

Research on the Impact of Digital Technology Innovation on Corporate Earnings Management

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Abstract. This paper takes the A-share listed companies in Shanghai and Shenzhen from 2007 to 2023 as the research object to empirically study the impact of digital technology innovation on corporate earnings management and its mechanism. It is found that digital technology innovation can significantly inhibit corporate earnings management behaviors. Mechanism analysis reveals that strengthening the sustainable development orientation and reducing the degree of information asymmetry are the keys to the emergence of the governance effect of digital technology innovation. The above findings enrich the research on the economic consequences of digital technology innovation and the influencing factors of earnings management, and provide new empirical evidence and practical insights for promoting the governance effect of the digital economy and improving the quality of corporate earnings.

Keywords: Digital Technology Innovation; Earnings Management; Sustainability Orientation; Information Asymmetry.

1. Introduction

In August 2022, the *Measures for Compliance Management of Chinese Central Enterprises* explicitly stated that central enterprises should be promoted to strengthen compliance management, effectively prevent and control risks, and vigorously safeguard the deepening of reform and high-quality development. This is highly consistent with the content of “guiding enterprises to strengthen compliance management” stated in the *Outline of the 14th Five-Year Plan (2021-2025)* and *Long-Range Objectives for 2035*, presenting the great importance of corporate compliance work at the national strategic level. As a key indicator of an enterprise’s operating conditions and profitability, the level and quality of earnings not only affect management’s compensation and corporate strategy formulation but also directly influence the effectiveness of decision-making by external stakeholders. In real economic activities, management, when faced with poor business operations, may adopt earnings management and other means to manipulate earnings information in order to make personal profits or achieve performance goals driven by capital market motives, contractual motives, and other opportunistic factors. For example, Enron Corporation went bankrupt in 2001 for inflating profits by nearly \$600 million through financial fraud and concealing over \$1 billion in debt. Orient Group was forced to delist for major violations after inflating sales revenue by a total of about \$16.1 billion from 2020-2023. It can be seen that the long-term existence of earnings management behavior will undoubtedly threaten the healthy development of the capital market. Therefore, both academic and business professionals are more concerned about corporate earnings management, whose factors are of great practical significance to explore and seek ways to suppress.

Previous studies have explored the influencing factors of corporate earnings management from the perspectives of information asymmetry (Chung et al., 2005), capital costs (Lambert et al., 2007), and the quality of accounting disclosure (Kang, 2023), but have not yet discussed it based on digital technology innovation. Therefore, in the context of the new round of technological revolution and industrial change, this paper focuses on the impact of digital technology innovation on corporate earnings management in order to expand the research boundaries in this field.

The report of the 20th CPC National Congress emphasized that it should “accelerate the digital economy and promote the deep integration of the digital and the real economy”. As an important engine for China’s digital economy, digital technology innovation has continued to make breakthroughs in the fields of 5G, big data, and artificial intelligence, leading to the rapid expansion

of the scale of the digital industry. With the in-depth application of digital technology innovation, its impact on corporate governance has triggered extensive discussions among scholars. Some studies have shown that digital technology innovation can improve corporate ESG levels through mechanisms such as improving production and operation efficiency, reducing financial and operational risks, and alleviating external environmental constraints (Yang R.F. and Yang J., 2024). Simultaneously, relying on the synergistic effect of multiple technologies, digital technology innovation can improve the efficiency of information transmission, reduce the degree of information asymmetry within and outside the enterprise, and then reshape the corporate governance mechanism (Wang et al., 2023). Previous research provides a theoretical basis for analyzing the governance effect of digital technology innovation, but no scholars have yet studied the relationship between digital technology innovation and corporate earnings management. Therefore, this paper utilizes the digital technology innovation word frequency index to portray the degree of digital technology innovation of enterprises, and systematically explores the impact and mechanism of digital technology innovation on corporate earnings management.

Specifically, this paper selects A-share listed companies in Shanghai and Shenzhen from 2007 to 2023 as the research object for the empirical test. The results show that digital technology innovation can significantly inhibit corporate earnings management behavior, whose mechanism of action is reflected in the strengthening of sustainable development orientation and reducing the degree of information asymmetry.

Compared with previous studies, this paper has the following main contribution. First, it expands the research perspective of earnings management. Most of the previous research analyzes the influencing factors of corporate earnings management from the branch perspective of digital technology innovation, but lacks the relevant discussion based on digital technology innovation as a whole. Second, it enriches the research on the economic consequences of digital technology innovation. Improvement of internal governance is one of the important goals of enterprises to introduce digital technology innovation, and corporate earnings management is an important manifestation of the defects of corporate internal governance. Few studies have yet focused on the relationship between digital technology innovation and corporate earnings management. Third, from the practical level, this study, for the first time from the perspective of corporate earnings management, provides data support to optimize the governance system of enterprises using digital technology innovation.

2. Theoretical Analysis and Research Hypothesis

Digital technology innovation refers to the process in which enterprises adopt a combination of digital technologies, such as big data, artificial intelligence, blockchain, and cloud computing, to carry out technological innovation around multiple dimensions such as products, processes, and business models (Liu et al., 2020). As an emerging field that brings together many elements of innovation and has broad prospects for development and application, digital technology innovation can not only help improve the productivity of enterprises, but also blur the boundaries of different subjects such as industries, organizations, departments and products, and reshape internal business models (Porter and Heppelmann, 2014). Therefore, compared with other technological innovations, digital technology innovation has a deeper impact on the economic behavior of enterprises. Does digital technology innovation inhibit contemporary corporate earnings management behaviors? What is its internal mechanism? Synthesizing the research results in related fields, this paper discusses the inhibitory effect of digital technology innovation on corporate earnings management from the aspects of strengthening the sustainable development orientation and reducing the degree of information asymmetry. The specific paths are as follows.

2.1 Digital Technology Innovation - Strengthening Sustainability Orientation - Curbing Earnings Management

Digital technology innovation can strengthen corporate sustainability orientation and thus inhibit corporate earnings management behavior. Sustainability orientation means that enterprises emphasize the trust of stakeholders and pursue long-term value goals. From the perspective of internal decision-making, the short-sightedness of management is a direct manifestation of the weakening of corporate sustainable development orientation, which usually leads to the excessive pursuit of short-term goals and self-interest and the neglect of the long-term development of the enterprise by the management, inducing performance manipulation represented by earnings management. Specifically, given the low-cost and quick-impact nature of earnings management, this characteristic can lead corporations to abandon projects that are truly conducive to maximizing long-term benefits and instead to whitewash short-term performance through earnings manipulation. On the other hand, since reaching short-term performance targets can lead to more lucrative compensation rewards for managers, short-sighted management may also engage in self-serving earnings management behaviors by manipulating corporate financial information. Further, digital technology innovation can make corporate information transparent and accelerate information transmission. Stakeholders can more effectively monitor the various behaviors of management, thus strengthening the external governance system and mitigating the problem of managerial myopia (Ke and Xu, 2024). The reduction of managerial myopia implies that enterprises pay more attention to sustainable development orientation and pursue the realization of long-term corporate value objectives. The incentives for irregular manipulation can also be weakened.

2.2 Digital Technology Innovation - Reducing Information Asymmetry - Curbing Earnings Management

Digital technology innovation can reduce the degree of information asymmetry and thus inhibit corporate earnings management behavior. Previous research shows that the existence of information asymmetry in a market economy may result in the differentiation of the amount of information possessed by participants. The management in an advantageous position may use its advantage to manipulate financial information, so as to make private profit. Meanwhile, in the process of investment decision-making, information asymmetry may bias the value assessment of the enterprise by external investors, which in turn may make it difficult for the enterprise to obtain a satisfactory amount of financing, and ultimately induce the behavior of the enterprise to whitewash its financial performance by inflating its income or hiding negative information. In other words, the ability to reduce information asymmetry to a greater extent is a key factor in curbing corporate earnings manipulation. Based on a variety of technology models such as artificial intelligence, big data, the Internet, and blockchain, digital technology innovation can alleviate this problem at the root. On the one hand, with efficient information collection and processing capabilities, the embedding of digital technology innovation in products, services, processes, and business models enables companies to absorb and integrate large-scale unstructured data, transforming it into quantifiable and analyzable information (Goldfarb and Tucker, 2019). Based on this, enterprises can improve the efficiency of releasing positive signals externally, thus reducing the degree of information asymmetry between them and external investors (Wang et al., 2023) and alleviating the information disadvantage of investors. At this time, it is less difficult for corporate earnings to be financed, thus it is easier to obtain stable and sufficient financial support, which ultimately suppresses the incentives for earnings manipulation arising from financing constraints. On the other hand, digital technology can realize the rapid acquisition, transmission, and storage of accounting data with the help of a big data-driven intelligent financial system to reduce human operation and errors for more transparent accounting information (Chen and Li, 2024). With the improvement of information transparency, the external market can more conveniently obtain information on internal corporate decision-making and form a more effective monitoring mechanism, which increases the cost and risk of corporate earnings management and thus reduces its tendency.

Based on this, this paper proposes Hypothesis 1, Hypothesis 2a, and Hypothesis 2b.

H₁: Digital technology innovation can inhibit corporate earnings management.

H_{2a}: Digital technology innovation can inhibit corporate earnings management by strengthening sustainable development orientation.

H_{2b}: Digital technology innovation can inhibit corporate earnings management by reducing the degree of information asymmetry.

3. Research Design

3.1 Sample Selection and Data Sources

This paper takes the data of China's A-share listed companies in Shanghai and Shenzhen from 2006 to 2023 as samples. While selecting, samples of financial listed companies, samples with missing relevant regression variables, and samples of ST and *ST companies were excluded. 43,690 observations were finally obtained. The ESG rating data in this paper comes from Sino-Securities Index Information Service (Shanghai) Co., Ltd, and other related financial data comes from the CSMAR database. In addition, in order to minimize the effect of extreme values, this paper shrunk all continuous variables at the 1% and 99% levels. Data analysis and tests were processed using Stata 16.0.

3.2 Definition and Measurement of Key Variables

3.2.1 Explained Variable: Corporate Real Earnings Management (*REM*)

With reference to the research of domestic and foreign scholars, this paper obtained abnormal net cash flow from operating activities (*Abcfo*), abnormal production costs (*Abprod*), and abnormal discretionary expenses (*Abdisexp*) according to the relevant formulas, and then calculated the *REM* index. The larger the absolute value of *REM*, the higher the degree of corporate *REM* is.

3.2.2 Explanatory Variable: Digital Technology Innovation (*Digtech*)

This study captured the keywords about digital technology innovation in the annual reports of enterprises, and multiplied the ratio of the sum of the word frequency of the three dimensions of digital product innovation, digital process innovation, and digital business model innovation in the keyword word spectrum and the total number of words in the full text of the annual report by 100 to get the *Digtech* index of the enterprise.

3.2.3 Control Variables

With reference to previous studies, the following control variables were selected, including firm size (*Size*, natural logarithm of total assets), debt to asset ratio (*Lev*, total debt / total assets at year-end), firm growth (*Growth*, (current operating income - previous operating income) / previous operating income), profitability (*ROA*, net profit / total assets at year-end), board size (*Board*, the natural logarithm of the number of board members), the proportion of independent directors (*Indep*, the number of independent directors / the number of directors), enterprise age (*Age*, the number of years of listing), shareholding concentration (*Shrcr1*, the number of shares held by the largest shareholder / the enterprise's total share capital), audit quality (*Big4*, the value is 1 if the listed company was audited by the Big Four accounting firms during the year, 0 otherwise), and dual positions (*Dual*, the value is 1 if the general manager and the chairman of the board are combined, 0 otherwise). Fixed effects for *Industry* and *Year* were also controlled.

3.3 Model Building

This paper constructed Model (1) to test the effect of *Digtech* on *REM*.

$$REM_{i,t} = \beta_0 + \beta_1 Digtech_{i,t} + \beta_2 Controls_{i,t} + Industry + Year + \varepsilon_{i,t} \quad (1)$$

i represents the corporate and *t* denotes time. *REM* is the explained variable that denotes the extent of corporate earnings management in year *t* of Corporate *i*. *Digtech* is the explanatory variable that

denotes the extent of digital technology innovation in year t of Corporate i . *Controls* is the main control variable chosen in this study. *Year* and *Industry* refer to year fixed effects and industry fixed effects, respectively. ε is a random disturbance term. The sign and significance of the β_1 coefficient are the focus of research attention. If β_1 is significantly negative, it indicates that the higher the degree of corporate *Digtech*, the less the corporate *REM*. In this way, H1 is valid.

4. Results and Analysis

4.1 Benchmark Regression Results

Table 1 reports the results of the benchmark regressions. Columns (1)-(3) of the table present the regression results with the inclusion of the core explanatory variables, control variables, control year, and industry fixed effects, respectively. Columns (1) and (2) show that the coefficient of *Digtech* on *REM* is significantly negative at the 1% level, regardless of whether control variables are added. Column (3) has a significantly negative regression coefficient at the 5% level for *Digtech* after further controlling for year and industry fixed effects in Column (2). The above regression results indicate that digital technology innovation will have a significant inhibitory effect on corporate earnings management, and H1 is thus proven.

Table 1 Benchmark Regression Results

	(1)	(2)	(3)
	<i>REM</i>	<i>REM</i>	<i>REM</i>
<i>Digtech</i>	-0.0844*** (-9.907)	-0.0311*** (-3.609)	-0.0228** (-2.212)
<i>Controls</i>	No	Yes	Yes
<i>Year</i>	No	No	Yes
<i>Industry</i>	No	No	Yes
<i>N</i>	43690	43690	43690
<i>Adj.R²</i>	0.0019	0.0798	0.1441

Note: ***, **, and * indicate significance levels at 1%, 5%, and 10% respectively, with t-values in parentheses (Same as Table 2).

4.2 Mechanism Tests

As mentioned above, digital technology innovation does significantly dampen corporate earnings management. Then, through what mechanism does it affect corporate earnings management? Following the theoretical analysis in the previous section, this paper developed empirical tests from the perspectives of strengthening sustainable development orientation and reducing the degree of information asymmetry, respectively.

4.2.1 Test for Sustainability Orientation Enhancement

In recent years, corporate sustainable development has become more and more closely linked to socio-economic development. In addition to economic benefits, companies need to emphasize the improvement of sustainable development capabilities in terms of environmental protection and social responsibility. As an important value system that includes environmental, social, and corporate governance dimensions, ESG level is regarded as a key indicator of corporate sustainable development. Therefore, this paper adopted corporate ESG ratings to measure corporate sustainability orientation. Meanwhile, in order to achieve short-term goals and make personal profits, management may adopt short-sighted behaviors that are not conducive to corporate sustainability. Therefore, this paper took the managerial short-sightedness indicator as another proxy for measuring corporate sustainability orientation.

The ESG in this paper is from Sino-Securities Index Information Service (Shanghai) Co. Ltd, which consists of nine grades of C, CC, CCC, B, BB, BBB, A, AA, AAA, and assigning values from 1 to 9 from the lowest to the highest. The larger the value is, the better the ESG performance is, and

the stronger the sustainable development orientation is. The regression results are shown in Column (1) in Table 2. It can be seen that the regression coefficients of ESG are all significantly positive at the 1% level, indicating that digital technology innovation significantly improves the ESG level of enterprises and provides preliminary evidence for the potential path of strengthening sustainability orientation. In addition, this paper drew on previous research to calculate the proportion of the total word frequency of “short-term horizon” words to the total word frequency of MD&A, and multiplied it by 100 to obtain the indicator of managerial short-sightedness (*DS*). The larger the value of the indicator is, the more short-sighted the manager is and the weaker the sustainable development orientation is. The results in Column (2) of Table 2 show that the regression coefficients of *DS* are all significantly negative at the 1% level, indicating that digital technology innovation significantly reduces the degree of short-sightedness of enterprise managers. The meanings represented by the other control variable symbols are the same as in the previous section. The above results indicate that digital technology innovation significantly strengthens corporate sustainable development orientation, which in turn inclines corporations to achieve long-term value objectives and reduces short-term earnings manipulation.

4.2.2 Test for Information Asymmetry Reduction

Drawing on previous studies, this paper calculated the degree of information asymmetry (*ASY*) between the supply and demand sides of capital based on daily stock purchase and sale data to compute the degree of information asymmetry between informed and uninformed traders about corporate value. The control variables are consistent with the previous parts.

The regression results reported in Column (3) of Table 2 show that the regression coefficient of *ASY* is significantly negative at the 1% confidence level, suggesting that digital technology innovation significantly reduces the degree of information asymmetry, thereby alleviating corporate financing constraints and strengthening external governance mechanisms. The above results imply that digital technology innovation does help to reduce information asymmetry, which in turn inhibits corporate earnings management behavior.

Table 2 Mechanisms Analysis Results

	(1)	(2)	(3)
	<i>ESG</i>	<i>DS</i>	<i>ASY</i>
<i>Digtech</i>	0.8579*** (14.982)	-0.0244*** (-11.705)	-0.1608*** (-7.543)
<i>Controls</i>	Yes	Yes	Yes
<i>Year</i>	Yes	Yes	Yes
<i>Industry</i>	Yes	Yes	Yes
<i>N</i>	38801	43449	43577
<i>Adj.R²</i>	0.2396	0.1106	0.5796

5. Conclusions and Suggestions

This paper empirically explores the impact and mechanism of digital technology innovation on earnings management using Chinese A-share listed companies from 2007 to 2023 as a research sample. The findings are as follows. First, digital technology innovation is significantly negatively correlated with earnings management, i.e., the positive spillover effect of digital technology innovation will have a governance effect on earnings management. Second, mechanism analysis shows that digital technology innovation restricts management’s motivation and ability to manipulate corporate earnings by strengthening sustainable development orientation and reducing information asymmetry, thus reducing the degree of corporate earnings management.

Combined with the above conclusions, this paper puts forward the following suggestions. First, in view of the current situation of the development level of enterprise digital technology innovation, the government should construct a differentiated policy support system. Due to the differences in corporate agency costs as well as the degree of regional market competition and the level of digital

infrastructure, the inhibitory effect of digital technology innovation on corporate earnings management will also vary. Therefore, the government should formulate differentiated and targeted incentive and subsidy policies for the development of digital technology innovation according to the resource endowment of different enterprises and the market development of different regions. Specifically, through tax incentives, government subsidies, and other financial means, the government should guide the flow of market resources to the field of digital technology innovation, so as to strengthen its role in corporate governance for the effective suppression of earnings management behavior. Second, when digital technology innovation lands in the real economy, corporate earnings management should be emphasized. At the strategic planning level, enterprises should incorporate sustainable development goals into the long-term strategic framework, improve the intelligent financial system based on digital technology innovation, compress the space for human manipulation, thus avoiding the short-sighted behavior of the management and enhancing the long-term competitiveness of enterprises. At the level of implementation, enterprises should actively promote the deep integration of digital technology innovation and core business, give full play to the advantages of big data, artificial intelligence and other digital technologies to form a real-time, transparent financial reporting system, thereby enhancing stakeholder trust and suppressing corporate earnings management behavior from the source.

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