

Study on the Impact of Digital Transformation in Manufacturing Enterprises on Audit Fees

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Abstract. Digital transformation enhances operational efficiency, reshapes traditional business models and processes, and redefines how enterprises generate and transmit information. This transformation not only impacts corporate performance but also presents risks and challenges for certified public accountants. This study examines the impact of digital transformation levels on audit fees within the manufacturing sector, using a sample of 1,017 listed companies from 2015 to 2022. It analyzes the underlying mechanisms through risk-oriented auditing theory, information asymmetry theory, and cost-benefit theory. Additionally, it introduces variables of managerial competence and corporate property rights to examine their moderating effects on the relationship between digital transformation and audit fees. The study concludes that: (1) digital transformation exhibits a significant positive correlation with audit fees; (2) managerial competence exerts a negative moderating effect on this relationship; (3) property rights structure exerts a negative moderating effect on this relationship. Based on these findings and the characteristics of the manufacturing sector, the paper proposes practical recommendations for governments, enterprises, and accounting firms.

Keywords: Corporate Digital Transformation, Audit Fees, Managerial Competence.

1. Introduction

With the advent of the digital era, the development of new technologies has become a solid foundation for upgrading enterprise management, presenting unprecedented opportunities and challenges for business operations and development. The advancement of intelligent technologies such as big data, cloud computing, artificial intelligence, blockchain, and the Internet of Things has led to increasingly widespread application of information technology across all aspects of enterprises. Companies are increasingly embracing digitalization, transforming traditional operational models. According to the White Paper on China's Enterprise Digital Transformation Development, China's digital economy has grown steadily from 2016 to 2022, reaching 50.2 trillion yuan in 2022 with a year-on-year increase of 10.3%. It is projected to reach 70.8 trillion yuan by 2025, indicating significant achievements in China's digital economy development and presenting new opportunities for high-quality economic growth and traditional enterprise digital transformation. Concurrently, the "Research Report on Digital Transformation of Chinese Enterprises" reveals that nearly 70% of companies prioritize digital transformation as their top strategic focus, having established detailed strategic roadmaps. Previously, Deloitte investigated the relationship between digital maturity and corporate performance across 1,200 global enterprises, publishing the report "Uncovering the Connection Between Digital Maturity and Financial Performance." Findings demonstrate that digital transformation consistently delivers sustained high performance. For enterprises to seize opportunities in the digital economy, achieving digital transformation and operating efficiently is both an inevitable path and an unstoppable trend.

In the era of digital economic development, corporate digital transformation serves as a crucial strategic initiative to maintain competitive advantage while also reflecting the demands of the times. Particularly under the impact of COVID-19, traditional business models no longer align with evolving market needs, compelling more enterprises to shift operations from offline to online platforms. To meet internal growth requirements and respond to external policy directives, companies are increasingly embracing digital transformation. Enterprise digital transformation impacts multiple

internal aspects including business processes, organizational structures, and business models. While bringing convenience, it may also introduce greater risks. Higher digitalization levels enhance internal management, production operations, and office efficiency, but impose higher matching requirements on financial accounting development. The massive data and information generated by digital development increase the complexity and opacity of business processes, affecting the audit work of certified public accountants. Corporate management capabilities must align with the degree of digital transformation. By integrating forward-looking strategies into digital development, organizations can mitigate fraud risks and possibilities, maintain a healthy balance between operational and audit risks, and thereby drive sustainable and stable corporate operations. Therefore, enterprises must fully recognize the internal and external risks brought by digital transformation. Only by ensuring compliance, rationality, standardization, and transparency in digital transformation can they safeguard their long-term, healthy development.

2. Theoretical Analysis and Research Hypotheses

2.1. Theoretical Foundation

2.1.1 Risk-Oriented Auditing Theory

Audit risk comprises material misstatement risk and detection risk, where material misstatement risk equals the product of inherent risk and control risk. Inherent risk is determined by the enterprise's own financial condition and operational risks. It exists in the financial statements prior to the audit and cannot be reduced; therefore, only detection risk can be mitigated. Control risk arises from deficiencies in the enterprise's internal controls and can be assessed by auditors through control testing. Detection risk can be controlled by auditors through additional audit procedures, increased audit effort, enhanced professional competence, and greater work experience, which may involve significant costs.

Risk-oriented auditing comprehensively analyzes both misstatement risks and operational risks within the audited entity, enabling a more thorough assessment and better mitigation of audit risk. Audit risk may result in financial losses for accounting firms and even expose them to litigation risks with corresponding legal consequences. When the audited entity presents higher risks, the firm will implement more audit procedures to reduce audit risk to a manageable level. This involves collecting as much financial and non-financial information about the company as possible, increasing the volume of audit evidence, and reasonably assessing the risk of material misstatement. Considering the issue of risk assumption, the firm will also charge a risk premium, leading to higher audit fees.

2.1.2 Information Asymmetry Theory

In economic markets, corporate managers and stakeholders possess vastly different levels of information about the enterprise. Managers typically gain access to accurate and complete information firsthand, placing them in a relatively advantageous position. Stakeholders, however, can only obtain limited insights into the company's operational status, development capabilities, and existing risks through publicly disclosed annual reports, social responsibility reports, prospectuses, and similar materials, placing them at an informational disadvantage. Bu Meiwén (2023) et al. note that when stakeholders receive untimely, incomplete, or unreliable corporate information, it can easily lead to issues like "adverse selection" and "moral hazard." For instance, companies may leverage their advantages to reduce or avoid disclosing unfavorable information, minimizing its negative impact, while proactively releasing favorable information to create a positive corporate image in the minds of information users. This dynamic, however, may lead information users to encounter more positive than negative corporate information, resulting in misjudged risks. Simultaneously, it enables companies to embellish their financial status, fostering overconfidence and complacency in operations while neglecting long-term development [1].

2.1.3 Cost-Benefit Theory

Costs are a critical consideration for sustainable business operations. Accounting firms must also factor in costs during their operations, relying on profitability to ensure continued existence. When making decisions about accepting engagements, they must adhere to cost-benefit ratios and consider the firm's profitability. During audit engagements, auditors comprehensively analyze costs and benefits to determine audit fees that cover all inputs—human resources, time, material resources, and risk exposure. However, when facing clients with higher inherent risks or complex engagement scopes, auditors must maintain a prudent approach and ensure report quality. This necessitates increased audit resources and testing procedures to control audit risks within reasonable limits, consequently raising the costs incurred by the auditing entity and justifying higher audit fees.

2.2. Research Hypothesis

2.2.1 Corporate Digital Transformation and Audit Fees

The adoption of digital technologies for digital transformation introduces new changes to companies, impacting inherent risks and control risks (Li Yingmei, 2023) [2]. Digital technologies inherently possess characteristics of high risk, high innovation, and high value. These technologies permeate every aspect of the enterprise value chain—from technological development, production operations, and marketing to human resource management and corporate infrastructure. Business models undergo transformation, causing employee resistance to new processes and operations. This creates conflicts between legacy systems, existing business practices, and new procedures. While enhancing efficiency, these changes also increase operational complexity and risk. Corporate strategic planning and business landscapes will also evolve during transformation, amplifying operational risks and pressures that heighten auditors' difficulty in identifying enterprise risks (Li Min and Qi Xirong, 2024) [3]. Wu Wuqing et al. (2022) note that even with auditors possessing adequate technical capabilities, digital transformation renders auditees' systems more complex. Software unfamiliar to auditors inevitably necessitates more extensive substantive procedures and larger sampling sizes in control testing [4]. Corporate digital transformation also demands continuous improvement in digital literacy, requiring substantial investment in digital infrastructure, business operations, and personnel training. This inevitably increases corporate financing and fundraising needs, thereby amplifying financial pressure and risk. Both operational and financial risks contribute to heightened inherent enterprise risk. In summary, this paper proposes the following hypothesis:

H1: The higher the degree of an enterprise's digital transformation, the higher the audit fees charged by the firm.

2.2.2 Moderating Effects of Managerial Capabilities on Digital Transformation and Audit Fees

The level of managers' understanding of enterprise digitalization influences the exploration and implementation of digital transformation. Zheng et al. (2020) note that executives with strong digital transformation thinking and high sensitivity to future market trends play a critical role in driving corporate digital transformation [5].

Managers with extensive prior experience possess stronger cognitive abilities, enabling them to better understand the importance and specific applications of information technology in corporate management and operations. Consequently, they place greater emphasis on digital transformation, increasing investment in IT infrastructure to enhance operational efficiency and accelerate data transmission. Xing Yang (2023) found that when critical audit matters are disclosed—particularly those revealing operational risk indicators—management may exploit their privileged access to information and decision-making authority to minimize high-risk items for personal gain. This leads to passive attitudes toward disclosure, increased information asymmetry, reduced corporate transparency, and even fraudulent practices like window-dressing financial statements [6]. High-level managers possess sufficient knowledge and capability to assist enterprises in selecting appropriate IT systems for implementation and integration. They ensure the effective execution of IT systems,

enhance the impact of enterprise IT, guarantee interconnectivity across all processes, and promote the rationalization and standardization of business workflows. This reduces inherent risks and control risks within the enterprise. Consequently, auditors face lower enterprise risks and encounter fewer difficulties in obtaining audit data, leading to reduced audit fees. In summary, this paper proposes the following hypothesis:

H2: The effect of digital transformation on increasing audit fees is more pronounced in enterprises with lower managerial competence.

2.2.3 Modulating Effects of Ownership Structure on Corporate Digital Transformation and Audit Fees

Due to China's market economy system, significant differences exist between state-owned and non-state-owned enterprises. Therefore, it is necessary to conduct grouped experiments based on enterprise property rights to gain deeper insights into the audit fee situations of enterprises with different property rights characteristics. As the state continuously issues relevant policies and documents to promote digital transformation and foster effective integration between the real economy and the digital economy, both state-owned and non-state-owned enterprises are actively pursuing digital transformation. However, the degree of digital transformation and associated risks vary.

The higher the level of digitalization within an enterprise, the greater the transparency and efficiency in its operational processes. This enables standardized management of all aspects involved in each workflow, including business operations, personnel, financial amounts, content, and customer/supplier relationships. Qi Fei et al. (2024) also note that higher digital transformation levels in state-owned enterprises reduce management's scope for earnings management, thereby standardizing business operations [7]. Consequently, CPAs conducting audits can inspect digital processes and operations more efficiently, face lower risks, and thus charge lower audit costs and risk premiums. In summary, this paper proposes the following hypotheses:

H3: For non-state-owned enterprises, digital transformation has a more pronounced effect on increasing audit fees.

3. Research Design

3.1. Sample Selection and Data Sources

The manufacturing sector requires multifaceted transformation encompassing new infrastructure, industrial data ecosystems, and entire supply chains, making it the largest entity undergoing digital transformation. This study therefore examines the relationship between corporate digital transformation and audit fees within the manufacturing context. Data from listed manufacturing companies between 2015 and 2022 were selected as the sample. To ensure data comparability and the validity and accuracy of research findings, the initial sample underwent the following processing:

- (1) Companies with ST or *ST status and abnormal financial data were excluded;
- (2) Companies with missing data for relevant variables were excluded;
- (3) Standardized relevant variables through logarithmic transformation;
- (4) To prevent outliers from affecting regression accuracy, all continuous variables underwent trimming at the 1% and 99% percentiles, and balanced panel data were employed for regression analysis.

Ultimately, 1,017 sample companies were selected, yielding a total of 8,136 sample data points. The financial data used in this study primarily originated from the Guotai An database, Juchao Information Network, China Research Data Platform, and corporate websites. All required digital transformation data were compiled from the Guotai An database and corporate annual reports. During the empirical testing process, Excel and Stata 17.1 were utilized for data screening and organization, model construction, and relevant statistical analysis.

3.2. Variable Definitions

(1) Dependent Variable

The dependent variable in this study is audit fees (Lnfee). For accounting firms, audit fees paid by enterprises constitute the consideration received for services rendered and are classified as revenue. Following the methodology of Huang Shizhong et al. (2024), this study measures audit fees for the current fiscal year using the logarithm of the audit fees reported in the listed company's financial statements for that year [8].

(2) Independent Variables

The independent variable in this paper is corporate digital transformation (DCG). The rise of text analysis relies on the development of big data analytics, which enables in-depth exploration of textual data through data mining and word frequency analysis. This paper utilizes text analysis techniques to quantify the frequency and patterns of keyword or key phrase occurrences, constructing word frequency matrices or sentence frequency matrices to measure the degree of corporate digital transformation.

(3) Moderating Variable

Following the approaches of Dermerjian et al. (2012) and Zhang Lu [9,10], managerial capability is separated from the firm efficiency model using Data Envelopment Analysis (DEA) and a Tobit model.

Table 1. Variable Definition Table

Variable	Variable Name	Symbo l	Variable Description
Dependent Variable	Audit Fee	Lnfee	Log of the audited entity's audit fees for the current year
Explanatory Variables	Digital Transformation	DCG	Natural logarithm of the frequency of digital transformation-related terms in the annual report
Moderator variable	Managerial Capability	MA MA4	DEA and Tobit Separation Residuals Regression Residual Rank
	Nature of Firm Ownership	State	State-owned enterprises = 1, Non-state-owned enterprises = 0
	Enterprise Scale	Size	Natural Log of Total Assets at Period End
	Return on Equity	ROE	Enterprise Net Profit / Enterprise Total Assets
Control Variables	Debt-to-Asset Ratio	LEV	Total Liabilities / Total Assets
	Operating Profit Growth Rate	Growth	(Current Period Operating Profit - Previous Period Operating Profit) / Previous Period Operating Profit
	Accounting Firm Size	Big4	For firms listed in annual reports as part of the international "Big Four," assign a value of 1; otherwise, assign 0
	Audit Opinion	Opinion	Previous year's audit opinion: Standard unqualified opinion is 1, otherwise 0
	Listing Duration	Age	Natural logarithm of company listing duration + 1

After determining the variables, establish a multiple linear regression model (1) to examine the relationship between corporate digital transformation and audit fees, testing hypothesis H1:

$$\text{Lnfee} = \beta_0 + \beta_1 \text{DCG} + \beta_2 \text{Size} + \beta_3 \text{ROE} + \beta_4 \text{State} + \beta_5 \text{LEV} + \beta_6 \text{Growth} + \beta_7 \text{Big4} + \beta_8 \text{Opinion} + \beta_9 \text{Age} + \sum \text{Ind} + \sum \text{Year} + \varepsilon \quad (1)$$

Testing Hypothesis H2 to verify whether corporate management capability mediates the relationship between digital transformation and audit fees, we incorporate management capability and its interaction term with digital transformation into Model (2) to validate the following relationship:

$$\text{Lnfee} = \beta_0 + \beta_1 \text{DCG} + \beta_2 \text{MA} + \beta_3 \text{DCG} * \text{MA} + \beta_4 \text{Size} + \beta_5 \text{ROE} + \beta_6 \text{State} + \beta_7 \text{LEV} + \beta_8 \text{Growth} + \beta_9 \text{Big4} + \beta_{10} \text{Opinion} + \beta_{11} \text{Age} + \sum \text{Ind} + \sum \text{Year} + \varepsilon \quad (2)$$

Testing Hypothesis H3 to verify whether property rights structure mediates the relationship between corporate digital transformation and audit costs. Model (3) incorporates property rights structure and the interaction term between property rights structure and corporate digital transformation:

$$\text{Lnfee} = \beta_0 + \beta_1 \text{DCG} + \beta_2 \text{State} + \beta_3 \text{DCG} * \text{State} + \beta_4 \text{Size} + \beta_5 \text{ROE} + \beta_6 \text{LEV} + \beta_7 \text{Growth} + \beta_8 \text{Big4} + \beta_9 \text{Opinion} + \beta_{10} \text{Age} + \sum \text{Ind} + \sum \text{Year} + \varepsilon \quad (3)$$

Robustness test model (4):

$$\text{Lnfee} = \beta_0 + \beta_1 \text{DCG} + \beta_2 \text{MA4} + \beta_3 \text{DCG} * \text{MA4} + \beta_4 \text{Size} + \beta_5 \text{ROE} + \beta_6 \text{State} + \beta_7 \text{LEV} + \beta_8 \text{Growth} + \beta_9 \text{Big4} + \beta_{10} \text{Opinion} + \beta_{11} \text{Age} + \sum \text{Ind} + \sum \text{Year} + \varepsilon \quad (4)$$

Where Lnfee denotes audit fees, DCG represents the degree of corporate digital transformation, Size indicates firm size, ROE signifies return on equity, LEV denotes financial leverage, Growth reflects revenue growth rate, State indicates ownership structure, MA/MA4 measures managerial ability, Big4 represents accounting firm size, Opinion denotes prior-year audit opinion, Age indicates firm age, β_0 is the intercept, and $\beta_i (i=1,2,3,4,5,6,7,8, 9, 10, 11)$ represents the coefficients of the regression equation, and ε denotes the random disturbance term.

4. Empirical Analysis

4.1. Descriptive Statistical Analysis

To gain a more comprehensive understanding of the sample data characteristics, this paper first conducts descriptive statistical analysis on the main variables.

Table 2. Descriptive Statistics of Variables

Variable	Sample Size	Minimum	Maximum	Mean	Standard
Lnfee	8136	12.210	21.420	13.920	0.650
DCG	8136	0	7.064	3.535	1.037
Size	8136	19.750	26.450	22.430	1.162
ROE	8136	-0.962	0.415	0.064	0.123
LEV	8136	0.052	0.924	0.403	0.180
Growth	8136	-0.653	3.894	0.148	0.341
State	8136	0	1	0.311	0.463
Big4	8136	0	1	0.051	0.221
Opinion	8136	0	1	0.980	0.139
Age	8136	2.079	3.611	2.999	0.269
MA	8136	-0.501	0.623	-0.0810	0.158
MA4	8136	1	4	2.031	1.017

As shown in the table, the dependent variable (Lnfee) represents the logarithmic form of audit fees for listed companies. The minimum value is 12.21, the maximum is 21.420, the mean is 13.920, and the standard deviation is 0.65. This indicates that audit fees for listed companies in the manufacturing sector exhibit certain variations, with different-sized companies applying distinct pricing standards. However, overall, the difference between the minimum and mean values is not significant, suggesting that audit fees for most companies remain relatively reasonable.

Explanatory Variable (DCG) Enterprise Digital Transformation (DCG) measures the degree of digital transformation through word frequency. The minimum value is 0, the maximum is 7.064, the mean is 3.535, and the standard deviation is 1.037. This indicates significant variation in digital transformation levels within the manufacturing sector, with some enterprises showing no transformation while others exhibit high levels. Overall, the low mean suggests the industry's digital transformation level requires improvement and holds potential for future development.

The moderating variable Managerial Ability (MA) exhibits a minimum value of -0.501, maximum value of 0.623, and mean of -0.081. The mean for MA4 is 2.031, indicating variations in managerial capabilities across enterprises and generally low levels of managerial competence.

4.2. Multiple Regression Analysis

4.2.1 Impact of Corporate Digital Transformation on Audit Fees

This study employs Stata 17.1 to establish balanced panel data for multiple linear regression analysis. A fixed-effects model is used to regress Model (1), controlling for industry and year to eliminate their potential impact on regression results. The regression results are presented in the table below.

Table 3. Impact of Enterprise Digital Transformation on Audit Fees

	Model (1) Lnfee
DCG	0.025*** (4.43)
Size	0.378*** (7.86)
ROE	-0.426*** (-10.13)
LEV	0.191*** (6.05)
Growth	0.0002 (0.02)
State	-0.097*** (-9.06)
Big4	0.557*** (25.33)
Opinion	-0.152*** (-4.52)
Age	0.030 (1.54)
_cons	5.477*** (43.42)
Industry	Yes
Year	Yes
N	8136
F	65.26
AdjR ²	0.208

As shown in the regression results of Table 5.4 above, controlling for other variables affecting audit fees, the explanatory variable Enterprise Digital Transformation (DCG) exhibits a significant positive correlation with the dependent variable Audit Fees (Lnfee) at the 1% level, with a t-value of 4.43. with a regression coefficient of 0.025. This confirms that corporate digitalization increases the

audit risks faced by auditors during the audit process, leading auditors to increase audit revenue and costs while raising audit fees, thereby validating Hypothesis H1.

4.2.2 Moderating Effect of Managerial Competence on the Relationship Between Digital Transformation and Audit Fees

To further investigate whether managerial competence mediates the relationship between corporate digital transformation and audit fees, Model (2) was constructed by incorporating managerial competence (MA) and the interaction term between managerial competence and corporate digital transformation (DCG*MA) into regression Model (1). The regression results are presented in the table below.

Table 4. Moderating Effect of Managerial Competence

	Model (2) Lnfee
DCG	0.014** (2.21)
MA	0.010 (0.1)
DCG*MA	-0.071** (-2.55)
Size	0.375*** (-7.07)
ROE	-0.350*** (-8.11)
LEV	0.208*** (6.59)
Growth	0.020 (1.34)
State	-0.094*** (-8.87)
Big4	0.553*** (-25.23)
Opinion	-0.152*** (-4.53)
Age	0.042** (2.14)
_cons	5.538*** (43.96)
Industry	Yes
Year	Yes
N	8136
F	59.730
AdjR ²	0.210

As shown in Table 4, the significance levels of control variables and the polarity of regression coefficients are largely consistent with Model (1), indicating good model fit. After introducing the moderator term DCG*MA: The regression coefficient for corporate digital transformation (DCG) is 0.014 with a t-value of 2.21, showing a significant positive correlation with audit fees (Lnfee) at the 5% level; The regression coefficient for the moderator term DCG*MA is -0.071, with a t-value of -2.55, indicating a significant negative effect at the 5% level. This demonstrates that management capability exerts a significant negative moderating effect on the relationship between corporate digital transformation and audit fees. Specifically, firms with lower management capability exhibit higher

digital transformation levels, leading to a more pronounced effect of prompting audit firms to increase audit fees. Thus, the null hypothesis H2 is validated.

4.2.3 Moderating Effect of Ownership Structure on Digital Transformation and Audit Fees

This study conducted grouped regression analysis on ownership structure, first examining the impact of digital transformation on audit fees for state-owned and non-state-owned enterprises, then introducing the interaction term between digital transformation and ownership structure (DCG*State) to construct regression model (3).

Table 5. Modulating Effects of Property Rights Nature

	State-Owned Enterprises State=1	Non-State-Owned Enterprises State=0	Model (3) Lnfee
DCG	0.019*** (3.11)	0.035*** (2.96)	0.023*** (3.65)
State			-0.006 (-0.62)
DCG*State			-0.117*** (-3.38)
Size	0.399*** (3.52)	0.363*** (7.66)	0.378*** (2.82)
ROE	-0.552*** (-6.53)	-0.391*** (-8.21)	-0.426*** (-10.14)
LEV	-0.089 (-1.46)	0.313*** (8.57)	0.192*** (6.08)
Growth	0.006 (0.20)	0.002 (0.12)	0.002 (0.02)
Big4	0.651*** (18.96)	0.459*** (15.60)	0.557*** (25.33)
Opinion	-0.242*** (-2.83)	-0.124*** (-3.51)	-0.151*** (-4.51)
Age	0.011 (0.26)	0.033 (1.58)	0.030 (1.54)
_cons	5.146*** (20.90)	5.734*** (38.42)	5.484*** (43.27)
Industry	Yes	Yes	Yes
Year	Yes	Yes	Yes
N	2512	5624	8136
F	54.13	57.61	62.02
AdjR ²	0.215	0.289	0.207

The results indicate that digital transformation in state-owned enterprises significantly affects audit fees at the 1% level, while digital transformation in non-state-owned enterprises also significantly affects audit fees at the 1% level. This demonstrates that digital transformation in both state-owned and non-state-owned enterprises promotes an increase in audit fees. This occurs because digital transformation involves the deep integration of next-generation information technology, digital technology, and business operations. Characterized by innovation, breakthroughs, and cluster-based development, this process may encounter challenges such as unclear strategy, ambiguous pathways, and inconsistent standards regardless of ownership structure. As enterprises advance further in digital transformation, their business processes become increasingly complex, their operational scope expands, and auditors face greater workloads with more testing procedures. Considering cost-benefit tradeoffs, auditors consequently charge higher fees.

The regression coefficient for digital transformation of state-owned enterprises (SOEs) on audit fees is 0.019, while that for non-state-owned enterprises (NSOEs) is 0.035. This suggests that digital transformation in NSOEs has a more pronounced impact on audit fees than in SOEs, consistent with the preceding hypothesis. Simultaneously, after incorporating the interaction term between enterprise digitalization and ownership structure ($DCG*State$), the moderator variable's regression coefficient (-0.117) is significantly negative at the 1% level. This indicates that compared to SOEs, the impact of digital transformation on audit fees is more pronounced in NSOEs, with ownership structure exerting a negative moderating effect between the two variables, supporting the validity of Hypothesis H3. Non-state-owned enterprises face higher financial risks and internal control risks associated with digital transformation than state-owned enterprises, and their transformation transparency is lower. Consequently, auditors face greater risks and charge higher risk premiums.

4.3. Robustness Tests

To mitigate potential instability in empirical results due to differing managerial competence measurement approaches, this study employs alternative metrics for moderator variable MA4. Residuals separated by the two-stage Tobit model regression are categorized into four groups, assigned values 1, 2, 3, and 4 respectively. Simultaneously, MA4=1 and 2 were grouped as low managerial competence, while MA4=3 and 4 were grouped as high managerial competence. Grouped regression was performed, and robustness tests were conducted by introducing MA4 and $DCG*MA4$. The results are shown in the table below.

As shown in the table above, the significance of control variables and the polarity of regression coefficients are largely consistent between the low-capability and high-capability manager groups, aligning with regression model (1). Furthermore, Digital Transformation (DCG) and Audit Fees (Lnfee) exhibit significant positive correlations at the 1% and 5% levels, respectively, indicating robust regression results.

This study categorizes managerial competence into low and high groups for regression analysis. In the low managerial competence group, corporate digital transformation (DCG) and audit fees (Lnfee) exhibit a significant positive correlation at the 1% level, with a regression coefficient of 0.025. In the high managerial competence group, DCG and audit fees show a significant positive correlation at the 5% level, with a regression coefficient of 0.020, consistent with hypothesis H1. This indicates that the impact and significance of digital transformation on audit fees are more pronounced in the low-capability group than in the high-capability group. To some extent, this reflects that lower managerial capability leads to higher audit fees charged by audit firms, consistent with Hypothesis H2.

Results from Model (4) show that after replacing the managerial competence variable (MA4), digital transformation (DCG) and audit fees (Lnfee) exhibit a significant positive relationship at the 1% level, with a regression coefficient of 0.036 and a t-value of 3.59. This indicates that higher digital transformation levels correlate with higher audit fees, consistent with Hypothesis H1. After introducing Managerial Ability (MA4) and its interaction term with Digital Transformation ($DCG*MA4$), the moderator term exhibits a significant negative correlation with audit fees at the 10% level, with a regression coefficient of -0.008 and a t-value of -1.85. This indicates that managerial ability exerts a negative moderating effect between corporate digital transformation and audit fees, supporting Hypothesis H2. Furthermore, the significance and sign of regression coefficients for control variables in Model (4) largely align with Model (1), indicating robust results.

Table 6. Robustness Test Results

	Low Managerial Capability Group MA4 ≤ 2	High Managerial Capability Group MA4 > 2	Model (4) Lnfee
DCG	0.025*** (3.02)	0.020** (2.39)	0.036*** (3.59)
MA4			-0.010 (-0.64)
DCG*MA 4			-0.008* (-1.85)
Size	0.395*** (5.04)	0.342*** (4.11)	0.375*** (7.45)
ROE	-0.445*** (-8.31)	-0.236** (-3.42)	-0.353*** (-8.23)
LEV	0.201*** (5.08)	0.184*** (3.56)	0.208*** (6.62)
Growth	-0.032 (-1.53)	0.053** (2.75)	0.017 (1.19)
State	-0.086*** (-6.58)	-0.107*** (-5.83)	-0.094*** (-8.79)
Big4	0.579*** (21.28)	0.432*** (11.57)	0.553*** (25.24)
Opinion	-0.134*** (-3.34)	-0.194*** (-3.19)	-0.153*** (-4.55)
Age	0.036 (1.52)	0.035 (1.00)	0.041** (2.09)
_cons	5.087*** (31.94)	6.307*** (30.48)	5.546*** (42.14)
Industry	Yes	Yes	Yes
Year	Yes	Yes	Yes
N	5620	2516	8136
F	58.67	57.97	59.83
AdjR ²	0.225	0.218	0.213

In summary, after replacing the measurement method for the moderator variable (managerial capability) and conducting robustness tests using MA4 as the new metric, both the group-specific regression results for digital transformation and audit fees and the regression results for the managerial capability moderation model remain robust.

5. Research Conclusions

This study selected 1,017 listed companies in the manufacturing sector from 2015 to 2022 as the sample. By constructing a multiple linear regression model, it empirically examined the impact of corporate digital transformation on audit fees while investigating the moderating effect of managerial capability on this relationship. The study reached the following conclusions:

(1) Descriptive statistics reveal significant variation in digital transformation levels across the manufacturing sector, with room for improvement. Due to differences in firm size and operational performance, audit fees exhibit variation as audit firms apply distinct pricing standards. While most firms face low audit risk and receive standard unqualified opinions, the overall low level of

managerial capability in manufacturing amplifies the negative impacts of digital transformation to some extent.

(2) There exists a significant positive correlation between enterprise digital transformation and audit fees. Higher levels of digital transformation correlate with higher audit fees charged by audit firms. Digital transformation increases the risk of material misstatement for enterprises, necessitating greater audit cost inputs from auditors, who consequently charge higher fees. When enterprises implement digital transformation, the adoption of more advanced digital technologies significantly increases inherent risks. Compared to traditional business models, digital transformation, while enhancing the efficiency of related operations and production, also increases their complexity. This introduces higher operational risks and opportunities for fraud. Furthermore, the use of digital technologies inherently carries high risks, all of which contribute to increased inherent audit risks. Moreover, digital transformation introduces new personnel, technologies, and operational environments, all of which amplify control risks. Simultaneously, auditors must invest substantial effort and resources to develop digital audit expertise to address these changes, further increasing their fees. Consequently, CPAs face heightened audit risks and costs when auditing digitally transformed enterprises, leading to higher audit fees charged to the company.

(3) The effect of digital transformation on increasing audit fees is more pronounced in enterprises with lower management capabilities. Enterprises with higher management capabilities tend to consider future development more comprehensively. They actively disclose information externally, prioritize the transparency, rationality, and compliance of digital transformation processes, and steer the enterprise toward positive development. This fosters trust from the public and relevant institutions, resulting in higher credit ratings, lower enterprise risks, smoother audit processes, and reduced audit risks. Conversely, companies with weaker management capabilities exhibit a mismatch between their capacity and the extent of digital transformation. They neglect standardization in digital transformation processes and lack comprehensive oversight of digital operational workflows. This creates operational risks and opportunities for fraud, elevating both business and strategic risks. Consequently, audit engagements become more complex, increasing the risk of audit failure for auditors. Auditors must expand audit procedures to control risks within acceptable levels, leading to higher audit fees. Therefore, enhancing management capabilities helps enterprises reduce audit fees incurred during digital transformation and lower overall costs.

(4) For non-state-owned enterprises, the effect of digital transformation on increasing audit fees is more pronounced. Non-state-owned enterprises require substantial investments in internet infrastructure, artificial intelligence, and high-tech solutions for digital transformation—funding they must secure independently without state support. They face higher financial risks in digital construction and exhibit weaker compliance and transparency in digital business processes compared to state-owned enterprises. Consequently, the greater the digital transformation, the higher the audit risk and fees for non-state-owned enterprises relative to their state-owned counterparts.

In summary, digital transformation represents an inevitable trend and is essential for high-quality corporate development. It enhances operational efficiency and innovation capabilities, improves operational management, creates greater value, and promotes sustainable growth. However, digital transformation must also guard against operational and financial risks. Strategic planning should precede transformation, strengthening internal controls across all digital processes to enhance compliance and transparency. Concurrently, employees' digital thinking and strategic perspectives must be cultivated to ensure the sustainable operation of digital transformation. This approach will mitigate the increase in audit costs associated with corporate digital transformation.

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