) fixed effects and year (Year) fixed effects were controlled.

3.3.2Mediation model

$$\text{SA}_{it}=\alpha_1+\beta_1\text{Reform}_{it}+\gamma_1\text{Control}_{it}+\text{Year}_t+\text{Id}_i+\theta_{it} \quad (3)$$

$$Innovation_{it} = \alpha_2 + \beta_2 Reform_{it} + \delta SA_{it} + \gamma_2 Control_{it} + Year_t + Id_t + \theta_{it} \quad (4)$$

Here, SA_{it} represents the mechanism variable, which measures the funding constraints of companies. If $\beta_2<0$ in model(3), it suggests that the registration system reform can affect the intermediary variable, and other explanatory variables are in line with the benchmark regression model.

4. Empirical Results and Analysis

4.1 Descriptive Statistical Analysis

The descriptive statistics of each variable are shown in Table 2. The bottom threshold of innovation input (RD) is 0.00045, while the top threshold is 0.358. This indicates significant disparities in R&D investment among listed companies and room for improvement in innovation capabilities. In this sample, the mean value of Reform is 0.108, expressing that approximately 10.8% of listed companies adopted the registration-based IPO system. The other variables show substantial consistency with outcomes in prior researches.

Table 2. Descriptive Statistical Results

Variable	Obs	Mean	Std.	Min	Max
RD	23,448	0.058	0.059	0.00045	0.358
Expend	23,448	18.100	1.381	14.350	21.820
Reform	23,448	0.108	0.3110	0.000	1.000
SA	23,448	3.892	0.2450	3.327	4.557
Size	23,448	22.180	1.2000	20.05	25.820
Age	23,448	2.949	0.3100	2.079	3.611
Lev	23,448	0.391	0.1930	0.0570	0.868
Tobin	23,448	1.966	1.1070	0.843	7.102
Variable	Obs	Mean	Std.	Min	Max
Indep	23,448	0.379	0.0530	0.333	0.571
HHI A	23,448	0.202	0.1930	0.0339	1.000
Gsubsidy	23,448	16.630	1.4150	12.850	20.350
ROE	23,448	0.052	0.1410	-0.766	0.318
Mown	23,448	17.540	20.500	0.000	69.440

4.2 Benchmark Regression

The benchmark regression outcomes of Model (2) are displayed in Table 3. Columns (1) and (2) only incorporate the two core variables:

registration system reform (Reform) and public companies' innovation R&D intensity (RD), with year fixed effects and industry fixed effects controlled for, respectively. The regression coefficients are all positively significant at the 1% level. Columns (3) and (4) incorporate control variables based on the first two columns. The regression coefficients of Reform are 0.034 and 0.035 respectively, remaining positively significant at the 1% level. What's more, the explanatory power of the model (R^2) has improved. The study indicates that the registration-based reform has the potential to increase the innovation and R&D efforts of listed companies, as a result, it enhances their innovation investment. This is consistent with Hypothesis H1 in this paper.

Table 3. Benchmark Regression Results

	(1)	(2)	(3)	(4)
	RD	RD	RD	RD
Reform	0.048***	0.042***	0.034***	0.035***
	(15.29)	(14.43)	(11.61)	(13.10)
Size			0.002***	0.004***
			(3.18)	(6.51)
Age			-0.020***	-0.012***
			(-7.82)	(-5.73)
Lev			-0.075***	-0.070***
			(-15.30)	(-16.06)
Tobin			0.013***	0.010***
			(13.48)	(12.74)
Indep			0.023*	0.019*
			(1.78)	(1.71)
ROE			-0.086***	-0.077***
			(-15.64)	(-14.70)
_cons	0.053***	0.054***	0.061***	-0.006
	(59.79)	(70.07)	(3.39)	(-0.42)
id	NO	YES	NO	YES
year	YES	NO	YES	NO
N	23448	23413	23448	23413
Adj. R^2	0.073	0.268	0.218	0.353

4.3 Robustness Test

4.3.1 Increase the number of control variables

To ensure the accuracy of the benchmark regression, this paper verifies whether the estimation results of the core explanatory variable (Reform) remain stable by introducing additional control variables. Therefore, on the basis of the benchmark regression, this paper adds three control variables: return on equity (ROE), government subsidies (Gsubsidy), and management ownership ratio (Mown). The results, consistent with columns (1) and (2) in Table 4, show that the coefficients and significance levels of the core variables did not exhibit significant changes (For example, the coefficients of Reform are 0.032 and 0.033, maintaining positive significance at the 1% level). This indicates that even after adding control variables, the conclusions of this paper remain valid.

4.3.2 Replace the explained variable

Given that some companies with innovative potential but insufficient profitability have been able to enter the capital market due to the registration system reform lowering the listing threshold. These listed companies will increase their innovation investment amounts. Thus, this paper changes the measurement method of innovation input from the original innovation R&D intensity to the amount of innovation investment. Other models maintain the same control variables and fixed effects settings as the benchmark analysis. The results are shown in columns (3) and (4) of Table 4, the regression coefficient of Reform remains positively significant at the 1% level, and the R-squared increases to 0.610. The findings suggest that the reform of the registration-based exerts a favorable influence on boosting the quantities of innovation investment, which further supports the robustness of the research findings.

Table 4. Robustness Test Results

	(1)	(2)	(3)	(4)
	RD	RD	Expend	Expend
Reform	0.032***	0.033***	0.153***	0.182***
	(26.32)	(32.01)	(4.18)	(6.13)
Size	-0.006***	-0.004***	0.797***	0.900***
	(-13.46)	(-8.90)	(44.08)	(67.77)
Age	-0.016***	-0.009***	-0.319***	-0.081**
	(-13.94)	(-8.84)	(-5.65)	(-2.08)
Lev	-0.071***	-0.070***	-0.382***	-0.161**
	(-33.32)	(-34.39)	(-3.75)	(-1.99)
Tobin	0.012***	0.009***	0.159***	0.099***
	(35.49)	(31.72)	(11.76)	(9.53)
Indep	0.018***	0.014**	0.463*	0.362*
	(2.83)	(2.51)	(1.79)	(1.75)
HHI_A	-0.039***	-0.026***		
	(-22.91)	(-14.95)		
ROE	-0.093***	-0.083***	0.202**	0.258***
	(-36.93)	(-35.52)	(2.39)	(3.40)
Gsubsidy	0.011***	0.010***		
	(36.00)	(33.55)		
Mown	0.000***	0.000***		
	(8.92)	(6.54)		
_cons	0.055***	0.009	1.055**	-1.872***
	(6.29)	(1.07)	(2.47)	(-6.21)

id	NO	YES	NO	YES
year	YES	NO	YES	NO
N	23448	23413	23448	23413
Adj. R^2	0.282	0.391	0.407	0.610

4.4 Mechanism Testing

Based on the research findings presented in the preceding sections, it turns out that most enterprises exhibit weak innovation investment enthusiasm, mainly due to the financing constraints they face. However, the registration-based reform is expected to broaden corporate financing channels and optimize the refinancing mechanism to alleviate financing constraints. To validate this perspective, this paper employs financing constraints (SA index) as the mechanism variable through which the registration-based IPO reform affects the innovation investment of listed companies. Table 5 Columns (1) (2) show that without including control variables and while controlling for year and industry fixed effects respectively. At the 1% significance level, the regression coefficient of Reform exhibits a notably negative value. In columns (3) and (4), the result is still evidently negative at the 1% level and the R2 value climbs from 0.122 to 0.853. The research findings reveal that the implementation of the registration-based reform has significantly reduced the financing constraints of listed companies. It helps them obtain funding more easily to support the enlargement of the production scale and the R&D of innovative products. In light of this, the H2 hypothesis in this research is validated.

Table 5. Mechanism of Action Testing

	(1)	(2)	(3)	(4)
	SA	SA	SA	SA
Reform	-0.217***	-0.135***	-0.022***	-0.012***
	(-24.31)	(-14.96)	(-5.76)	(-3.24)
Size			-0.020***	-0.018***
			(-7.86)	(-7.35)
Age			0.731***	0.739***
			(130.22)	(143.39)
Lev			0.003	0.013
			(0.41)	(1.57)
Tobin			-0.009***	-0.009***
			(-7.10)	(-7.66)
Indep			-0.131***	-0.124***
			(-4.67)	(-4.56)
ROE			0.010	0.011
			(1.42)	(1.57)
_cons	3.916***	3.907***	2.250***	2.183***
	(968.39)	(978.40)	(37.23)	(37.60)
id	NO	YES	NO	YES
year	YES	NO	YES	NO
N	23448	23413	23448	23413
Adj. R^2	0.122	0.042	0.850	0.853

5. Conclusions and Recommendations

Ever since the registration-based system was first put into practice in 2019, significant changes have taken place in the capital market. This paper selects A-share listed companies from 2016 to 2023 and conducts empirical analysis based on the Science and Technology Innovation Board (STAR Market), Growth Enterprise Market (GEM), Shanghia and Shengzhen Main Board, and Beijing Stock Exchange A-shares. It examines the influence of the registration-based IPO reform on innovation investment among listed enterprises. The conclusions are as follows: (1) the registration-based reform's implementation has significantly enhanced the innovation R&D intensity and R&D expenditure of listed firms. Notably, this supports the theoretical hypothesis that "Innovation investment in public companies is boosted by the registration system". (2) Due to financing constraints being the core transmission channel, the registration-based system reduces the SA index of listed companies. Thereby increasing the creative contributions of publicly-traded companies in technology, products, and other areas.

Based on the findings of the aforementioned research, the following policy recommendations are proposed: (1) Deepen the implementation of the registration-based system reform. To enhance the vitality of the capital market and foster the growth of innovative enterprises, the listing procedures for the STAR Market and the Growth Enterprise Market should be further streamlined. The scope for "unprofitable tech companies" to enter the market should be expanded, with a greater emphasis on the authenticity and effectiveness of corporate information disclosure rather than mere formal compliance. (2) Establish a mechanism linking innovation performance to refinancing eligibility. Regulatory authorities should incorporate key innovation indicators like R&D intensity and patent quality into refinancing approval criteria, setting differentiated thresholds. For companies with sub-standard innovation investment for three consecutive years or weak technological achievements, constrain their financing scale. In

contrast, give preferential policies to companies with outstanding innovation performance, such as priority review and increased credit limits. Also, establish an information disclosure mechanism, asking financing applicants to explain the use of innovation funds and past R&D outcomes. Financial regulatory authorities and science and technology departments should jointly evaluate to ensure capital-innovation alignment.

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