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Government Digital Governance and Corporate Supply Chain Risk: Empirical Evidence from the "Internet Plus Government Services" Pilot Program

Fan He[1], Qingqing Tan[2,*], Xi Cao[2]

[1] Center for China Fiscal Development, Central University of Finance and Economics, Beijing, 100098, China
[2] School of Accounting, Chongqing Technology and Business University, Chongqing, 400067, China

[*] **Corresponding Author:** tanqingqing@ctbu.edu.cn

Abstract: Using a sample of Chinese A-share listed firms from 2012 to 2024, this study treats the "Internet Plus Government Services" pilot reform as a quasi-natural experiment and employs a difference-in-differences model to examine the effect of government digital governance on corporate supply chain risk. The results show that government digital governance significantly reduces corporate supply chain risk, and this finding remains robust after parallel trends tests, placebo tests, endogeneity analysis, and a series of robustness checks. The mechanism analysis suggests that government digital governance may reduce supply chain risk by promoting corporate innovation investment and improving information transparency. The heterogeneity analysis further shows that the risk-reducing effect is more evident among state-owned enterprises, non-high-tech firms, and firms with lower analyst attention. This study extends the literature on the microeconomic consequences of government digital governance and provides empirical evidence for advancing digital government development and strengthening corporate supply chain risk management.

Keywords: Government Digital Governance, Corporate Supply Chain Risk, Investment in Innovation, Level of Information Transparency, Difference-in-Differences.

1. Introduction

As the division of labor among firms continues to deepen, supply chains have become a critical organizational form for corporate production and operations. However, information asymmetry and distorted demand signals within supply chains can easily amplify fluctuations in supply and demand, thereby increasing firms' inventory, production, and operational risks. Lee et al. (1997) [1] pointed out that demand forecasting errors, batch ordering, and information distortion are major sources of amplified supply chain volatility. Bray and Mendelson (2012) [2] further validated the close relationship between information flow and supply chain volatility at the firm level. Therefore, improving the corporate information environment and enhancing risk response capabilities are key strategies for reducing supply chain risks.

The development of digital technology has provided a new technical foundation for the transformation of government governance. Through data sharing, process integration, and online government services, digital governance enhances the efficiency of public services and the accessibility of information. Dunleavy et al. (2006) [3] point out that digital technologies can drive the integration of government departments and the reengineering of administrative processes. For enterprises, government digital governance not only reduces the costs of administrative procedures and information acquisition but also improves the external information environment, thereby supporting business decision-making and innovation activities. Hao et al. (2024) [4] found that the development of a digital government can improve the innovation environment for enterprises and promote their innovation activities.

In 2014, the National Development and Reform Commission and other departments issued the "Notice on Approving Shenzhen and 79 Other Cities as National Pilot Cities for Information for the People" (NDRC High-Tech [2014] No. 1274), designating 80 cities as national pilot cities and calling for greater cross-level and cross-departmental information sharing and operational coordination. In 2016, the General Office of the State Council issued the "Implementation Plan for Promoting 'Internet Plus Government Services' and Conducting Information-for-the-People Pilot Programs" (State Council General Office Document [2016] No. 23), which selected the same 80 cities as pilot areas and advanced the reform in two stages over two years. The first stage in 2016 focused mainly on infrastructure development, including electronic certificate repositories and data sharing and exchange platforms. In 2017, the reform moved further toward the interoperability and sharing of electronic certificates and public service information across pilot cities, thereby promoting cross-regional, cross-level, and cross-departmental coordination in government services. This reform provides a quasi-natural experiment for identifying the microeconomic effects of government digital governance. Government data sharing, operational coordination, and online public services can improve firms' access to public information and government services and may strengthen their ability to identify and respond to supply chain risks by promoting innovation investment and improving information transparency.

Zhao (2025) [5], drawing on a quasi-natural experiment based on China's Public Data Open Platform, found that public data sharing can significantly reduce corporate supply chain risk. However, existing research has mainly focused on the supply chain effects of government public data openness, with relatively limited attention paid to the broader role of government digital governance. To address this gap, this paper examines the impact of the "Internet Plus Government

Services" reform, which promotes the digitalization of government processes and cross-departmental operational coordination, on corporate supply chain risk and further investigates two underlying mechanisms, namely innovation investment and information transparency. Using Chinese A-share listed companies from 2012 to 2024 as the sample, this paper constructs a difference-in-differences model based on the reform for empirical testing. This study extends research on the determinants of corporate supply chain risk from the perspective of government governance and enriches the literature on the microeconomic consequences of digital government.

2. Theoretical Analysis and Research Hypotheses

2.1. Government Digital Governance and Corporate Supply Chain Risk

Supply chain risks in enterprises are closely linked to the efficiency of information transmission. Insufficient access to demand information or delays in its transmission can easily amplify fluctuations between production and demand. Ojha et al. (2019) [6] found that information sharing significantly influences the bullwhip effect in supply chains. Babai et al. (2016) [7] further noted that demand characteristics affect the value of information sharing, indicating that improving the availability of demand information plays a crucial role in supply chain decision-making.

Government digital governance enhances the availability of public information and the efficiency of administrative coordination through data sharing, process integration, and online government services. Cordella and Tempini (2015) [8] argue that information technology can improve the efficiency of public services through process simplification and organizational coordination. For enterprises, reduced information acquisition and administrative costs help improve the efficiency of business decision-making and minimize production adjustment errors caused by information lag, thereby mitigating the amplification of supply-demand fluctuations. Based on the above analysis, Hypothesis 1 is proposed.

H1: Government digital governance can reduce corporate supply chain risk.

2.2. Innovative Investment Mechanisms

Government digital governance can improve the information and institutional environment necessary for corporate innovation. The digitization of government processes helps reduce the administrative burden, while data sharing can minimize information frictions and the costs of accessing resources. Research by Wu et al. (2026) [9] indicates that government digital governance can significantly increase corporate R&D investment. R&D activities further help enhance corporate technological capabilities and production flexibility, thereby strengthening their ability to respond to supply chain disruptions (Parast, 2020) [10]. Consequently, by promoting R&D investment, government digital governance can enhance firms' ability to adjust production and respond to risks, thereby reducing supply chain risks. Based on the above analysis, Hypothesis 2 is proposed.

H2: Government digital governance reduces firms' supply chain risks by increasing their innovation investment.

2.3. Information Transparency Mechanism

Through the integration of government data, the sharing of public data, and the provision of online government services, government digital governance can reduce the cost for firms to access external information, enhance the convenience and timeliness of information access, and thereby improve corporate information transparency. Zhang and Jiao (2026) [11] found that the development of digital government can significantly improve the quality of information disclosure by listed companies, indicating that government digital governance helps improve the corporate information environment and alleviates information asymmetry between firms and external stakeholders.

Higher information transparency helps enterprises promptly obtain information on suppliers, customers, and external business operations, thereby reducing decision-making biases caused by information gaps and transmission delays. Fan et al. (2017) [12] point out that risk information sharing, as well as risk analysis and assessment, are integral components of supply chain risk management. Li et al. (2015) [13] further found that risk information sharing and collaborative risk management help supply chain members identify and address potential risks. Therefore, digital governance by the government can reduce supply chain risk levels by enhancing corporate information transparency and strengthening the ability to identify and respond to supply chain risks. Based on the above analysis, Hypothesis 3 is proposed.

H3: Digital governance by the government can reduce corporate supply chain risk levels by enhancing corporate information transparency.

3. Research Design

3.1. Sample Selection and Data Sources

This paper uses companies listed on the Shanghai and Shenzhen A-share markets from 2012 to 2024 as the initial research sample and screens them according to the following principles: (1) Exclude financial companies; (2) Exclude ST and *ST companies; (3) Exclude companies that have been listed for less than three years; (4) Exclude samples with missing key data on supply chain risks and major control variables. Continuous variables were winsorized at the 1% and 99% quantiles to reduce the impact of outliers on the estimation results. After the above processing, a total of 23,677 company-year observations were obtained. The data in this paper are primarily sourced from the CSMAR database and publicly available government documents. Data on corporate finance, corporate governance, and R&D investment were obtained from the CSMAR database. The list of pilot cities for the "Internet Plus Government Services" initiative was compiled based on Document No. 1274 [2014] issued by the National Development and Reform Commission and other relevant departments, and the effective date of the policy was determined in accordance with Document No. 23 [2016] issued by the General Office of the State Council.

3.2. Variable Descriptions

(1) Dependent variable. Corporate supply chain risk (Bullwhip), following Yang et al. (2020) [14], is proxied by the bullwhip effect from the perspective of risk amplification due to supply and demand fluctuations. Demand volatility is measured by quarterly cost of sales, and the supply chain risk indicator "Bullwhip" is constructed as the ratio of the

standard deviation of quarterly production volume to the standard deviation of quarterly cost of sales. In the robustness analysis, following Bray and Mendelson (2012) [2], we use quarterly sales revenue to measure demand volatility and construct an alternative indicator, Bullwhip_base. Quarterly production volume is calculated as the sum of quarterly cost of sales and changes in inventory, while quarterly sales revenue is the sum of operating revenue and other business revenue. Prior to calculating standard deviations, the relevant variables were log-transformed and first-differenced. A higher indicator value indicates a greater amplification of production fluctuations relative to demand fluctuations, and thus a higher level of supply chain risk for the firm.

(2) Explanatory variables. Following Shen et al. (2025) [15], this study constructs the government digital governance (DID) variable based on the 80 national pilot cities for the "Information for the People" initiative. Enterprises located in the pilot cities are assigned to the treatment group, while enterprises in other cities are assigned to the control group. Since the reform entered a stage of deeper implementation in 2017 and its economic effects may involve a certain transmission lag, 2017 is selected as the main policy shock year. The DID variable is set to 1 for enterprises located in pilot cities in 2017 and subsequent years, and to 0 otherwise.

(3) Control variables. Firm size (Size) is measured as the natural logarithm of total assets. Growth (Growth) is calculated using the revenue growth rate, while leverage (Lev) is measured as the ratio of total liabilities to total assets. Loss is a dummy variable that equals 1 when the firm reports negative net income for the year and 0 otherwise. Capital expenditures (Capex) are measured as cash paid for the acquisition or construction of fixed assets, intangible assets, and other long-term assets divided by total assets. The inventory ratio (Inv) is calculated as net inventory divided by total assets. Firm age (FirmAge) is measured as the natural logarithm of the number of years since the firm was established. Board size (Board) is measured as the natural logarithm of the number of board members. The proportion of independent directors (Indep) is calculated as the number of independent directors divided by the total number of board members.

(4) Mechanism variables. Innovation investment (R&D) is measured as the ratio of a company's annual R&D expenditure to its operating revenue. Drawing on the research by Hutton et al. (2009) [16], we use the sum of the absolute values of a firm's discretionary accruals for the current year and the previous two years to measure the firm's level of information opacity, where discretionary accruals are estimated based on the modified Jones model. "Opaque" serves as a reverse indicator of information transparency. A higher value indicates a higher degree of information opacity, i.e., lower information transparency.

3.3. Model Setting

To examine the effect of government digital governance on corporate supply chain risk and further investigate the roles of innovation investment and information transparency, this study constructs a difference-in-differences (DID) model. Firms located in cities participating in the "Internet Plus Government Services" pilot program are assigned to the treatment group, with Treat equal to 1, while firms located in non-pilot cities are assigned to the control group, with Treat equal to 0. The post-policy period is defined as 2017 and subsequent years, with Post equal to 1, while the pre-policy period is assigned a value of 0. The interaction between Treat and Post is used to construct the DID variable. Accordingly, DID equals 1 when a firm is located in a pilot city and the observation year is 2017 or later, and 0 otherwise. The baseline regression includes firm and year fixed effects, and standard errors are clustered at the city level to account for potential within-city correlation and heteroskedasticity. Mechanism variables are further introduced to examine the roles of innovation investment and information transparency, as described in the subsequent analysis.

4. Empirical Analysis

4.1. Descriptive Statistical Analysis

Table 1 presents the descriptive statistics for the main variables. The mean value of the Bullwhip coefficient for corporate supply chain risk was 0.960, with a standard deviation of 0.170, indicating some variation among firms. The mean value of the DID for government digital governance was 0.420, indicating that approximately 42% of the observations in the sample belonged to the treatment group following the implementation of policies in the pilot cities. The remaining variables all exhibited some variation across the sample, providing a foundation for subsequent regression analysis.

Table 1. Descriptive Statistics

Variable	N	Mean	SD	Min	Max
Bullwhip	23677	0.960	0.170	0.410	1.620
DID	23677	0.420	0.490	0.000	1.000
Size	23677	22.430	1.210	20.220	26.100
Lev	23677	0.420	0.190	0.060	0.860
Growth	23677	0.130	0.320	-0.510	1.760
Loss	23677	0.110	0.310	0.000	1.000
Capex	23677	0.040	0.040	-0.020	0.200
Inv	23677	0.140	0.120	0.000	0.650
FirmAge	23677	3.010	0.300	2.080	3.610
Board	23677	2.120	0.190	1.610	2.640
Indep	23677	0.380	0.050	0.330	0.570

4.2. Regression Analysis

The results of the baseline regression are presented in Table 2. In Column (1), with no control variables included, the DID coefficient is -0.033 and is significant at the 1% level. In Column (2), after including control variables, the DID coefficient is -0.040 and remains significant at the 1% level. In Column (3), after further controlling for firm and year fixed effects, the DID coefficient is -0.018 and is significant at the 1% level. Overall, the DID coefficient is significantly negative across all model specifications, indicating that government digital governance can effectively reduce firms' supply chain risks. Research hypothesis H1 is thus supported.

Table 2. Baseline Regression Results

	(1)	(2)	(3)
	Bullwhip	Bullwhip	Bullwhip
DID	-0.033***	-0.040***	-0.018***
	(-14.444)	(-16.631)	(-3.247)
Size		0.005***	0.004
		(4.054)	(1.053)
Lev		-0.047***	-0.028*
		(-6.593)	(-1.658)
Growth		-0.017***	-0.006
		(-4.810)	(-1.174)
Loss		0.004	0.008*
		(0.979)	(1.879)
Capex		-0.031	-0.175***
		(-1.075)	(-5.168)
Inv		-0.095***	-0.139***
		(-9.364)	(-3.011)
FirmAge		0.028***	0.031
		(6.881)	(1.086)
Board		0.013*	-0.005
		(1.733)	(-0.302)
Indep		0.048*	0.030
		(1.847)	(0.733)
_cons	0.972***	0.777***	0.819***
	(653.865)	(25.769)	(6.301)
N	23677	23677	23677
ar2	0.009	0.019	0.266
Firm/Year	No	No	Yes

Note: *,** , and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively. The values in parentheses are t-statistics based on standard errors clustered at the city level. The same convention applies to subsequent tables.

4.3. Endogeneity Test

4.3.1. Instrumental Variables Method

To mitigate potential endogeneity arising from reverse causality and omitted variables, this study uses the one-period lagged government digital governance variable (L_DID) as an instrumental variable and employs two-stage least squares (2SLS) estimation. The results are reported in Table 3. Government digital governance exhibits strong policy persistence, suggesting that the lagged DID is closely correlated with the current DID. Meanwhile, the implementation of the pilot policy is largely determined by established institutional arrangements, making it less likely that firms' current supply chain risks affect prior policy implementation. After controlling for firm characteristics, firm fixed effects, and year fixed effects, the effect of the lagged policy shock on current supply chain risks is expected to operate primarily through the persistence of government digital governance, which provides theoretical support for the exclusion restriction of the instrumental variable. The first-stage results show that the coefficient of L_DID is 0.765 and statistically significant at the 1% level, indicating a strong correlation between the instrumental variable and the endogenous explanatory variable. In the second-stage regression, the estimated coefficient of DID is -0.025 and remains statistically significant at the 1% level, further supporting the baseline findings.

Table 3. Endogeneity Test Results

	(1)	(2)
	Instrumental Variables Stage 1	Instrumental Variables Stage 2
	DID	Bullwhip
L_DID	0.765***	-
	(257.469)	-
DID	-	-0.025***
	-	(-3.390)
Size	0.004	0.005
	(1.239)	(1.037)
Lev	0.019	-0.031**
	(1.551)	(-2.057)
Growth	-0.016***	-0.007
	(-4.068)	(-1.296)
Loss	0.005	0.008**
	(1.634)	(2.017)
Capex	-0.009	-0.174***
	(-0.258)	(-4.581)
Inv	-0.019	-0.138***
	(-0.829)	(-3.029)
FirmAge	-0.019	0.026
	(-0.675)	(0.732)
Board	-0.006	-0.002
	(-0.482)	(-0.127)
Indep	-0.012	0.049
	(-0.346)	(1.080)
_cons	0.116	-
	(0.849)	-
N	21421	21421
ar2	0.931	-0.104
Firm/Year	Yes	Yes

4.3.2. Trends in Parallel Testing

The results of the parallel trends test are shown in Figure 1. Using the period immediately prior to policy implementation as the baseline, the estimated coefficients for all periods before policy implementation were not significant, and the confidence intervals all included zero. This indicates that there were no significant systematic differences between the treatment group and the control group prior to the policy shock, and the parallel trends hypothesis is supported. After policy implementation, the estimated coefficients generally turned negative, indicating that government digital governance has a certain mitigating effect on corporate supply chain risk. It should be noted that the 80 pilot cities had already begun initiatives related to "Information for the People" starting in 2014, which may have constituted a policy "warm-up" period. However, the event study results show that no significant pre-event differences emerged between the treatment and control groups from 2014 to 2016, suggesting that these earlier initiatives did not significantly disrupt the parallel trends.

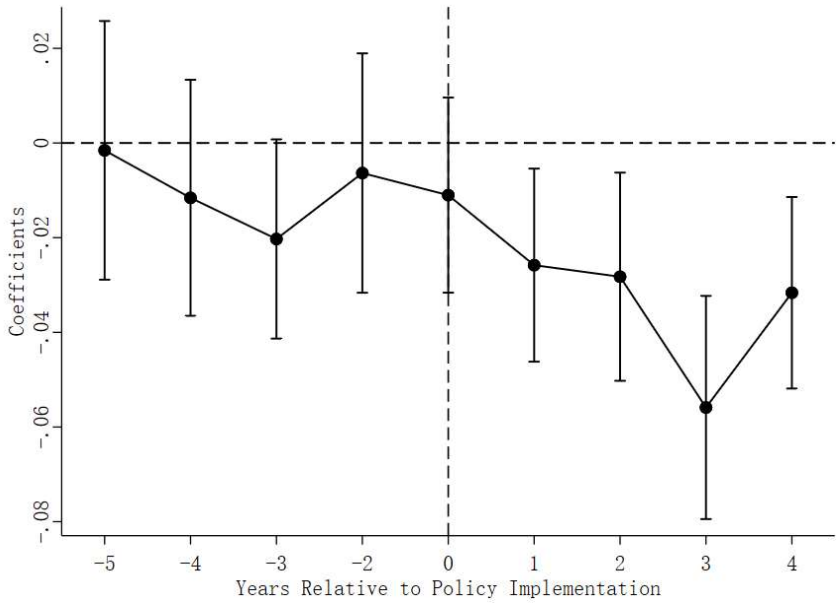


Figure 1. Trends in Parallel Tests

4.3.3. Placebo Test

To rule out the possibility that the baseline results are driven by random factors, this study conducts a placebo test by randomly assigning firms to the treatment group and repeating the estimation 500 times. The results are presented in Figure 2. The placebo coefficients are mainly distributed around zero, whereas the actual DID estimate of -0.018 lies clearly in the left tail of the placebo coefficient distribution. This suggests that the probability of obtaining an estimate as extreme as the baseline result purely by chance is relatively low. Therefore, the baseline findings are unlikely to be driven by random assignment or other incidental factors, providing further evidence of the robustness of the main results.

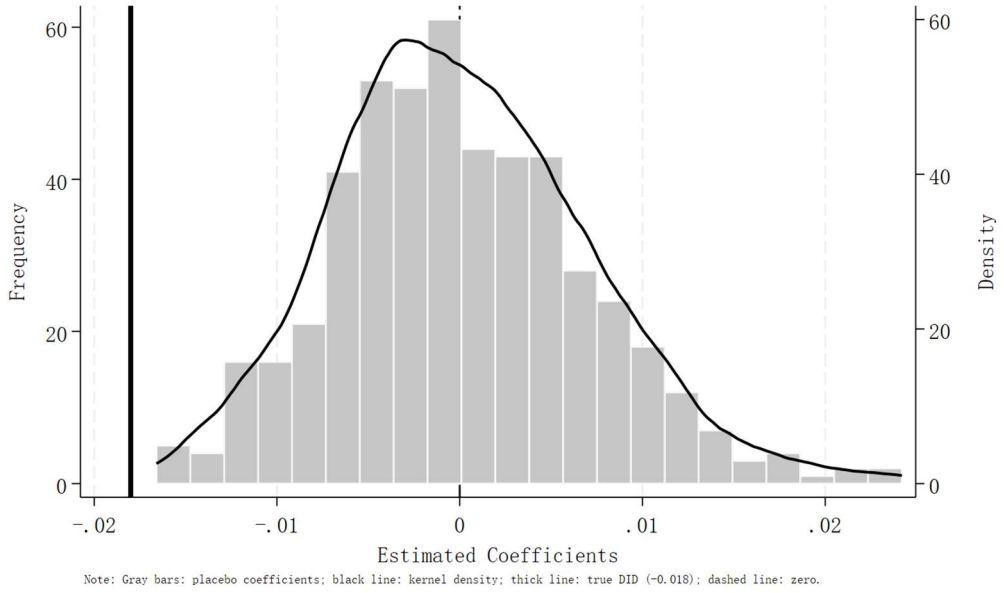


Figure 2. Placebo Test

4.4. Robustness Tests

To further assess the robustness of the baseline results, this study conducts three additional tests by replacing the dependent variable, excluding specific years, and adjusting the timing of the policy shock. The results are reported in Table 4. In Column (1), the original dependent variable is replaced with Bullwhip_base. The coefficient of DID is -0.017 and statistically significant at the 1% level, indicating that the main conclusion remains unchanged when an alternative measure of supply chain risk is used. To account for the potential effects of stock market volatility, U.S.–China trade frictions, and the COVID-19 pandemic, Columns (2) to (4) exclude observations from 2015, 2018, and 2020, respectively. The corresponding DID coefficients are -0.018, -0.018, and -0.013, all of which remain significantly negative. These results suggest that the baseline findings are not driven by shocks associated with these specific years. In addition, this study advances the policy shock year to 2016. As shown in Column (5), the coefficient of DID2016 is -0.017 and statistically significant at the 1% level. Overall, the results remain highly consistent with the baseline regression across alternative variable definitions, sample exclusions, and policy timing adjustments, providing further support for the robustness of the finding that government digital governance reduces corporate supply chain risk.

Table 4. Robustness Test Results

	(1)	(2)	(3)	(4)	(5)
	Replace the interpreted variable	Excluding 2015	Excluding 2018	Excluding 2020	Treat × Post 2016
	Bullwhip_base	Bullwhip	Bullwhip	Bullwhip	Bullwhip
DID	-0.017***	-0.018***	-0.018***	-0.013**	-
	(-2.849)	(-3.196)	(-3.190)	(-2.323)	-
DID2016	-	-	-	-	-0.017***
	-	-	-	-	(-2.598)
Size	0.001	0.004	0.004	0.003	0.004
	(0.167)	(0.982)	(0.944)	(0.687)	(1.079)
Lev	-0.033*	-0.025	-0.032*	-0.025	-0.028*
	(-1.796)	(-1.527)	(-1.878)	(-1.455)	(-1.658)
Growth	0.013*	-0.011*	-0.006	-0.004	-0.006
	(1.806)	(-1.962)	(-1.069)	(-0.757)	(-1.154)
Loss	0.023***	0.009**	0.008*	0.005	0.008*
	(3.956)	(2.072)	(1.811)	(1.283)	(1.849)
Capex	-0.169***	-0.168***	-0.163***	-0.181***	-0.174***
	(-4.038)	(-4.816)	(-4.567)	(-5.088)	(-5.117)
Inv	-0.150***	-0.150***	-0.135***	-0.162***	-0.138***
	(-2.767)	(-3.084)	(-2.849)	(-3.144)	(-2.981)
FirmAge	0.075**	0.038	0.037	0.032	0.031
	(2.389)	(1.367)	(1.264)	(1.099)	(1.082)
Board	-0.003	-0.010	-0.006	-0.010	-0.005
	(-0.178)	(-0.578)	(-0.325)	(-0.611)	(-0.292)
Indep	0.045	0.023	0.021	0.014	0.031
	(1.002)	(0.519)	(0.491)	(0.352)	(0.758)
cons	0.757***	0.820***	0.814***	0.869***	0.816***
	(5.911)	(6.541)	(5.923)	(6.620)	(6.259)
N	23677	22088	21625	21660	23677
ar2	0.253	0.268	0.257	0.272	0.266
Firm/Year	Yes	Yes	Yes	Yes	Yes

4.5. Mechanism Testing

Government digital governance may reduce corporate supply chain risk by promoting innovation investment and improving information transparency. On the one hand, digital governance can improve the external environment for corporate innovation, reduce the cost of accessing resources and information, encourage firms to increase R&D investment, and strengthen their capacity to respond to supply chain disruptions. On the other hand, government data sharing, process integration, and online public services can improve the efficiency of information acquisition and transmission, reduce information asymmetry, and enhance corporate information transparency. These improvements can further strengthen firms' ability to identify and respond to supply chain risks.

Column (1) of Table 5 shows that the coefficient of DID on innovation investment (RD) is 0.003 and statistically significant at the 5% level, indicating that government digital governance promotes corporate innovation investment. In Column (2), the coefficient of RD is -0.227 and statistically significant at the 1% level, suggesting that greater innovation investment is associated with lower corporate supply chain risk. These results provide support for the proposed innovation investment mechanism and Hypothesis H2. Column (3) shows that the coefficient of DID on information opacity (Opaque) is -0.014 and statistically significant at the 5% level, indicating that government digital governance reduces corporate information opacity and improves information transparency. In Column (4), the coefficient of Opaque is 0.040 and statistically significant at the 1% level, suggesting that greater information opacity is associated with higher corporate supply chain risk. Taken together, these results support the proposed information transparency mechanism and Hypothesis H3. Overall, the mechanism tests provide evidence that government digital governance may reduce corporate supply chain risk by promoting innovation investment and improving information transparency.

Table 5. Mechanism Test Results

	(1)	(2)	(3)	(4)
	RD	Bullwhip	Opaque	Bullwhip
DID	0.003**	-0.014**	-0.014**	-0.010*
	(2.059)	(-2.433)	(-2.260)	(-1.676)
RD		-0.227***		
		(-3.891)		
Opaque				0.040***
				(2.750)
Size	0.002**	0.004	-0.012**	0.007*
	(2.344)	(1.001)	(-2.041)	(1.828)
Lev	-0.017***	-0.034**	0.140***	-0.036**
	(-2.804)	(-2.152)	(6.706)	(-2.104)
Growth	-0.011***	-0.010**	0.014***	-0.002
	(-8.428)	(-2.060)	(3.729)	(-0.403)
Loss	0.003**	0.007*	0.028***	0.007
	(2.096)	(1.654)	(8.421)	(1.618)
Capex	0.027***	-0.168***	-0.033	-0.158***
	(3.246)	(-4.749)	(-0.830)	(-4.651)
Inv	-0.007	-0.140***	0.004	-0.122***
	(-1.012)	(-3.109)	(0.119)	(-3.458)
FirmAge	-0.002	0.022	-0.002	0.017
	(-0.322)	(0.781)	(-0.056)	(0.567)
Board	0.002	-0.009	-0.007	-0.007
	(0.717)	(-0.540)	(-0.491)	(-0.402)
Indep	0.004	0.033	-0.045	0.017
	(0.425)	(0.784)	(-0.999)	(0.371)
_cons	0.010	0.872***	0.430***	0.793***
	(0.365)	(6.480)	(2.711)	(6.738)
N	23238	23238	21821	21821
ar2	0.804	0.267	0.322	0.288
Firm/Year	Yes	Yes	Yes	Yes

4.6. Heterogeneity Test

Table 6 reports the heterogeneity analysis of the effect of government digital governance on corporate supply chain risk. The analysis is conducted across three dimensions, including the information environment, industry characteristics, and ownership type.

(1) Analyst attention. Following Pan Yue et al. (2011) [17], this study uses the one-period lagged analyst attention to capture firms' external information environment. The DID coefficient is -0.002 and statistically insignificant for the high-attention group, while it is -0.032 and statistically significant at the 1% level for the low-attention group. The larger magnitude of the coefficient for firms with low analyst attention suggests that the risk-reducing effect of government digital governance is more evident among firms receiving less external information coverage. One possible explanation is that digital governance improves firms' access to information and partially compensates for insufficient external information coverage.

(2) Industry characteristics. The DID coefficient is -0.009 and statistically insignificant for firms in high-tech industries, while it is -0.030 and statistically significant at the 1% level for firms in non-high-tech industries. These results suggest that the effect of government digital governance on reducing supply chain risk is more evident among non-high-tech firms. Compared with high-tech firms, non-high-tech firms may have relatively weaker digital infrastructure and technological capabilities, leaving greater scope for improvements associated with government digital governance.

(3) Ownership type. The DID coefficient is -0.028 and statistically significant at the 1% level for state-owned enterprises, while it is -0.011 and statistically insignificant for non-state-owned enterprises. The results suggest that the risk-reducing effect of government digital governance is more evident among state-owned enterprises. A possible explanation is that state-owned enterprises generally have closer institutional interactions with government departments and may therefore be better positioned to benefit from government data sharing, digital public services, and cross-departmental coordination.

Table 6. Heterogeneity Test Results

	(1)	(2)	(3)	(4)	(5)	(6)
	Analyst Coverage		Industry Characteristics		Nature of Ownership	
	High	Low	High-Tech Industry	Non-High-Tech Industry	State-Owned Enterprises	Non-State-Owned
	Bullwhip	Bullwhip	Bullwhip	Bullwhip	Bullwhip	Bullwhip
DID	-0.002	-0.032***	-0.009	-0.030***	-0.028***	-0.011
	(-0.226)	(-3.585)	(-1.017)	(-3.383)	(-3.813)	(-1.537)
Size	-0.000	0.003	0.005	0.001	0.011*	0.000
	(-0.002)	(0.443)	(1.075)	(0.157)	(1.662)	(0.064)
Lev	-0.023	-0.036*	-0.014	-0.043*	-0.043	-0.028
	(-1.058)	(-1.928)	(-0.595)	(-1.948)	(-1.448)	(-1.584)
Growth	-0.016**	0.002	-0.010	-0.000	-0.003	-0.007
	(-2.100)	(0.264)	(-1.479)	(-0.051)	(-0.298)	(-0.926)
Loss	0.008	0.008	0.010*	0.004	-0.009	0.014***
	(0.845)	(1.519)	(1.932)	(0.542)	(-1.339)	(2.996)
Capex	-0.130**	-0.217***	-0.202***	-0.128**	-0.137**	-0.180***
	(-2.382)	(-3.613)	(-4.668)	(-2.038)	(-2.060)	(-4.173)
Inv	-0.242***	-0.142***	-0.216***	-0.103*	-0.161**	-0.128**
	(-3.392)	(-2.855)	(-3.858)	(-1.711)	(-2.449)	(-2.407)
FirmAge	0.023	0.038	-0.032	0.089*	-0.003	0.018
	(0.652)	(0.742)	(-0.943)	(1.881)	(-0.061)	(0.452)
Board	-0.035	0.014	0.017	-0.035	-0.002	-0.007
	(-1.386)	(0.573)	(0.903)	(-1.319)	(-0.104)	(-0.308)
Indep	-0.074	0.110*	0.051	-0.001	0.060	0.020
	(-1.262)	(1.695)	(0.932)	(-0.009)	(1.057)	(0.380)
_cons	1.046***	0.762***	0.911***	0.811***	0.750***	0.943***
	(6.232)	(3.770)	(6.020)	(3.783)	(3.263)	(6.672)
N	10929	12453	14232	9445	8111	15566
ar2	0.368	0.219	0.243	0.279	0.255	0.273
Firm/Year	Yes	Yes	Yes	Yes	Yes	Yes

5. Conclusion and Recommendations

Based on a sample of A-share listed firms on the Shanghai and Shenzhen stock exchanges from 2012 to 2024, this study uses the "Internet Plus Government Services" pilot reform as a quasi-natural experiment to examine the effect of government digital governance on corporate supply chain risk. The empirical results show that government digital governance significantly reduces corporate supply chain risk. This finding remains robust after a series of tests, including the parallel trends test, placebo test, endogeneity analysis, and alternative robustness checks. The mechanism analysis suggests that government digital governance may reduce supply chain risk by promoting corporate innovation investment and improving information transparency. The heterogeneity analysis further shows that the risk-reducing effect is more evident among state-owned enterprises, non-high-tech firms, and firms with lower analyst attention.

Based on these findings, several policy implications can be drawn. First, the government should continue to deepen the "Internet Plus Government Services" reform, promote government data sharing and cross-departmental coordination, improve the quality and accessibility of digital public services, and provide greater support to firms with relatively weak digital capabilities. Second, enterprises should make more effective use of government digital platforms and public data resources, increase investment in innovation, improve their mechanisms for information acquisition and transmission, and strengthen their ability to identify and respond to supply chain risks. Third, regulatory authorities may pay greater attention to traditional industries, firms with limited external information coverage, and firms exposed to greater supply chain volatility. Improving digital service provision and information accessibility for these firms may help strengthen their capacity to prevent and manage supply chain risks.

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