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Social Credit System Construction and Corporate Innovation Investment

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Abstract: ***This paper utilizes data from Chinese A-share listed companies from 2018 to 2024, employing the establishment of National Social Credit System Construction Demonstration Zones as a quasi-natural experiment. We apply a Difference-in-Differences (DID) model to evaluate the impact of the construction of these demonstration zones on corporate innovation investment. The empirical findings reveal that the establishment of social credit demonstration zones significantly promotes corporate innovation investment. This core conclusion remains robust after a series of robustness checks and addressing potential endogeneity concerns. Further analysis of the transmission mechanism indicates that the policy primarily influences corporate innovation investment by alleviating financial constraints. Heterogeneity analysis shows that the policy's positive effects are more pronounced for state-owned enterprises (SOEs), technology-intensive firms, and firms located in regions with higher levels of economic development. The findings of this study not only provide a rigorous quantitative assessment of the effectiveness of the social credit demonstration zone policy in boosting corporate innovation but also offer empirical evidence and practical implications. This evidence supports the view that the construction of social credit demonstration zones serves as a crucial external institutional environment for fostering corporate innovation, thereby contributing to China's high-quality development.***

Keywords: Social Credit, Corporate Innovation Investment, Difference-in-Differences (DID), Financial Constraints, Market Competition.

1. Introduction

The report of the 20th National Congress of the Communist Party of China (CPC) emphasizes that innovation is the "primary driving force" for development. As the core carriers of innovation, the investment activities of enterprises are profoundly constrained by the institutional environment. Therefore, constructing a stable and efficient institutional environment to stimulate the vitality of enterprise innovation has become a central issue in promoting high-quality economic development. The construction of a social credit system is a critical component of optimizing this institutional environment. The 20th CPC National Congress and the subsequent Third Plenary Session of its 20th Central Committee have explicitly stated that the social credit system is the cornerstone for building a high-level socialist market economy. By improving credit evaluation mechanisms, the social credit system alleviates information asymmetry between banks and enterprises, enabling creditworthy firms to secure the necessary funds for innovation at a lower cost. Furthermore, by optimizing the market environment and strengthening credit supervision, it curbs opportunistic behaviors and unfair competition, thereby safeguarding a fair order and encouraging enterprises to win market share through technological innovation rather than short-term speculation. To advance the social credit system from top-level design to practical implementation, since 2015, the state has approved 130 cities (urban districts) in four batches as National Social Credit System Construction Demonstration Zones. These zones serve not only as policy "testing grounds" but also provide a crucial pathway for exploring replicable experiences and promoting the nationwide development of the credit system through a point-to-area approach, thanks to their tracking, evaluation, and dynamic adjustment mechanisms. Building on this context, this paper takes China's A-share listed companies as its research sample and treats the establishment of these demonstration zones as a quasi-natural experiment. Employing a Difference-in-Differences (DID) model, it investigates the impact of the social credit system on corporate innovation investment and its underlying mechanisms.

The marginal contributions of this paper are mainly reflected in the following three aspects:

First, while existing literature predominantly focuses on the impact of the social credit system on the "output" of corporate innovation (Chen & Zheng, 2025), this paper shifts its focus to the examination of innovation "input," exploring how the credit system influences the decision-making process of corporate innovation investment. This not only expands the research boundaries of corporate innovation theory but also aligns with the core tenets of the "credit economy" construction emphasized at the 20th CPC National Congress.

Second, this paper further reveals the moderating effect of market competition in the relationship between the social credit system and corporate innovation investment. The study finds that the innovation-incentive effect of the credit system varies significantly across different competitive environments. This provides a new theoretical perspective for understanding how the institutional environment and market forces synergistically influence corporate innovation. It also offers a crucial basis for policymakers on how to optimize the credit system to adapt to different market structures and promote sustainable corporate development.

Third, by examining the heterogeneous effects of the Social Credit System Construction Demonstration Zones on corporate innovation investment, this paper identifies the differentiated impacts of this policy on various types of enterprises. This provides a more nuanced and granular reference for the future policy design of the social credit system, contributing to the enhancement of policy relevance and effectiveness.

2. Theoretical Analysis and Research Hypotheses

2.1 The Impact of Social Credit Demonstration Zone Construction on Corporate Innovation Investment

The establishment of Social Credit Demonstration Zones represents a systematic institutional arrangement designed to reshape the regional innovation ecosystem. Its core lies in leveraging the construction of "credit capital" to resolve the dilemmas of trust, capital, and governance that confront corporate innovation investment.

First, at the level of trust-building, demonstration zones enhance the quality of corporate information disclosure by strengthening the collection and sharing of information, thereby transforming abstract social trust into a tangible asset. This enables potential partners to accurately assess risks. Powerful reputation effects and mechanisms for punishing dishonesty significantly increase the cost of default, effectively mitigating moral hazard and default risk (Fan Run et al., 2024). This compels firms to abandon opportunism and adhere to long-term contracts. This institutionalized trust acts as a lubricant for cooperative R&D (Jia & Zhuang, 2025), making a strong credit record a key intangible asset for establishing collaborations, reducing friction, and enhancing the willingness to engage in synergistic R&D (He & Zhu, 2025), thereby fostering network effects of innovation synergy.

Second, at the level of capital empowerment, the credit system alleviates information asymmetry, which directly reduces a firm's transaction costs and financing constraints (Yu et al., 2020). This, in turn, lowers the cost of equity (Zhong et al., 2024) and reduces corporate cash holdings (Qian et al., 2024), freeing up more available capital for firms. This enables capital to flow more efficiently to creditworthy enterprises with innovative potential, providing a solid financial foundation for long-term, high-risk R&D activities.

Third, at the level of innovation governance, the credit mechanism serves a dual function of protecting technology and supervising R&D. On one hand, by clarifying rights and responsibilities and enhancing mutual trust, it reduces the risk of technology spillovers in collaborative innovation. On the other hand, as a novel governance tool, it effectively curbs R&D manipulation by firms seeking to fraudulently obtain subsidies or embellish their performance (Fang & Zhang, 2024), guiding resources away from "sham innovation" toward high-quality exploratory innovation.

Ultimately, the construction of credit demonstration zones empowers enterprises to achieve breakthroughs in key and core technologies through a four-fold mechanism: optimizing the business environment, establishing a foundation for data as a factor of production, incentivizing R&D investment, and reducing financing costs (Chen & Yang, 2025). This creates a virtuous cycle of "good money driving out bad" (Guo et al., 2025). Conversely, the negative effects of a dishonest environment—such as impeded corporate growth and exacerbated financing constraints (Yu et al., 2020; Qiu et al., 2024) — serve as a compelling counter-argument that underscores the necessity and effectiveness of the social credit system's development.

In summary, by establishing a tripartite mechanism of building trust, empowering capital, and optimizing governance, Social Credit Demonstration Zones systematically reduce the uncertainty and costs of innovation while enhancing its quality and efficiency. Consequently, they can significantly promote the innovation investment of enterprises within their jurisdictions. Based on the theoretical analysis above, this paper proposes the following research hypothesis:

H1: The establishment of Social Credit Demonstration Zones can significantly promote the innovation investment of enterprises within their designated regions.

2.2 Analysis of Mechanisms of Action

2.2.1 The Mediating Mechanism of Financial Constraints

Corporate financing constraints primarily stem from high agency costs and transaction costs caused by information asymmetry (Lin et al., 2020), a problem that is particularly pronounced in the realm of innovation investment. Due to the characteristics of innovation activities—such as long cycles, high risk, and extended return periods—enterprises' dependence on and sensitivity to external financing far exceed that of ordinary projects (Zhou et al., 2021). Therefore, reducing the cost of external financing and narrowing the gap between internal and external financing are key to stimulating corporate innovation investment (Zhong & Du, 2022). The construction of Social Credit Demonstration Zones addresses this critical link by systematically alleviating information asymmetry.

From the perspective of bank credit supply, the development of the social credit system, by enhancing the overall level of social credit, has been shown to significantly increase the scale of bank loans and extend their maturities, thereby improving banks' liquidity creation capacity (Liang et al., 2024). The underlying mechanism is that the credit system enables banks to more accurately assess the creditworthiness of borrowers, effectively mitigating adverse selection and moral hazard, which in turn reduces banks' risk-taking (Huang & Li, 2024). Concurrently, as a core measure for optimizing the business environment, the establishment of Social Credit Demonstration Zones reduces government intervention in the market, fostering a more relaxed atmosphere for financial resource allocation. This allows banks to allocate capital more efficiently to highly efficient, innovation-driven entities (Peng et al., 2021).

From the perspective of corporate financing demand, a sound social credit environment effectively lowers agency costs and market transaction costs by strengthening the quality of information disclosure (Zhou et al., 2024; Hao & Sun, 2025). This not only broadly improves corporate loan accessibility but also, by alleviating the financing "crowding-out" effect often associated with state-owned enterprises, provides a more equitable financing landscape for non-state-owned enterprises, which are typically more active in innovation. Consequently, this effectively reduces financial constraints

for these firms. Conversely, the negative impacts of dishonest behavior serve to corroborate the necessity of credit construction from the opposite angle. Social dishonesty exacerbates information asymmetry while simultaneously increasing external financing constraints and internal agency costs. This can lead to heightened sensitivity between "investment and short-term loans" and the risk of maturity mismatching, characterized by "using short-term loans for long-term investment" (Zhang & Chen, 2024). Such distorted financing behavior is detrimental to innovation activities, which require long-term, stable funding support, and severely inhibits firms' long-term innovation incentives.

In summary, the construction of Social Credit Demonstration Zones establishes a clear transmission pathway by optimizing bank credit supply, lowering corporate financing costs and constraints, and curbing the negative impacts of dishonest behavior. This pathway can be described as follows: social credit construction alleviates information asymmetry, which in turn reduces bank risk and corporate financial expense ratios, thereby mitigating corporate financial constraints and ultimately increasing corporate innovation investment. Based on the theoretical analysis above, this paper proposes the following research hypothesis:

H2: The construction of Social Credit Demonstration Zones can enhance corporate innovation investment by alleviating corporate financial constraints.

2.2.2 The Moderating Mechanism of Market Competition

In the academic discourse on the relationship between market competition and corporate innovation, a long-standing theoretical divergence exists between the "Schumpeterian effect" (where monopoly profits support innovation) and the "escape-competition effect" (where competitive pressure forces innovation). Recent research tends to support the coexistence of both, suggesting an inverted U-shaped relationship between market competition and corporate innovation (Xu et al., 2017; Wang & Zhao, 2023). In the stage of moderate competition, firms increase innovation to build competitive advantages. However, once competition surpasses a certain threshold, survival pressures compel firms to cut long-cycle, high-risk innovation projects and shift their focus to short-term survival (He et al., 2017; Xie & Wei, 2016). Nevertheless, as technological gaps within industries narrow, the "escape-competition effect" is becoming increasingly dominant over the "Schumpeterian effect," driving firms to enhance efficiency by increasing R&D investment (Ren, 2021). Moreover, the deep integration of high-tech industries and information technology is shaping a more efficient and transparent competitive landscape by optimizing resource allocation and industry chain synergy. Strengthening technology-driven innovation will be key to optimizing market competition in the future (Feng, 2025). Beyond product market competition, the competitive pressure from market leaders can enhance a firm's awareness of differentiation, prompting it to increase innovation (Xu & Yin, 2025).

Against this theoretical backdrop, the institutional value of constructing Social Credit Demonstration Zones becomes prominent. This institutional framework fosters an innovation-friendly ecosystem by enhancing social trust capital, reducing information asymmetry, and alleviating financing constraints. It can effectively counteract the negative impact of high-intensity market competition on innovation. Specifically: first, it improves the financing conditions for firms operating in fiercely competitive environments, preventing them from being forced to abandon innovation due to "financial poverty" (Zhu et al., 2017). Second, by strengthening contract enforceability and lowering future risks, it boosts firms' confidence in long-term investment, encouraging them to reallocate defensive cash holdings towards strategic innovation activities. This, in turn, broadly reinforces the "escape" driving effect of market competition. Based on the theoretical analysis above, this paper proposes the following research hypothesis:

H3: The stronger the degree of market competition, the more pronounced the enhancing effect of the Social Credit Demonstration Zone construction on corporate innovation investment.

3. Research Design

3.1 Sample Selection and Data Sources

To obtain a clean estimate of the policy effect, it is essential to ensure a clear definition of the treatment and control groups. If multiple batches of demonstration zones were included in the analysis, firms from earlier batches would cease to be valid control groups in the later stages of the study, as they would have already been subjected to the long-term effects of the policy. Concurrently, significant heterogeneity would exist within the treatment group due to varying durations of policy implementation. This would result in an estimated policy effect that is a conflation of different treatment intensities, rendering it ambiguous and difficult to interpret. Therefore, focusing on a single, clean policy point in time is crucial for satisfying the parallel trend assumption of the Difference-in-Differences (DID) model and for obtaining unbiased estimates. Based on this rationale, this paper selects the period from 2018 to 2024 as the sample window, with the sub-periods of 2018–2020 and 2021–2024 serving as the pre- and post-policy observation windows, respectively. The former period is sufficiently long to validate the parallel trend assumption, while the latter allows for an effective examination of the policy's dynamic effects.

In terms of data processing, the sample underwent rigorous screening: observations with missing data, firms in the financial industry, and firms classified as ST, *ST, or PT were excluded. To eliminate interference from other policy batches, only firms not located in the first three batches or the fourth batch of demonstration zones were retained. Furthermore, all continuous variables were winsorized at the 1st and 99th percentiles to mitigate the influence of outliers. The data for this study are sourced from the CSMAR and Wind databases, culminating in a final sample of 13,818 valid firm-year observations.

3.2 Variable Definition

(1) Dependent Variable – Corporate Innovation Investment (INN). To enhance data stability and reduce interference from

external fluctuations, this study, drawing on the research of Luo and Qin (2019), selects the ratio of R&D expenditure to operating revenue as the core indicator for measuring corporate innovation investment. Concurrently, to test the robustness of the research conclusions and avoid potential measurement bias from a single indicator, a robustness check is conducted by employing the ratio of R&D expenditure to total assets as an alternative for regression analysis, thereby ensuring the reliability and consistency of the findings.

(2) Core Explanatory Variable – "Social Credit Demonstration Zone" Policy ($Treat_j \times Post_t$). A quasi-natural experiment is constructed based on the three batches of credit demonstration cities successively approved by the state in 2021. The explanatory variable is defined using a dummy variable approach. Specifically, for a listed company, the variable Treat is assigned a value of 1 if the company's location is within a credit demonstration city, and 0 otherwise. The variable Post is assigned a value of 1 for the year of the pilot's commencement and all subsequent years, and 0 otherwise.

(3) Mediating Variable – Financial Constraint (FC). Financial constraint refers to the state in which a firm, when making investment decisions, is unable to acquire required capital under optimal conditions due to disparities in internal and external financing costs or limited access to financing channels. Using the financial expense ratio of listed companies to measure corporate financial constraint can effectively capture the direct costs incurred by firms to raise capital, making it a good proxy variable for the degree of corporate financing constraint. Drawing on the research of Du and Fan (2025), the financial expense ratio is measured as the ratio of financial expenses to operating revenue to gauge the intensity of financial expenses.

(4) Moderating Variable Market Competition (HHI). Drawing upon prior research, the Herfindahl-Hirschman Index (HHI) is used to measure the degree of market competition. The HHI is calculated as the sum of the squares of the market shares of all firms within an industry, where market share is defined as the ratio of an individual firm's main business revenue to the total main business revenue of the industry. A smaller value of the HHI indicates a more intense level of market competition.

(5) Control Variables

To the greatest extent possible, this study controls for other factors that may influence corporate innovation investment and mitigates the bias arising from omitted variables by introducing a series of control variables into the regression model. These include: firm size (Size), firm age (Age), asset-liability ratio (Lev), return on assets (Roa), liquidity ratio (Liquidity), and the shareholding percentage of the largest shareholder (Top1).

The definitions and descriptions of all the variables mentioned above are presented in Table 1.

Table 1: Variable Definitions

Dependent Variable	Variable Name	Variable Symbol	Variable Description
Dependent Variable	Corporate Innovation Investment	INN	Corporate innovation investment =R&D expenditure / Operating revenue
Independent Variable	"Social Credit Demonstration Zone" Policy	$Treat_j \times Post_t$	Equals 1 if the firm is located in a credit demonstration city and the period is on or after the policy approval year; otherwise 0.
Mediating Variable	Financial Expense Ratio	Fr	Financial expense ratio =Financial expenses / Operating revenue
Moderating Variable	Market Competition	HHI	Herfindahl-Hirschman Index
Control Variable	Firm Size	Size	Natural logarithm of total assets
	Firm Age	Age	Natural logarithm of the number of years since the firm's establishment
	Asset-Liability Ratio	Lev	Asset-liability ratio =Total liabilities / Total assets
	Return on Assets	Roa	Return on assets = Net profit / Total assets
	Liquidity Ratio	Liquidity	Liquidity=Current assets / Current liabilities
	Shareholding Percentage of Largest Shareholder	Top1	Shares held by the largest shareholder / Total shares outstanding

3.3 Model Specification

Based on the theoretical analysis presented above, the multi-period difference-in-differences (DID) model constructed in this study is specified in Equation (1):

$$INN_{i,t} = \alpha_1 + \beta_1 Treat_j \times Post_t + \sum \gamma_1 control + year + Ind + \varepsilon_{i,t} \quad (1)$$

In Equation (1), the difference-in-differences (DID) model, the subscript i denotes the firm, t denotes the year, and j denotes the credit demonstration city. INN represents corporate innovation investment. $Treat_j \times Post_t$ represents the "Social Credit Demonstration City" policy. control represents a set of firm-level control variables. year and Ind respectively represent firm time fixed effects and industry fixed effects. α_1 is the constant term, β_1, γ_1 denotes the coefficient of influence, $\varepsilon_{i,t}$ represents the error term.

3.4 Descriptive Statistics

The descriptive statistics for the variables are presented in Table 2.

Table 2: Descriptive Statistical Analysis

Variable Name	Sample Size	Mean	Standard Deviation	Minimum	Maximum
INN	13818	5.681	6.144	0.0400	37.40
Fr	13818	0.0100	0.0280	-0.0640	0.147
HHI	13818	0.0710	0.0630	0.0140	0.316
Size	13818	8.710	1.323	6.336	12.79
Age	13818	3.030	0.297	2.197	3.664
Lev	13818	0.422	0.193	0.0630	0.884
Roa	13818	0.0300	0.0710	-0.284	0.211
Liquidity	13818	2.387	2.169	0.396	13.91
Top1	13818	31.85	14.33	7.799	72.02

The results show that the mean value of corporate innovation investment (INN) is 5.681, with a minimum of 0.0400, a maximum of 37.40, and a standard deviation of 6.144. These findings indicate significant variation in the level of innovation investment among Chinese listed companies. All variables share a consistent sample size with no missing values, indicating good data integrity. Some control variables exhibit large ranges or standard deviations. To mitigate the influence of outliers, all continuous variables are winsorized at the 1st and 99th percentiles. Additionally, industry and year

fixed effects are included in the empirical analysis to control for unobserved factors.

3.5 Correlation Analysis

The correlation analysis results are presented in Table 3. This analysis preliminarily reveals the statistical relationships between corporate innovation investment (INN) and several key variables. The findings indicate that liquidity is a significant factor promoting innovation, whereas debt levels, ownership concentration, firm size, and age tend to suppress innovation investment. These results provide an important foundation for subsequent regression analysis and mechanism tests, and suggest that financial constraints may be a critical channel influencing corporate innovation.

Table 3: Correlation Analysis

	INN	Size	Age	Lev	Roa	Liquidity	Top1
INN	1						
Size	-0.220***	1					
Age	-0.172***	0.202***	1				
Lev	-0.294***	0.447***	0.160***	1			
Roa	-0.145***	0.086***	-0.045***	-0.319***	1		
Liquidity	0.328***	-0.331***	-0.163***	-0.687***	0.191***	1	
Top1	-0.182***	0.176***	-0.046***	-0.006	0.197***	0.006	1

4. Empirical Analysis

4.1 Baseline Regression Results

The baseline regression results are presented in Table 4. As shown in column (1) of Table 4, without the inclusion of control variables, the regression coefficient of the core explanatory variable (the dummy variable for the Social Credit Demonstration Zone) is 0.558, and it is statistically significant at the 1% level. This demonstrates that, in the absence of other influencing factors, the establishment of Social Credit Demonstration Zones significantly promotes corporate innovation investment, with an increase of 0.558 units. As shown in column (2) of Table 4, after adding a series of control variables such as firm size, age, and asset-liability ratio, the regression coefficient of the core explanatory variable is 0.654, remaining statistically significant at the 1% level. This indicates that even after controlling for firm-specific heterogeneity, the establishment of Social Credit Demonstration Zones continues to effectively enhance corporate innovation investment, with an increase of 0.654 units. Thus, it is evident that with the progressive implementation of the Social Credit Demonstration Zone policy, corporate innovation investment has indeed increased significantly. Therefore, the core hypothesis H1 of this paper is validated.

Table 4: Analysis of Baseline Regression Results

Variable	(1) INN	(2) INN
$Treat_j \times Post_t$	0.558*** (4.493)	0.654*** (5.711)
Size		0.231*** (5.731)
Age		-2.743*** (-17.772)
Lev		-4.992*** (-14.016)
Roa		-17.486*** (-25.669)
Liquidity		0.552*** (19.778)
Top1		-0.038*** (-11.879)
Industry Effects	Yes	Yes
Year Effects	Yes	Yes
Sample Size	13818	13818
Adjusted R-squared	0.205	0.331

Note: The values in parentheses in the table are t-statistics. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively. The same applies to the following tables.

4.2 Endogeneity and Robustness Checks

(1) Placebo Test. To examine the robustness of the impact of the "Social Credit Demonstration Zone" policy on corporate innovation investment (INN), this paper employs a placebo test. By randomly generating virtual policy shocks and conducting repeated sampling, this method helps rule out interference from unobserved random factors. While maintaining the original sample size, new "virtual treatment groups" and "virtual control groups" are randomly generated (i.e., firms are randomly assigned as being "affected by the policy"), thereby breaking the true causal relationship between the policy and corporate innovation. Based on these virtual groupings, 500 regression simulations are repeated, with the results shown in Figure 1. A comparison between the actual coefficient from the baseline regression and the distribution of placebo coefficients reveals that the true coefficient significantly deviates from the center of the placebo distribution, indicating that the policy effect is robust. The mean of the placebo coefficients is close to zero, and the density curve is symmetrically distributed around the mean, satisfying the symmetry requirement of a normal distribution. In contrast, the coefficient of the explanatory variable ($Treat_j \times Post_t$) from the baseline regression is located significantly to the right of the placebo distribution. This comparison demonstrates that, after excluding random interference, the Social Credit Demonstration Zone policy exerts a significant and robust positive effect on corporate innovation investment.

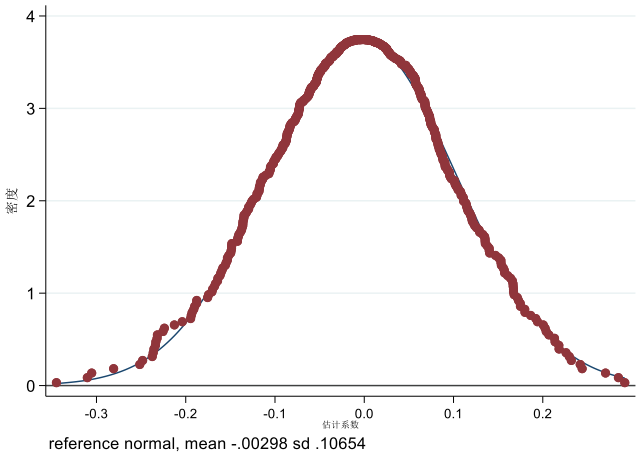

Figure 1: Placebo Test

(2) PSM Test. In empirical analysis, non-random sample selection may lead to endogeneity issues, thereby compromising the accuracy of the estimation results. To mitigate the interference caused by sample selection bias, this paper draws on prior research methods and introduces the Propensity Score Matching (PSM) approach for correction. Specifically, this study employs the nearest neighbor matching method to construct treatment and control groups, using all control variables as matching covariates to ensure comparability in the pre-intervention characteristic distributions between the two groups. Subsequently, the matched sample is reintroduced into model (1) for regression testing. If the regression results align with those of the baseline regression, this indicates that the research conclusions possess strong robustness, effectively ruling out the influence of sample selection bias on the empirical outcomes, thereby enhancing the credibility and scientific validity of the findings.

As shown in Figure 2, the standardized biases of the covariates were generally large before matching; after matching, these biases were substantially reduced, with most falling within the 5% threshold. This indicates that the distributions of covariates between the treatment and control groups have become balanced after matching, eliminating significant systematic differences.

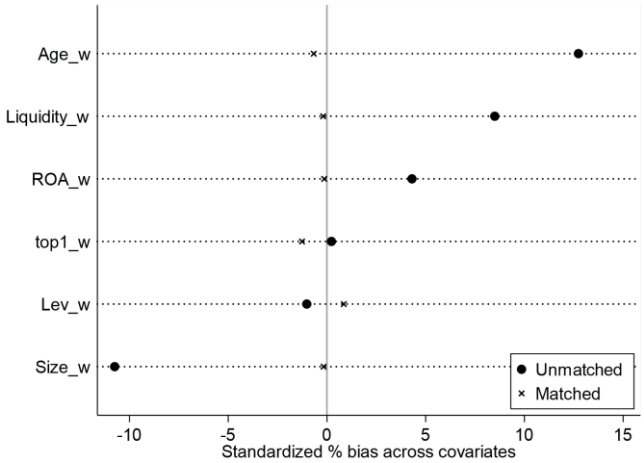

Figure 2: Standardized Bias Before and After Propensity Score Matching

After performing propensity score matching, the remaining sample was re-estimated using Model (1), with the results presented in Table 5. Table 5 shows that the coefficient of the explanatory variable is 0.710 and statistically significant at the 5% level. This demonstrates that the baseline regression results remain robust after mitigating endogeneity issues arising from sample selection bias, thereby enhancing the reliability and validity of the original findings.

Table 5: PSM Regression Results

Variable	PSM
	INN
$Treat_j \times Post_t$	0.710**
	(2.8194)
Control Variable	Yes
Industry Effects	Yes
Year Effects	Yes
Sample Size	Yes
Adjusted R-squared	0.350

(3) Additional Robustness Checks. To further enhance the robustness and reliability of the baseline regression conclusions, this paper also employs the following two methods for robustness checks:

First, changing the measurement of the dependent variable. The original dependent variable, corporate innovation investment (INN), was measured as "the ratio of R&D expenditure to operating revenue." It is now replaced with "the ratio of R&D expenditure to total assets." This change helps verify whether the core conclusions depend on a single indicator, thereby enhancing the reliability of the findings. As shown in column (1) of Table 6, the regression coefficient of the explanatory variable ($Treat_j \times Post_t$) is 0.004 and is significantly positive at the 1% level. This indicates that even after changing the measurement of the dependent variable, the Social Credit Demonstration Zone policy still significantly increases corporate innovation investment by 0.4%, reinforcing the robustness and reliability of the baseline regression results.

Second, adding more control variables. To mitigate potential endogeneity issues arising from omitted variables, three additional variables were included in the model based on the original set of controls: the ratio of fixed assets to total assets (PPE), the proportion of institutional investors (Ins), and the growth rate of operating revenue (Growth).These newly added variables complement the factors that may influence corporate innovation investment from three dimensions: capital structure, growth, and governance structure. Specifically: Fixed assets ratio: Reflects the capital intensity of the firm and controls for the effect of asset structure on innovation input.

Operating revenue growth rate: Indicates the firm's growth stage and controls for the impact of expansion phases on innovation decisions. Institutional investor ratio: Represents corporate governance structure and controls for the influence of external investors on strategic decision-making. The inclusion of these variables helps to more comprehensively capture the driving factors of corporate innovation investment, thereby reducing model specification error. As shown in column (2) of Table 6, the regression coefficient of the explanatory variable ($Treat_j \times Post_t$) is 0.584 and is significantly positive at the 1% level, further strengthening the robustness and reliability of the baseline regression results.

Table 6: Additional Robustness Checks Regression Results

Variable	Changing the measurement of the dependent variable	Adding more control variables
	(1) INN	(2) INN
$Treat_j \times Post_t$	0.004***	0.584***
	(8.558)	(5.149)
Control Variable	Yes	Yes
Industry Effects	Yes	Yes
Year Effects	Yes	Yes
Sample Size	14290	14287
Adjusted R-squared	0.253	0.341

5. Extended Analysis

5.1 Mediation Effect Test

The theoretical analysis above suggests that the establishment

of social credit demonstration zones can promote corporate innovation investment by reducing firms' financial burdens. To further examine this underlying mechanism, and in line with the theoretical derivations discussed earlier, this paper constructs the following models:

$$Fr_{i,t} = \alpha_2 + \beta_2 Treat_j \times Post_t + \sum \gamma_2 control + year + Ind + \varepsilon_{i,t} \quad (2)$$

$$INN_{i,t} = \alpha_3 + \beta_3 Treat_j \times Post_t + \mu_1 Fr_{i,t} + \sum \gamma_3 control + year + Ind + \varepsilon_{i,t} \quad (3)$$

Among these, Fr is the mediating variable, analyzed through the channel of the financial expense ratio; the remaining variables are consistent with those in the baseline regression model above.

Columns (1) and (2) of Table 7 report the results of the mechanism test based on the corporate financial expense ratio. The results in Column (1) show that the coefficient of the explanatory variable($Treat_j \times Post_t$) on the financial expense ratio (Fr) is negative and significant at the 1% level. The results in Column (2) indicate that the coefficient of the corporate financial expense ratio is also negative and significant at the 1% level. These findings suggest that the establishment of social credit demonstration zones reduces corporate earnings volatility, alleviates financial burdens on firms, and thereby enhances corporate innovation investment. Therefore, Hypothesis 2 of this study is supported.

Table 7: Mechanism Test

Variable	(1) Fr	(2) INN
$Treat_j \times Post_t$	-0.003*** (-6.428)	0.629*** (5.485)
Fr		-7.942*** (-4.025)
Control Variable	Yes	Yes
Industry Effects	Yes	Yes
Year Effects	Yes	Yes
Sample Size	13818	13818
Adjusted R-squared	0.410	0.331

To further explore whether market environmental factors influence the mechanism through which social credit demonstration zones affect corporate innovation investment, this study introduces the degree of market competition (HHI) as a moderating variable. By constructing an interaction term between the explanatory variable and the moderating variable, it is incorporated into the regression model. The specific model is specified as follows:

$$INN_{i,t} = \alpha_4 + \beta_4 Treat_j \times Post_t + \mu_2 Treat_j \times Post_t \times HHI + \mu_3 HHI + \sum \gamma_4 control + year + Ind + \varepsilon_{i,t} \quad (4)$$

Table 8 reports the results of the moderating effect analysis after introducing the degree of market competition (HHI) as a moderating variable, examining its impact on the relationship between social credit demonstration zones and corporate innovation investment. As shown in Table 8, after controlling for firm-level characteristics, industry fixed effects, and year fixed effects, the regression coefficient of the interaction term ($Treat_j \times Post_t \times$HHI) between the core explanatory variable ($Treat_j \times Post_t$) and the moderating variable (HHI) is -5.665, and is statistically significant at the 1% level. This result indicates that as market competition decreases (i.e., as the HHI value increases), the positive effect of social credit demonstration zones on corporate innovation investment is significantly reduced. In other words, the degree of market competition plays a significant negative moderating role in the mechanism through which social credit demonstration zones promote corporate innovation investment. Therefore, Hypothesis 3 of this study is supported.

Table 8: Analysis of the Moderating Effect of Market Competition

Variable	INN
$Treat_j \times Post_t$	0.955*** (5.924)
$Treat_j \times Post_t \times$HHI	-5.542*** (-3.052)
Control Variable	Yes
Industry Effects	Yes
Year Effects	Yes
Sample Size	13818
Adjusted R-squared	0.345

5.2 Heterogeneity Analysis

(1) Heterogeneity Based on High-Tech Attributes

As an institutional policy tool, the social credit demonstration zone may lead to significant differences in innovation investment performance between high-tech and non-high-tech enterprises through the transmission of policy effects. High-tech enterprises, leveraging their technological accumulation and innovation capabilities, are better positioned to utilize the conveniences and institutional safeguards brought by an improved credit environment. They can allocate resources toward innovation and R&D, foster technological upgrading, and thus generate stronger endogenous momentum for innovation investment. In contrast, non-high-tech enterprises may face limitations in terms of innovation resource input and technological R&D, and may be unable to further enhance their innovation investment levels under the influence of the policy environment. This disparity not only reflects differences in innovation demand and credit dependency across industries but also underscores the need to consider firm heterogeneity during policy implementation to achieve more precise policy outcomes.

To test the above hypothesis, this paper draws on the research methodology of Peng Hongxing et al. It identifies high-tech listed enterprises by referencing the Strategic Emerging Industries Classification Catalogue, the Strategic Emerging Industries Classification (2012) (Trial), and relevant OECD documents, while cross-referencing the Guidelines for Industry Classification of Listed Companies (2012 Revision) to determine industry codes. Based on this classification, high-tech and non-high-tech firms are distinguished, and a group regression analysis is conducted using Model (1). The regression results are presented in Table 9.

For non-high-tech enterprises, the regression coefficient of the explanatory variable ($Treat_j \times Post_t$) is 0.280 but not statistically significant, indicating that the establishment of the social credit demonstration zone has no statistically significant effect on innovation investment in these firms. In contrast, for high-tech enterprises, the regression coefficient of the explanatory variable ($Treat_j \times Post_t$) is 0.702 and significant at the 1% level, suggesting that the establishment of the social credit demonstration zone significantly enhances innovation investment in high-tech firms. The innovation

investment of high-tech enterprises responds more strongly to the social credit demonstration zone, with an average increase of 0.702 units, while no significant change is observed in non-high-tech enterprises. This indicates that the social credit demonstration zone policy exerts a more pronounced incentive effect on innovation-driven industries (high-tech firms), while its impact on traditional industries (non-high-tech firms) is limited.

Table 9: Heterogeneity Analysis by Firm Attributes

Variable	(1) INN (non-high-tech firms)	(2) INN (high-tech firms)
$Treat_j \times Post_t$	0.280	0.702***
	(1.403)	(5.153)
Control Variable	Yes	Yes
Industry Effects	Yes	Yes
Year Effects	Yes	Yes
Sample Size	3476	10342
Adjusted R-squared	0.374	0.289

(2) Heterogeneity Based on Enterprise Ownership

Differences between state-owned enterprises (SOEs) and non-state-owned enterprises (non-SOEs) in terms of preferential access to policy resources and risk-incentive mechanisms lead to varying effects of the social credit demonstration zone policy on innovation investment. The social credit demonstration zone policy is typically accompanied by supporting measures such as government - guided funds, tax incentives, and priority project approvals — resources that are often prioritized for SOEs. As primary implementers of policy, SOEs are more likely to receive resource support, thereby effectively enhancing their level of innovation input. In contrast, non-SOEs, with more limited access to resources, struggle to achieve an equally advantageous position within the policy environment. In terms of risk preference and incentive mechanisms, the promotion criteria for senior executives in SOEs are often linked to innovation input. The improved policy environment further strengthens these innovation incentives, encouraging SOEs to engage in more long-term innovative planning. Non-SOEs, on the other hand, tend to focus more on short-term profitability and remain cautious toward long-term innovation investments. Even in a more favorable policy environment, their responsiveness and persistence in innovation are relatively weaker.

The regression coefficient for the explanatory variable ($Treat_j \times Post_t$) corresponding to non-state-owned enterprises (non-SOEs) is 0.615, while that for state-owned enterprises (SOEs) is 0.889. Both coefficients are positive and statistically significant at the 1% level. This indicates that the social credit demonstration zone policy has a significant positive effect on the innovation investment of both types of enterprises. However, the promotional effect is stronger for SOEs, suggesting that state-owned enterprises are more likely to benefit from the resource optimization and environmental improvements brought about by the credit system construction within the policy context.

Table 10: Heterogeneity Analysis by Enterprise Ownership Type

Variable	(1) INN (non-state-owned enterprises)	(2) INN (state-owned enterprises)
$Treat_j \times Post_t$	0.615***	0.889***
	(4.554)	(4.358)
Control Variable	Yes	Yes
Industry Effects	Yes	Yes
Year Effects	Yes	Yes
Sample Size	10587	3231
Adjusted R-squared	0.318	0.301

5.3 Heterogeneity Based on Regional Economic Development Level

As a form of institutional environmental regulation, the social credit demonstration zone may exert differential effects on the enhancement of corporate innovation investment across regions with varying levels of economic development. Regions with higher levels of economic development are more likely to translate improvements in the credit environment into increased corporate innovation investment, owing to their well-developed financial systems, stronger technological accumulation, and more efficient governance. These factors provide greater internal impetus for corporate innovation. In contrast, regions with lower levels of economic development may face limitations in terms of innovation resources and policy implementation capacity, and thus may struggle to further enhance corporate innovation investment under policy pressure. In more economically developed regions, financial markets are more mature, and the establishment of a credit system can more effectively reduce information asymmetry and alleviate financing constraints, thereby providing stable funding support for corporate innovation. Enterprises in these regions generally possess stronger technological accumulation, R&D capabilities, and risk tolerance. As the credit environment improves, they are more willing to increase innovation investment. Moreover, the higher level of governance and stronger policy implementation in developed regions ensure that both policy execution and supporting measures are effectively carried out, making it easier for the construction of social credit demonstration zones to translate into a driving force for corporate innovation.

In regions with low levels of economic development, the regression coefficient of the explanatory variable ($Treat_j \times Post_t$) is negative but not statistically significant. This indicates that the social credit demonstration zone policy has a negative but insignificant impact on corporate innovation investment. In contrast, in regions with high levels of economic development, the regression coefficient of the explanatory variable ($Treat_j \times Post_t$) is positive and significant at the 1% level, suggesting that the policy exerts a significant positive effect on corporate innovation investment. These findings reveal significant regional heterogeneity in the impact of the social credit demonstration zone policy on corporate innovation investment. In economically developed regions, the policy is effective in promoting corporate innovation, whereas in less-developed regions, its effect is not significant or even negative, underscoring the importance of policy transmission mechanisms and regional economic foundations.

Table 11: Heterogeneity Analysis by Regional Economic Development Level

Variable	(1) INN (Low)	(1) INN (High)
$Treat_j \times Post_t$	-0.461	1.513***
	(-1.315)	(10.773)
Control Variable	Yes	Yes
Industry Effects	Yes	Yes

Year Effects	Yes	Yes
Sample Size	6859	6959
Adjusted R-squared	0.349	0.319

6. Research Conclusions and Policy Implications

6.1 Research Conclusions

This paper takes Chinese A-share listed companies from 2018 to 2024 as its research sample and employs a difference-in-differences (DID) model to investigate the impact and underlying mechanisms of the social credit demonstration zone policy on corporate innovation investment. The findings are as follows:

First, the social credit demonstration zone policy significantly enhances corporate innovation investment, a conclusion that remains robust after multiple robustness checks. Second, the policy promotes corporate innovation investment by reducing firms' financial burdens. Third, the stronger the market competition, the more pronounced the promotional effect of the social credit demonstration zone policy on corporate innovation investment. Fourth, the positive effect of the social credit demonstration zone policy on corporate innovation investment is more significant among high-tech enterprises, state-owned enterprises, and regions with higher levels of economic development.

6.2 Policy Implications

First, the government should continue to deepen the construction of social credit demonstration zones and optimize the credit environment. By improving credit information sharing mechanisms and strengthening credit reward and punishment systems, the overall credit level of enterprises can be enhanced, thereby stimulating their innovation vitality. Especially in regions where credit system development lags, greater efforts should be made in policy advocacy and the implementation of supporting measures to facilitate the transformation of an improved credit environment into innovation-driven growth.

Second, the government should address the constraining effect of financial burdens on corporate innovation investment. Through measures such as tax and fee reductions, optimization of the financing environment, and provision of innovation subsidies, financial pressure on enterprises can be alleviated, creating a more favorable funding climate for innovation. Meanwhile, financial institutions should be encouraged to develop innovative credit products—such as unsecured loans based on creditworthiness and intellectual property pledge financing—to ease financing constraints for innovation.

Third, the government should focus on fostering a competitive market environment by breaking up industry monopolies and lowering market entry barriers to stimulate corporate innovation motivation. The innovation-promoting effect of the social credit demonstration zone policy is more pronounced in highly competitive industries. Therefore, fair competition should be encouraged, and the synergy between market mechanisms and credit policies should be strengthened to form a "credit + competition" dual-driven innovation ecosystem.

Fourth, the government should develop differentiated credit policy support tailored to different types of enterprises. For high-tech firms, state-owned enterprises, and regions with high levels of economic development, the precision and incentive effects of credit policies should be further enhanced, directing credit resources toward innovation-active sectors. For non-high-tech firms, non-state-owned enterprises, and less-developed regions, efforts should focus on strengthening credit infrastructure and policy support to enhance their credit capacity and willingness to innovate, thereby promoting coordinated innovation development across regions and enterprises.

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