

Research on the Impact of Industrial Internet on Corporate Governance of Chinese Enterprises

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Abstract: The industrial internet transformation is key to the high-quality development of manufacturing enterprises. This paper treats it as a systematic strategic change, using data of Chinese listed manufacturing firms (2015-2024) to empirically test its driving effect and internal mechanisms on corporate governance. Major findings include: 1) It exerts a significant positive impact on corporate governance; 2) The enhancement mainly works via two channels: strengthening internal controls and improving executive incentives; 3) Heterogeneity analysis shows stronger governance improvement in private firms than state-owned ones, and obvious effects in eastern/central regions, while incomplete effects in western regions. The paper provides empirical evidence for the relationship and mechanisms between the two under real economy-internet integration, offers decision references for policymakers and enterprises, and promotes healthy capital market development.

Keywords: Industrial Internet Transformation; Corporate Governance; Quality of Internal Control; Executive Incentives.

1. Introduction

Industrial manufacturing is the foundation of the real economy and is also vital to the lifeblood of a nation's economy. Since the Chinese government incorporated the Industrial Internet into the national strategic agenda in 2017, its policy positioning has been continuously strengthened. By 2022, the Industrial Internet had been included in the government work report for five consecutive years, gradually becoming an important support for promoting the sustainable development of China's economy. Despite the advancement of this strategy, deep issues remain that have not been thoroughly studied: as a special product of the deep integration of the real economy and the Internet economy, how can the Industrial Internet, alongside technological transformation, enhance the level of corporate governance in enterprises? What is the mechanism through which Industrial Internet transformation affects corporate governance in manufacturing enterprises? These questions, which are of high concern to society, have become the focus of this study.

While implementing Industrial Internet transformation has attracted widespread attention from the market and enterprises, previous research has mostly focused on its impact on enterprise production efficiency and supply chain optimization. However, there is relatively little academic research on how Industrial Internet transformation reshapes a firm's micro-level governance mechanisms.

The marginal contributions of this paper are as follows: first, from the perspective of Industrial Internet transformation, it provides empirical support for enhancing corporate governance and promoting the healthy development of the capital market. Second, it strengthens the understanding of corporate governance mechanisms and heterogeneity. Furthermore, this paper offers insights for the Chinese government and manufacturing enterprises on their Internet transformations and provides ideas on how China can more scientifically implement Industrial Internet transformation to promote corporate governance in listed companies.

2. Literature Review

With the deepening of the industrial Internet transformation, research on the relationship between it and corporate governance has become an important topic of concern across society. Existing studies mainly explore the relationship from two perspectives: technological empowerment and institutional change.

From the perspective of technological empowerment, Li (2025), based on a data-driven legal system framework, confirmed that Internet data analysis and artificial intelligence technologies can significantly optimize corporate governance. This conclusion aligns with Chiu and Lim's (2021) "technology-governance" coupling findings: they found that artificial intelligence and distributed ledger technologies can further reduce agency risks and promote improvements in corporate governance. Furthermore, Wang and Wu (2025) pointed out that integrating neural network technology into corporate governance structures can systematically enhance the level of digital governance within enterprises.

From the institutional change perspective, research focuses on adaptive governance structure adjustments driven by industrial Internet transformation. Varoglu et al. (2021) used institutional theory to explore the Internet transformation's potential impacts on corporate governance and associated change mechanisms—this view has empirical support. Yang et al. (2024) [5] found that digital transformation significantly boosts corporate ESG performance using Chinese listed company data; Fang et al. (2024) noted that Internet transformation improves internal control quality, thereby enhancing corporate accounting information quality.

However, research in this field still has limitations. First, although Goranova et al. (2024) and Randive (2024) keenly recognized the governance challenges brought by Internet transformation, their work remains at the level of theoretical inference, lacking empirical examination in the specific context of the industrial Internet. Second, existing literature often focuses on single aspects of corporate governance, such as ESG or internal controls, lacking comprehensive studies on overall corporate governance. Therefore, based on existing research, this paper focuses on the industrial Internet

transformation and empirically tests the impact of industrial Internet transformation on the level of corporate governance.

3. Research Design

3.1. Sample Selection and Data Sources

We selected Chinese A-share listed manufacturing companies from 2015 to 2024 as the research sample for empirical testing. The initial sample was screened as follows: (1) Industries related to computers are often at the core of the Internet ecosystem and inherently digital, making their transformation paths and governance models not representative of the dynamic adjustments of traditional manufacturing under the impact of the Industrial Internet. Therefore, they are excluded from this study; (2) Manufacturing companies with incomplete data are excluded; (3) ST and *ST manufacturing companies are excluded. Additionally, to reduce the influence of extreme values, all continuous variables were winsorized at the 1% level on both ends. The final sample size was 14,853. Industrial Internet transformation data were obtained from annual reports, and other main variables from the CSMAR database.

3.2. Definition of Main Variables

3.2.1. Dependent Variable

Corporate Governance (CorpGov): As per Chen et al. (2022), corporate governance is measured using four

indicators, including whether the company uses one of the Big Four auditors and the proportion of independent directors on the audit committee. The rationale is that corporate governance, as the core mechanism for supervising and coordinating different interests within a firm, cannot usually be measured by a single indicator. Therefore, following Chen et al. (2022), this study constructs a composite index of corporate governance using principal component analysis, incorporating aspects such as incentive mechanisms and equity structure.

3.2.2. Independent Variable

Industrial Internet Transformation (IIT): Following Wu et al. (2022), this study calculates the frequency of keywords related to Internet transformation in listed companies' annual reports. To address potential right-skewed data, the natural logarithm of the frequency of these keywords plus one is used as the measurement for Industrial Internet transformation.

3.3. Control Variables

Following the variable setup in Li et al. (2025), the control variables selected in this study are firm Size (Size), Leverage (Lev), Profitability (ROA), Operating Cash Flow (Cashflow), Growth (Growth), and Board Size (Board). The definitions and measurement methods of the main variables are shown in Table 1.

Table 1. Variable Definition

Variable Type	Variable Name	Variable Symbol	Variable Definition
Dependent Variable	CorporateGovernance	CorpGov	Refer to the description above
Independent Variable	Industrial Internet Transformation	IIT	The natural logarithm of (the frequency of Internet transformation keywords + 1).
	Size	Size	The natural logarithm of a firm's total assets at the end of the year.
	Leverage	Lev	Total liabilities / Total assets
Control Variables	Profitability	ROA	Net profit / Total assets
	Operating Cash Flow	Cashflow	Net cash flow from current operating activities / Total assets at the end of the period
	Growth	Growth	(Current year's operating income / Previous year's operating income) - 1
	Board Size	Board	The natural logarithm of the total number of directors on the board

3.4. Model Setting

To examine the impact and mechanism of industrial internet transformation on corporate governance, following academic conventions, a multiple linear regression model is used, controlling for year fixed effects, with clustering adjustments applied at the level of listed manufacturing companies during the regression.

4. Empirical Analysis

4.1. Descriptive Statistical Analysis

Table 2 presents the descriptive statistics of the sample variables. The dependent variable, corporate governance (CorpGov), has a mean of 0.225, a standard deviation of 0.945, a minimum of -1.467, and a maximum of 2.839, indicating significant differences in corporate governance levels among the sample enterprises. The impact of industrial Internet transformation on corporate governance varies across different enterprises. The independent variable, industrial Internet transformation (IIT), has a mean of 1.366, a standard deviation of 1.181, a minimum of 0, and a maximum of 4.812,

suggesting that there is noticeable differentiation in the industrial Internet transformation process among the sample enterprises, with some enterprises not yet initiating the transformation (IIT=0), while leading enterprises have reached relatively high levels of transformation. Other control variables are generally consistent with previous studies and real-world conditions.

Table 2. Descriptive Statistics

Variable	N	Mean	SD	Min	Max
CorpGov	14853	0.225	0.945	-1.467	2.839
IIT	14853	1.366	1.181	0.000	4.812
ROA	14853	0.047	0.061	-0.173	0.226
Size	14853	22.210	1.137	20.180	25.760
Lev	14853	0.388	0.178	0.061	0.799
Cashflow	14853	0.057	0.063	-0.113	0.242
Growth	14853	0.142	0.307	-0.460	1.647
Board	14853	2.097	0.182	1.609	2.485

4.2. Regression Analysis

Table 3 presents the basic regression results. Column (1)

shows the regression results without controlling for other influencing factors and time effects, with the estimated coefficient of IIT being 0.0399, significant at the 1% level. Column (2) includes control variables but does not control for time effects. The results indicate that the estimated coefficient of IIT is 0.0631, also significant at the 1% level. Column (3) accounts for other potential influencing factors and time effects, and IIT remains significant at the 1% level, with an estimated coefficient of 0.0531. This indicates that Industrial Internet Transformation has a significant positive driving effect on corporate governance, and this effect remains robust after controlling for firm characteristics and the macro environment.

Table 3. Baseline Regression Results

	(1)	(2)	(3)
	CorpGov	CorpGov	CorpGov
IIT	0.0399*** (6.089)	0.0631*** (5.550)	0.0531*** (4.597)
Size		-0.1975*** (-14.542)	-0.2008*** (-14.701)
Lev		-0.3672*** (-4.181)	-0.3744*** (-4.303)
Cashflow		0.4603*** (2.677)	0.4118** (2.395)
Growth		0.2443*** (10.497)	0.2714*** (11.090)
Board		-2.3398*** (-29.403)	-2.2915*** (-28.803)
_cons	0.1702*** (14.375)	9.5147*** (31.982)	9.3296*** (31.866)
N	14853	14853	14853
ar2	0.0025	0.3440	0.3527
Year	NO	NO	YES

4.3. Mechanism Testing

The previous empirical analysis shows that industrial Internet transformation (IIT) can enhance corporate governance levels. Regarding its mechanism, at the theoretical level, high-quality internal control not only can prevent, detect, and correct material misstatements in corporate financial statements, but also functions to reduce agency costs by constraining executive actions. Therefore, following the approach of Li et al. (2018) and Tao et al. (2023), this study uses the "Internal Control Index of Chinese Listed Companies" published by DIB Risk Management Technology Co., Ltd. (DIB) in Shenzhen as a representation of internal control quality (IC), while also standardizing this variable. A higher value indicates higher internal control quality (IC). The results in Column (1) of Table 4 show that the estimated coefficient of IIT is significantly positive, with a regression coefficient of 0.0304, indicating that IIT helps to optimize corporate internal control quality.

In addition, because industrial internet transformation has a long return cycle and high uncertainty, it inherently conflicts with the traditional short-term performance-based compensation system. To make management pay more

attention to the long-term value of the company, enterprises introduce executive incentive mechanisms. Drawing on the ideas of Carline et al. (2023), this study uses equity incentives to represent executive incentives (Incentive); specifically, the natural logarithm of the executive shareholding ratio is used as a proxy variable. The results in Column (2) of Table 4 show that the regression coefficient of IIT is 0.5044 and is significant at the 1% level, indicating that IIT helps to optimize the corporate governance structure through executive incentives.

Table 4. Mechanism Test Results

	(1)	(2)
	IC	Incentive
IIT	0.0304*** (4.305)	0.5044*** (5.439)
Size	0.1216*** (10.860)	-0.3802*** (-2.918)
Lev	-0.4795*** (-7.135)	-3.9493*** (-5.076)
Cashflow	1.4262*** (10.898)	3.0411** (2.068)
Growth	0.6184*** (22.883)	1.6374*** (7.889)
Board	0.0188 (0.373)	-1.7114*** (-2.610)
_cons	3.7358*** (16.590)	24.3551*** (8.912)
N	14853	14853
ar2	0.1148	0.0446
Year	Yes	Yes

4.4. Heterogeneity Test

Against China's actual property rights system, state-owned and private enterprises differ in policy support, social expectations, and market pressures. Table 5, columns (1)-(2) show industrial Internet transformation has a more pronounced effect on improving corporate governance in non-state-owned enterprises. This is due to non-state-owned industrial enterprises' more flexible systems, less resistance to industrial Internet transformation, and the ability to quickly adjust corporate governance strategies to meet transformation needs.

Table 5, columns (3)-(5) (regional heterogeneity test) shows that the industrial Internet transformation's corporate governance promotion effect has a significant regional imbalance: it exerts a significant positive effect on eastern (coefficient 0.0511) and central region enterprises (coefficient 0.0467), but its impact on western region enterprises fails the significance test. This is because the western region, limited by economic development, cannot provide sufficient funds and talents for Internet transformation, with relatively backward digital infrastructure; in contrast, the eastern and central regions have more developed digital infrastructure and, coupled with national policy support, show a more prominent corporate governance improvement effect.

Table 5. Results of Heterogeneity Test

	(1)	(2)	(3)	(4)	(5)
	CorpGov	CorpGov	CorpGov	CorpGov	CorpGov
IIT	0.0327**	0.0141	0.0110	0.0511***	0.0467*
	(2.516)	(1.210)	(0.287)	(3.794)	(1.780)
Size	-0.1967***	-0.0073	-0.1337***	-0.2054***	-0.1871***
	(-11.241)	(-0.608)	(-4.090)	(-12.540)	(-5.688)
Lev	-0.2610**	-0.1359*	-0.4300*	-0.3286***	-0.5584***
	(-2.532)	(-1.715)	(-1.846)	(-3.144)	(-3.055)
Cashflow	0.2189	0.0739	0.4254	0.2395	0.8323**
	(1.099)	(0.422)	(1.000)	(1.151)	(2.279)
Growth	0.2445***	0.0046	0.2895***	0.2651***	0.2722***
	(8.871)	(0.197)	(3.536)	(9.386)	(4.728)
Board	-2.0275***	-1.9446***	-2.0515***	-2.2649***	-2.1546***
	(-22.154)	(-23.105)	(-9.833)	(-24.049)	(-11.494)
_cons	8.8339***	3.7651***	7.1816***	9.4295***	8.6900***
	(23.332)	(13.062)	(10.428)	(26.959)	(11.643)
N	11433	3420	1611	10743	2412
ar2	0.2648	0.4514	0.3424	0.3307	0.3899
Year	Yes	Yes	Yes	Yes	Yes

5. Conclusions and Recommendations

This study uses Chinese A-share listed manufacturing enterprises on the Shanghai and Shenzhen Stock Exchanges from 2015 to 2024 as samples to empirically test the driving effect and mechanisms of industrial internet transformation on corporate governance, and draws the following key conclusions: (1) Industrial internet transformation positively impacts corporate governance significantly, mainly by optimizing manufacturing enterprises' internal control quality and executive incentives to further drive governance improvements; (2) Property rights heterogeneity analysis shows private manufacturing enterprises gain more significant corporate governance enhancement from internet transformation than state-owned ones; (3) Regional heterogeneity analysis indicates Eastern and Central regions, with advantages, can effectively improve corporate governance, unlike Western regions with less developed infrastructure.

Based on the above research conclusions, this paper proposes the following recommendations:

(1) Continue to improve industrial internet infrastructure, increase investment in base stations and other facilities in regions with weak digital infrastructure to reduce the cost of enterprise internet transformation, especially supporting state-owned enterprises and enterprises in Western regions, promoting a more inclusive improvement of corporate governance.

(2) Fully utilize the characteristics of industrial internet technology to integrate all enterprise processes and decision-making mechanisms into the information management framework, and build an internal control system compatible with modern technological architecture, thereby strengthening the foundation for enterprise transformation.

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