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The Impact of Digital Transformation on Firm Profitability

Tongxin Zheng[1*]

[1] *Bartlett Faculty of the Built Environment, University College of London, WC1E 6BT, London, UK*

***Corresponding Author:** txzhengedu@163.com

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ABSTRACT

With the increasing convergence of the digital economy and the real economy, digital transformation has become a vital pathway for enterprises to achieve high-quality development. Against this backdrop, where digital technology's effect on firm profitability is key to understanding its real-economy impact, this article provides empirical data from a panel of Chinese A-share listed companies (2010–2023), systematically showing that digital transformation significantly increases return on assets (ROA). From a mechanistic perspective, digital transformation enhances profitability by lowering financing costs through increased information transparency and improved market signaling, while also boosting financial flexibility by improving access to financing and optimizing the debt maturity structure. The dual contributions of this study lie in furnishing novel empirical evidence for understanding digital technology's empowerment of real-economy firm performance and in generating micro-level policy implications that can inform the effective implementation of digital strategies and the advancement of high-quality economic growth.

Keywords: Digital Transformation, Firm Profitability, Financing Costs, Financing Structure

INTRODUCTION

As global value chains undergo transformation and the Fourth Industrial Revolution continues to advance, core digital technologies such as artificial intelligence, blockchain, cloud computing and big data (ABCD) are reshaping enterprises' value creation processes, offering fresh perspectives for enhancing corporate profitability. The growth of China's digital economy is anchored by two salient features: institutional evolution and technical spread. The expansion of China's digital economy, historically rooted in the 1990s concept of IT-driven industrialization, entered a phase of systematic breakthrough after 2010. This shift was significantly propelled by the 12th Five-Year Plan (2011-2015), which officially recognized "next-generation information technology" as a strategic emerging industry, channeling substantial investments into critical infrastructure including communication networks and cloud computing. The launch of the "Internet +" action plan in 2015 marked a critical turning point for digital technology to penetrate from the consumer end to the production end.

The evolution of technology has gone through three key stages: first, the explosive popularization of the mobile Internet (2013-2017). During this period, financial technologies such as Alipay and WeChat payment have reshaped the business ecosystem, and mobile payment has increased 47 times; followed by the policy dividend period of artificial intelligence and big data technology (2017-2020). Entering the stage of all-element integration under the "Digital China" strategy (2021–present), this period is characterized by several key trends. Algorithm-driven industrial transformation has been propelled by policies such as the New Generation of Artificial Intelligence Development Plan. At the same time, the digital economy's share of GDP surpassed 30%, and the industrial Internet experienced rapid expansion, with the number of networked devices on its platforms increasing at an average annual rate of 67% (Ministry of Industry and Information Technology, 2020). The rise of concepts like the metaverse has further deepened the intergration between the digital and real economy.

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Since the 18th National Congress of the Communist Party of China, the integration of the digital and real economies has been deepening and expanding. Against this backdrop, the China Digital Economic Development Report (2024) indicates that in 2023, China's digital economy reached a scale of 53.9 trillion yuan, accounting for 42.8% of the nation's GDP and contributing 66.45% to GDP growth, thus solidifying its role as a vital driver of high-quality economic development. The integration of the digital and real economies is deepening, evidenced by its expanding scale and penetration. Both in absolute and relative terms, the digital economy's footprint grew in 2023: it accounted for 10.78%, 25.03%, and 45.63% of the value added in the three major industries, respectively, while its penetration rates increased by 0.32, 1.03, and 0.91 percentage points year-on-year. Functioning as a critical mechanism for organically merging the digital and real economies (Chen Yulu, 2023), digital transformation acts as a central engine that elevates production capacity and advances high-quality economic development. This process fundamentally reshapes corporate resource allocation and value creation, thereby enabling the shift from traditional factor dependence to growth fueled by technology and data (Bharadwaj et al., 2013; Verhoef et al., 2021).

In this wave of transformation, corporate profitability, as a key indicator of enterprise management and development, has attracted more and more attention from the academic and practical circles. By deeply integrating digital technology into business and management processes, enterprises have effectively broadened information channels and improved the efficiency of technical knowledge flow, thus improving operational performance (Guo et al., 2023). Existing research shows that digital transformation has a profound influence on the decision-making of companies through technological empowerment and institutional reorganization. Scholars widely concur that the positive economic impacts of enterprise digital transformation are reflected in three primary dimensions. First, it enhances economic performance and firm value by optimizing human capital structure and resource allocation to increase total factor productivity (Zhao Chenyu et al., 2021; Huang Xingang et al., 2022; Chen et al., 2022), and by improving operational efficiency through better supply chain integration (Li Qi et al., 2021). By making integration into international innovation networks easier, it also improves innovation performance (Li Xuesong et al., 2022; Tambe, Hitt, & Brynjolfsson, 2012; Li, Su, & Liu, 2020). Second, it optimizes corporate governance, as digital tools enhance transparency, alleviate agency problems, and strengthen internal control (Chen Deqiu & Hu Qing, 2022). For example, Wu Fei et al. (2021) found it improves management supervision, curbs opportunistic behavior, and enhances stock liquidity. Third, it improves resource access by serving as a signal of high-quality development, thereby broadening financing channels. Within the new "double cycle" development pattern, digital transformation represents a strategic choice for companies to overcome technological challenges and generate new productive forces, as well as a key lever to reshape core competitiveness and promote quality and efficiency improvements in the real economy.

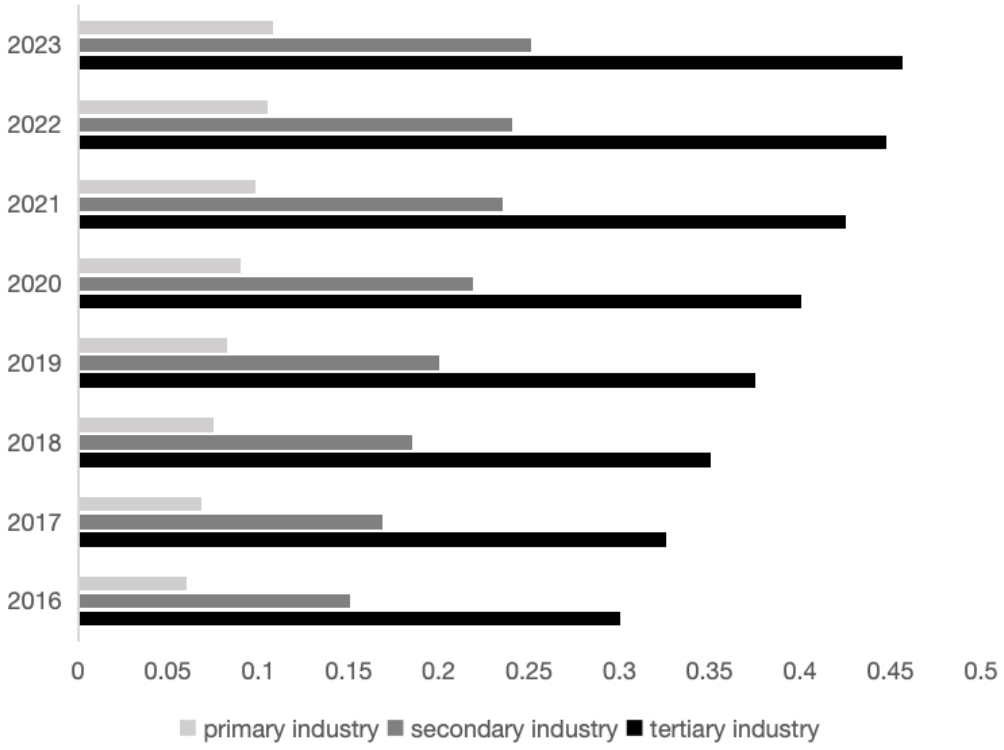

Figure 1: Digital Economic Penetration Rate of China's Three Major Industries (2016-2023)

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Existing research has collectively demonstrated the potential of digitalization to enhance enterprise performance. While there is considerable discussion on how digital transformation influences innovation, governance, and efficiency, its impact on a critical financial metric, corporate profitability, remains insufficiently explored. In fact, profitability is shaped not only by internal operational efficiency but also by external constraints such as the financing environment, institutional context, and market structure, making its underlying mechanisms more complex (Guo & Shen, 2023). Therefore, it is imperative to examine how digital transformation influences corporate profitability from a micro-level perspective, focusing on firm behavior and its interaction with financial markets.

Utilizing a rigorous empirical approach, this research conducts a systematic analysis of how digital transformation influences enterprise profitability. The following is a summary of this study's main contributions:

First, it enriches the literature concerning the economic outcomes of digital transformation. While earlier research have mostly focused on its effects on innovation capability (Nambisan et al., 2017; Tambe et al., 2012), organizational efficiency (Aral et al., 2012), and governance quality (Chen e The influence of t al., 2022), this research broadens the scope by examining its impact on a distinct dimension. Nonetheless, research on the influence of digital transformation on key financial performance metrics, particularly profitability, remains limited. This paper incorporates digital transformation into the analytical framework for corporate financial performance and, through rigorous panel data analysis, provides empirical proof of enhanced corporate profitability, thereby expanding the research domain on the economic impact of digital transformation.

Secondly, this article proposes an analytical framework from a financial perspective, focusing on capital cost and financing structure, to elucidate how digital transformation influences profitability. While existing research typically examines digitalization's impact through the lenses of innovation, technological efficiency, or organizational change, few studies have explored how it enhances corporate profitability by reshaping the financing environment. According to the capital structure and financial limitations theory (Myers & Majluf, 1984; Parrino & Weisbach, 1999), this study pinpoints two main ways that digital transformation boosts profitability: lowering financing costs and optimizing the debt maturity structure. These mechanisms contribute to improved financial flexibility and more efficient capital allocation. This study adds to our understanding of how businesses behave financially in the backdrop of the digital economy.

Third, this article provides digital governance and policy insights for China's national conditions. Chinese firms are currently undergoing rapid digital advancement, with notable differences in their digital infrastructure, financial systems, and institutional frameworks compared to those in Western countries (Cusumano et al., 2022). Through empirical analysis of large samples, this article reveals the impact and mechanism of digital transformation on the profitability of Chinese enterprises. It provides micro-level evidence for enterprises to formulate digital strategies and regulators to optimize digital economy policies, thus enhancing the practical value and practical significance of the research.

Hypotheses

In the digital economy era, digital transformation, as a way to deeply integrate digital technology and business elements, provides a new theoretical explanation for improving profitability by restructuring the resource acquisition and allocation mode of enterprises. In terms of resource allocation, digital technology acts as a key enabler by significantly upgrading enterprises' data acquisition, processing, and analytical capacities. This empowers large-scale information integration, which ultimately enhances productivity and refines decision-making. Secondly, digitalization promotes business process automation and operational collaboration, reduces transaction costs and internal operating costs, and increases marginal profits (Aral, Brynjolfsson and Wu, 2012). In addition, by building digital platforms and innovative business models, enterprises have obtained new ways to create value, thus improving profitability (Nambisan et al., 2017). Existing research demonstrates that digital transformation improves organizational efficiency (Chen et al., 2022), enhances innovative output (Li, Su, & Liu, 2020), and increases firms' market responsiveness (Yoo et al., 2010). Since all these effects contribute to higher profitability, it logically follows that digital transformation is expected to exert a positive impact on profitability by comprehensively enhancing a firm's operational capabilities.

Digital transformation enhances profitability by improving capital allocation efficiency. A key mechanism is the reduction of financing costs, particularly debt financing costs, which provides enterprises with lower-cost capital. In China, the main external financing channel for listed companies is bank loans. However, in the case of information asymmetry, in order to reduce their own credit risk, banks often require enterprises to provide full guarantees and reduce the loan amount (Sufi, 2007), which weakens the debt financing capacity of enterprises. By leveraging digital tools such as blockchain, online sales systems, and enterprise information management software, digital transformation offers a viable solution to mitigate information asymmetry between enterprises and banks.

By using digital tools, enterprises can convert soft information (such as corporate reputation, product sales, etc.) into hard information, that is, digital footprint. In addition, the use of financial management software

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improves the transparency of financial information and business processes, alleviates the information asymmetry between banks and enterprises, and optimizes the external financing environment. Alternatively, digital transformation can reduce the cost of equity financing. With the ability to process and transmit information more effectively, enterprises can "push" information to market participants. Digital transformation enables external investors to obtain more comprehensive information, thereby mitigating information asymmetry and laying a solid groundwork for capital market transactions. Furthermore, given its alignment with national policy direction and its status as a development priority in the new era, enterprises often utilize digital transformation as a strategic tool to convey positive signals to the market (Wang Shouhai et al., 2022). Market investors often have higher expectations for enterprises undergoing digital transformation, which enhances confidence in the future cash flow of enterprises. This positive "exposure effect" can reduce the risk premium of equity financing. When the financing constraints are low and the funds are relatively abundant, the profit expectations of the enterprise may increase.

From the viewpoint of debt maturity heterogeneity, there are notable differences between long-term and short-term debt regarding their risk profiles, impact on corporate governance, and influence on profitability. Digital transformation enhances profitability by optimizing this structure, particularly by reducing the proportion of long-term debt and increasing financial flexibility. Based on the financing sequence theory, short-term debt financing has a significant cost advantage over long-term debt and can reduce the risk of reverse selection caused by information asymmetry. According to the theory of incomplete contracts, long-term debts face a greater risk of default for creditors due to their long contract terms and high uncertainty. This risk expectation prompts long-term creditors to participate more actively in corporate governance, thus constraining the investment decisions of shareholders and management (Ma Qingkui et al., 2017). Empirical research shows that the rise in the long-term debt ratio will significantly reduce the company's performance, exacerbate the proxy conflict between shareholders and creditors, and lead to low investment efficiency (Parrino & Weisbach, 1999). Specifically, long-term debt suppresses profitability in two ways: first, the strict repayment obligation of long-term debt increases financial risks and forces management to take a more cautious approach to investing; second, the strict supervision of long-term creditors strengthens the refusal to pay high-risk projects, thus inhibiting innovative investment and risk bias. Wei Qun (2018) further pointed out that long-term debt has a detrimental influence on both underinvestment and overinvestment: on the one hand, long-term lending exacerbates investment underinvestment by increasing financing constraints; on the other hand, agency conflicts caused by long-term lending may lead to overinvestment, while short-term debt can be structured through flexible terms. Effectively curb excessive investment behavior. Therefore, the higher the dependence on short-term debt, the greater the profitability of the firm.

Digital transformation has reshaped the financing ecosystem and had a structural impact on the long-term debt ratio. First of all, the digital transformation has spurred the emergence of new financing tools such as supply chain finance, blockchain financing and equity crowdfunding. These tools have significant advantages in terms of flexible term, efficient approval process and low cost. They can replace traditional long-term loans, shorten the financing cycle, and reduce intermediary costs. Secondly, the application of digital cash flow management system has significantly improved the liquidity management efficiency of short-term debt and enhanced the ability of enterprises to allocate short-term funds, thus reducing dependence on long-term debt. This helps enterprises maintain their ability to expand and improve profitability.

Building on the previous analysis, this research presents its central hypothesis: digital transformation has a substantial positive influence on corporate profitability, assuming other factors remain constant. Specifically, this improvement is achieved through the mechanisms of reducing financing costs and optimizing financing structures.

Research Design

Sample and Data

The primary sample for analysis in this study includes data from Chinese A-share companies from 2010 to 2023. The sample is subsequently processed in accordance with the following principles: First, eliminate financial enterprises. Financial enterprises have significant differences from non-financial enterprises due to their unique accounting standards (such as financial asset measurement models) and business risk structure (high leverage, strict supervision) (King et al., 2006), and there are also systematic differences in their financial indicators (Li Qingyuan, 2019 Secondly, exclude PT, ST or *ST listed companies. Third, eliminate samples with missing values in related variables. After the above screening, the final sample contains 34,470 company-annual observations. In Order To Avoid The Distortion Of The Estimated Value Caused By Extreme Values, We Processed 1% Winsorization Of The Main Continuous Variables In The Analysis.

Variables

1. Dependent Variable

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Return on Assets (ROA). This research employs return on assets (ROA) as a statistic to analyze a company's profitability. ROA reflects the company's ability to use its total assets to generate profits and is a key financial indicator for evaluating operational performance and resource allocation efficiency. It has been extensively employed in research examining the connection between corporate digitalization, technological innovation, and business performance. To enhance the comparability and practicality of data collection, ROA is calculated as the ratio of net income to total assets at the reporting period's end.

2. Independent Variable

Corporate Digital Transformation (Dig). Two common methods to measure the degree of digital transformation are: (1) text analysis method, such as the research of Liu Fei (2020), Wu Fei et al. (2021), Zhao Chenyu et al. (2021) and Yuan Chun et al. (2021); (2) digital asset ratio method, such as Qi Huaijin et al. (2020), Zhang Yongkun, etc. (2021) research. Digital transformation covers comprehensive changes in various aspects such as business operation, organizational structure, business model and management cognition (Qi Yudong, Xiao Xu, 2020). However, these changes cannot be fully reflected in financial data. As digital transformation becomes a critical element in annual report disclosures, frequently emphasized by companies to appeal to investors, textual analysis of these reports has emerged as the primary method for measuring this transformation. Consistent with this approach, this paper estimates the amount of digital transformation by measuring the frequency of terms related to "digital transformation" in corporate annual reports.

The "China Digital Economy Research Database" in the GTAR database follows the method of Wu Fei et al. (2021) to separate digital transformation into two dimensions: "basic technology" and "practical application". The "basic technology" dimension includes artificial intelligence (AI), blockchain (BD), cloud computing (CC) and big data (DT). The "Practical Application" dimension refers to the application of digital technology (ADT). This study statistics the frequency of keywords in the five dimensions of digital transformation, and eliminates the negative words before the keywords, such as "no", "no" and "no". To estimate the amount of business digital change, a keyword lexicon was built and matched against annual report texts. The keyword frequencies for each of the five aspects are added together, and the result is transformed into a standardized measure to create the digital transformation index. A higher value on this index signifies a greater degree of digital transformation.

3. Control Variables

Building on previous studies (Zhou Zejiang et al., 2019; Xiao Tusheng et al., 2022), this research comprises a set of control variables, with their precise definitions provided in Figure 2.

Variable Type	Variable Name	Symbol	Definition
Dependent Variable	Return on assets	*ROA*	Net profit divided by its total assets
Independent Variable	Digital Transformation	*Dig*	Natural logarithm of (1 + frequency of digital transformation keywords in annual reports)
Control Variables	Leverage	*Lev*	Total liabilities divided by total assets
	Cash Flow Ratio	*Cashflow*	Net cash flow from operating activities divided by total assets
	Growth rate of operating income	*Growth*	The ratio of the increase in operating income for the current year to the total operating income of the previous year
	Board Size	*Board*	Natural logarithm of the number of board members
	Independent Director Ratio	*Indep*	Ratio of independent directors to total board members
	CEO Duality	*Dual*	Equals 1 if CEO and board chair are the same person, 0 otherwise
	The shareholding ratio of the largest shareholder	*Top1*	The proportion of the shares held by the largest shareholder of a listed company to the total number of shares of the listed company
	TobinQ	*TobinQ*	Market value divided by total assets
	Years on the market	*ListAge*	The length of time since the company was officially listed on the stock exchange
	Institutional Ownership	*INST*	Institutional shareholding divided by total tradable shares
	Administrative Expense Ratio	*Mfee*	Administrative expenses divided by operating revenue

Figure 2. *Variable Definitions*

Descriptive Statistics

Table 1 displays the descriptive statistics for the primary variables examined in this study. The findings indicate that the mean value of the dependent variable, return on assets (ROA) is 0.041, the standard deviation is 0.064, the

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maximum value is 0.253,the minimum value is -0.353, and the median is 0.039. This indicates that the overall profitability of the sampled enterprises is at a low-to-medium level, with significant inter-firm disparities. Notably, some firms even reported substantial losses, further indicating pronounced performance differentials under the prevailing economic conditions. The average and median of the degree of digital transformation are 1.450 and 1.099 respectively, which is consistent with previous literature (Wu Fei et al., 2021), indicating that the overall level of digital transformation of sample enterprises is relatively low. With a maximum value of 5.389 and a minimum value of 0, the digital transformation index indicates significant diversity in the degree of digital transformation among businesses, with some not yet beginning the process. The distribution of the remaining variables falls within an acceptable range.

Table 1. Descriptive Statistics of Main Variables

Var	N	Mean	p50	SD	Min	Max
ROA	34470	0.041	0.039	0.064	-0.353	0.253
Dig	34470	1.450	1.099	1.422	0	5.389
Lev	34470	0.422	0.416	0.203	0.033	0.909
Cashflow	34470	0.047	0.046	0.069	-0.235	0.267
Growth	34470	0.167	0.107	0.391	-0.654	3.705
Board	34470	2.122	2.197	0.196	1.609	2.708
Indep	34470	0.376	0.364	0.054	0.273	0.600
Dual	34470	0.281	0	0.449	0	1
Top1	34470	0.338	0.315	0.148	0.080	0.806
TobinQ	34470	2.051	1.624	1.348	0.770	15.611
ListAge	34470	2.156	2.303	0.821	0	3.468
INST	34470	0.435	0.449	0.246	0.001	0.940
Mfee	34470	0.086	0.068	0.068	0.006	0.616

Model Specification

We estimate the following basic model to assess how corporate digital transformation affects profitability:

$$ROA_{i,t} = \alpha_1 Dig_{i,t} + \alpha_2 Controls_{i,t} + \eta_i + \gamma_t + \varepsilon_{i,t} \quad (1)$$

Empirical Results

Baseline Regression

Table 2 shows the core empirical results of the relationship between digital transformation and return on assets (ROA). In the benchmark regression, this study utilizes a stepwise regression technique. Column (1) only lists the findings of the influence of digital transformation (Dig) on ROA. The regression coefficient of the digital transformation index (Dig) is -0.00147, which has statistical significance at the significance level of 1%. This indicates that, before accounting for firm-specific characteristics and macroeconomic variables, digital transformation is negatively correlated with corporate profitability. Column (2) adds control variables such as company size, asset structure, growth and corporate governance. Despite a reduction to -0.00109, the Dig coefficient maintained its statistical significance at the 1% level. This supports the notion that the negative correlation between digital transformation and ROA persists even when firm heterogeneity is accounted for, suggesting that initial digital efforts, which involve significant upfront investments and organizational restructuring aimed at future efficiency, may lead to a temporary decline in profitability. The coefficient for digital transformation (Dig) in column (3) rises to 0.000973 and is still statistically significant at the 1% level when industry and year fixed effects are taken into account to account for unobserved variability. This confirms that, after purging the influence of industry attributes and economic cycles, digital transformation significantly increases the return on assets (ROA). The result implies that under a cleaner identification, digitalization has a positive causal impact on profitability by improving resource allocation, reducing costs, and fostering value creation.

Table 2. Baseline Regression Results: Digital Transformation and ROA

	ROA		
Var	**(1)**	**(2)**	**(3)**

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Dig	-0.00147***	-0.00109***	0.000973***
	(0.000264)	(0.000212)	(0.000260)
Lev		-0.103***	-0.110***
		(0.00187)	(0.00198)
Cashflow		0.276***	0.293***
		(0.00517)	(0.00524)
Growth		0.0352***	0.0327***
		(0.000997)	(0.000999)
Board		0.0182***	0.0157***
		(0.00178)	(0.00179)
Indep		0.000176**	0.000168**
		(0.0000605)	(0.0000598)
Dual		-0.000948	-0.000344
		(0.000665)	(0.000656)
Top1		0.0221***	0.0190***
		(0.00215)	(0.00213)
TobinQ		0.00622***	0.00657***
		(0.000281)	(0.000298)
ListAge		-0.00788***	-0.00727***
		(0.000359)	(0.000372)
INST		0.0222***	0.0213***
		(0.00134)	(0.00133)
Mfee		-0.211***	-0.231***
		(0.00596)	(0.00642)
_cons	0.0429***	0.0271***	0.0334***
	(0.000477)	(0.00541)	(0.00544)
Industry FE	NO	NO	YES
Year FE	NO	NO	YES
Obs	34470	34470	34470
Adj.R^2	0.001	0.392	0.412

*Note: ***, ** and * indicate statistical significance at the significance levels of 1%, 5% and 10% respectively. This rule shall apply to the following.*

Robustness Tests

1. ***Replacement of Dependent Variable***

This study uses Return on Assets (ROA) as the core profitability measure in its benchmark analysis. To further check the robustness of the findings, Return on Equity (ROE) is used as an alternative dependent variable, following established research practice. Unlike ROA, ROE evaluates performance from the equity return standpoint, thereby enabling a multi-dimensional assessment of digital transformation's influence and reducing the risk of measurement error inherent in single-metric analyses.

As shown in column (1) of Table 4, the coefficient for Digital Transformation (Dig) is a statistically and economically significant 0.00320. This positive result confirms that digital transformation robustly improves firm profitability across alternative proxies (ROA and ROE), thereby validating the benchmark findings and reducing potential bias from dependent variable selection.

2. ***Subsample Analyses***

Firstly, since the textual data concerning digitalization in the annual reports of firms within the information industry mainly reflects the evolving trends of their business activities rather than providing a comprehensive picture of their digital transformation, the precision of digital transformation indicators derived from text analysis methods may be compromised. Therefore, this study excludes samples from companies in the computer, communication, and other electronic equipment manufacturing industries, the software and information technology services industry, and the internet and related services industries. Second, following Tang Song et al. (2020), this study excludes the 2015 sample data (the year of the Chinese stock market crash) to eliminate the confounding effect of a major economic shock. This adjustment is necessary because such events can lead to altered corporate decisions, reduced profitability, and potential setbacks in digital transformation.

The coefficients for the digital transformation variable are still positive and statistically important at the 1% level, as seen in Table 3's columns (2) and (3). This supports the core findings of the paper, confirming that the results are robust even after excluding specific samples.

Table 3. Robustness Tests

Var	**Alternative ROA**	**Excluding IT Sectors**	**Excluding Market Crash**

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	(1)	(2)	(3)
	ROE	***ROA***	***ROA***
Dig	0.00320***	0.00122***	0.00119***
	(0.000563)	(0.000290)	(0.000302)
CVs	YES	YES	YES
Industry FE	YES	YES	YES
Year FE	YES	YES	YES
Obs	34470	28889	27035
Adj.R^2	0.294	0.424	0.429

Mechanism Analysis

Based on the previous benchmark regression and robustness test, an important conclusion can be drawn: digital transformation exerts a significant and consistent positive influence on corporate profitability. To deeper explore the underlying mechanisms of this effect, this research investigates these mechanisms through the lenses of financing cost and financing structure. For this reason, this article adopts the intermediary effect test method proposed by Jiang Ting (2022):

$$M_{i,t} = \alpha_1 Dig_{i,t} + \alpha_2 Controls_{i,t} + \eta_i + \gamma_t + \varepsilon_{i,t} \quad (2)$$

We estimate the model (2), take the mechanism variables $M_{i,t}$ as the dependent variables, and the digital transformation as the key explanatory variable, while maintaining other controls consistent with the benchmark model.

Financing Cost Mechanism

Theoretically, digital transformation lowers financing costs through improved transparency and signaling, easing constraints and boosting profitability. We measure financing cost (Cost) as the ratio of financial expenses to average total liabilities, following Pan Yue et al. A significantly negative Dig coefficient in model (2) would support the hypothesis that digital transformation reduces financing costs to enhance firm performance.

The results presented in column (1) of Table 5 indicate that digital transformation significantly reduces financing costs, with statistical significance at the 1% level. This finding supports the view that a greater extent of digital transformation lowers corporate financing costs, thus improving profitability. In addition, low financing costs mean that enterprises can carry out investment activities at a lower cost, improve capital utilization efficiency, and enhance expansion capacity, thus laying the financial foundation for improving enterprise profitability.

Capital Structure Mechanism

The debt maturity structure has a significant impact on shaping corporate financing risk, financial flexibility, and investment choices. Digital transformation aids in optimizing this structure by enhancing access to financing, expanding financing options, and improving credit evaluation and risk pricing capabilities. Therefore, a significantly negative coefficient for digital transformation (Dig) would indicate that it helps reduce the long-term debt proportion, thereby optimizing the overall financing structure.

The regression results in column (2) of Table 4 show that the coefficient of digital transformation (Dig) is significantly negative at the significance level of 1%, indicating that, driven by tools such as supply chain finance and blockchain finance, digital transformation replaces some traditional long-term debt with short-term financing tools using digital technology. These tools have the advantages of flexible term, high approval efficiency, and low credit identification cost (Wei Qun, 2018). This adjustment is in line with the financing sequence theory, because short-term debt costs are lower and there are fewer restrictions, which helps enterprises maintain financial flexibility and enhance capital allocation flexibility. In addition, the reduction of the long-term debt ratio has reduced the restrictions on investment behavior of creditors' supervision and alleviated the proxy conflict between shareholders and creditors (Parrino & Weisbach, 1999), thus improving decision-making efficiency and further improving profitability.

Table 4. Mechanism Analysis

	Financing Cost	**Capital Structure**
Var	**(1)**	**(2)**
	Cost	*L_Loan*
Dig	-0.000977***	-0.00764***
	(0.000171)	(0.000721)
CVs	YES	YES
Industry FE	YES	YES
Year FE	YES	YES
Obs	34470	34470

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Adj.R^2	0.299	0.223

CONCLUSION

The main conclusions are outlined below:

Firstly, digital transformation significantly enhances corporate profitability, with companies that undergo more extensive digital transformation exhibiting notably higher return on assets (ROA). This key finding remains consistent across various robustness tests, including replacing return on assets (ROA) with return on equity (ROE) and using different subsamples, highlighting the widespread positive impact of digitalization on financial performance.

Secondly, digital transformation improves profitability by reducing financing costs and optimizing financing structure. On the one hand, digital transformation has decreased the cost of debt financing and equity capital through mechanisms such as information transparency, signal enhancement and market expectation management, thus easing the financing constraints of enterprises. On the other hand, digital transformation optimizes the financing structure through new financing tools such as supply chain finance and blockchain financing, reducing the proportion of long-term debt, enhancing financial flexibility, and alleviating agency conflicts, thus improving profitability.

In light of the aforementioned study findings, this article proposes the following policy recommendations:

First of all, the government should seize the opportunities brought by digital economic development, support digital transformation through tax incentives, special subsidies and other policy tools, encourage enterprises to use blockchain, artificial intelligence and other technologies to optimize the financing structure, reduce dependence on long-term debt, and make room for high-risk investment.

Secondly, we should deepen the reform of the financial market, take digital transformation as an opportunity to reshape the financing ecosystem, improve the market standards of new financing tools such as supply chain finance and equity crowdfunding, use financial technology to increase the transparency between banks and enterprises, lower the cost of debt financing, reduce the equity capital premium, and make digital transformation Transform into capital market value more effectively.

Third, the construction of regional digital infrastructure should be strengthened. In areas with a low degree of marketization, priority should be given to the deployment of digital infrastructure to promote the accurate docking of financial technology and local industries. Blockchain credit, smart contracts and other tools should be used to solve the problem of information asymmetry, provide stable financial support for high-risk innovation projects, help enterprises overcome the dilemma of "reluctance to transform" and "lack of knowledge of transformation", and promote high-quality development.

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