Does corporate digital transformation improve capital market transparency? Evidence from China*

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ABSTRACT: Digital transformation empowers enterprises with new kinetic energy for high-quality development, can digital transformation enhance the transparency of capital market? This study constructs a corporate digital transformation index, and examines its impact on Chinese capital market transparency from the perspective of information senders. We find that corporate digital transformation significantly improves transparency, and this finding is more pronounced in non-SOEs, firms with low political connection, high industry environment uncertainty, and low regional marketization level. Channel tests show that lowering management myopia and increasing analyst attention are possible mechanisms. Furthermore, digital transformation improves stock liquidity by enhancing enterprises' information transparency. Overall, our findings provide critical insights for improving transparency in China's capital market.

Keywords: Digital transformation; Transparency; Information senders; Information disclosure; Capital market

JEL codes: D21; G14; G30

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I. Introduction

Since the 21st century, global science and technology innovation has entered a period of intense activity, automation has hastened towards digitization, networking, and intelligence, leading to the emergence of new technologies, new industries, new modes, and new business forms. These advancements profoundly affect the pattern of global innovation and the direction of economy, and the digital transformation of the global economy has become a general trend. As one of the top three countries in digital economy development,[1] China's digital development history parallels international digital development, which can be roughly divided into three stages: informatization transformation, Internet transformation and digital transformation. Compared to its predecessors, the core feature of digital transformation is the adoption of new-generation ICT technology, enabling the superimposition of data as a new production factor on the enterprise's original factors, thus causing innovation and restructuring of the business model. Both small startups and multinational giants are facing fierce market competition during rapid technological growth and globalization, while digital transformation opens the door for enterprises of all sizes to innovate and change, becoming an inevitable way for enterprises to enhance competitiveness and achieve high-quality development.

As digital transformation advances, the integration of enterprise production factors with digital technology breaks down the constraints of traditional production models, unveiling a new data value function. To a great extent, this integration enhances information processing and dissemination capacity, and improves the information efficiency in capital market transactions (Balakrishnan et al., 2014), which in turn increases the transparency of corporate information. However, investors are now confronting more complex macro-market information and stock price information, enterprises are involved in a wider range of information disclosure subjects, which may exacerbate the information asymmetry between listed companies and investors (Gao and Zhang, 2023). Therefore, we aim to examine the impact of digital transformation on corporate information transparency.

The capital market is a market that trades based on information. Information senders are able

[1] According to the 2021 Annual Report on the Development of Global Digital Economy Competitiveness, the United States, Singapore and China rank in the top three in terms of economic digitalization.

to directly influence the content and quality of information, and information receivers react to such information, which subsequently affects the economic activities. From the perspective of information senders, on the one hand, as the direct maker of corporate disclosure decisions, the behavior of management is closely related to the quality of corporate disclosure. Chen and Nadkarni (2016) examined managements' strategic decision-making behavior using time-orientation, finding that their short-term orientation may lead to more focus on the current development of the enterprise, and make behaviors that satisfy personal interests at the expense of the future development of the enterprise, such as the decoration of accounting statements and the dissemination of false information. So, will corporate digital transformation alter the motivation of managements to disclose information and thus improve the quality of corporate disclosure? On the other hand, as an important information intermediary, security analysts follow up the development status of listed companies and the industry situation. They process corporate information with their access to private information and professional information interpretation skills and then disseminate it to information users in the form of accurate and easy-to-read analyst reports via social media channels (Crawford et al. 2012). And will corporate digital transformation affect the behavior of analysts and thus enhance the information dissemination efficiency of information intermediaries?

Given the above analysis, we attempt to develop a comprehensive research framework to explore the potential mechanisms by which digital transformation affects the information transparency of Chinese listed companies from the perspective of information senders. This study is conducted in China for two reasons. First, as a developing country, digital economy has become an important engine for stabilizing growth and promoting transformation in China's economy. According to the Digital China Development Report (2021), in 2021, the scale of China's digital economy grows to more than RMB 45 trillion, and its share of GDP rises to 39.8%, firmly ranking second in the world. Therefore, studying the economic consequences of digital development of Chinese companies can provide certain insights for other emerging economies. Second, while the Chinese government is committed to continuously improving the disclosure system of listed companies and promoting the enforcement of disclosure regulations, many disclosure disruptions still exist due to the inefficiency of the internal and external institutional environments of firms (Jiang and Kim, 2020). Therefore, based on the Chinese

setting, we can clarify the potential channels through which digitalization affects corporate disclosure behavior and provide references for governments, industries, and academia to better understand the importance of digital transformation as well as the improvement of the disclosure environment in the capital market.

To investigate the impact of corporate digital transformation on capital market transparency, we use textual analysis to construct the index of corporate digital transformation based on the data from the annual reports of Chinese listed companies, and use entropy value approach to portray China's capital market transparency. By identifying the impacts, channel mechanisms, and economic consequences of corporate digital transformation on capital market transparency, we find that corporate digital transformation significantly improves transparency, which holds after considering endogeneity concerns and a series of robustness tests. We next conduct a series of channel tests and cross-section analysis. We find that lowering management myopia and increasing analyst attention are possible mechanisms. And cross-section analysis show that the findings are more pronounced in non-SOEs, firms with low political connection, high industry environment uncertainty, and low regional marketization level. Moreover, digital transformation improves stock liquidity by enhancing enterprises' information transparency. Overall, our findings shed light on the crucial role that listed companies' digital transformation plays in enhancing China's capital market transparency.

Our research makes the following three contributions. Firstly, on the theoretical level, this paper links corporate digital transformation with information transparency, innovatively expands the study of the economic consequences of digital transformation from the perspective of information senders. The findings that both management myopia and analyst attention driven by digital transformation affect the level of information transparency, which complements the researches of Mikalef and Psteli (2017) and Zhai et al. (2022). Secondly, at the methodological level, based on the traditional information quality metrics, this paper utilizes the entropy method to construct a comprehensive measure of transparency in the Chinese capital market by selecting different indicators from the dimensions of information disclosure quality and information dissemination efficiency of information intermediaries. This indicator effectively improves the problem of measurement bias caused by single metric selection, and incorporates the current status of information disclosure in China's capital market into the construction

framework of the indicator, which is an effective refinement of the measurement of information transparency, and contributes to a deeper understanding of the transparency of China's capital market. Thirdly, on the practical level, transparency construction is an important issue in the new development mode of China's capital market, and the development of emerging digital technology in the context of digital economy is an important driving force for the improvement of information disclosure quality and information dissemination efficiency. Our findings not only provide theoretical support for guiding enterprises to make correct information disclosure decisions, but also provide important insights into the construction of transparency in China's capital market.

The rest of the paper is organized as follows. Section 2 reviews the relevant literature. Section 3 discusses the main hypothesis. Section 4 presents the research design, including the sample and data sources, variable measurement, and model construction. Section 5 provides the baseline results and robustness checks. Section 6 presents a further analysis, including channel tests, cross-section analysis, and economic consequences analysis. Section 7 concludes the study.

2. Relevant literature

Our study relates to two branches of literature. First, this study is closely related to the literature that examines the measurement of capital market transparency and its influencing factors. Transparency is a fundamental requisite for the sustenance and advancement of capital markets, serving as a critical condition for the capital market to function effectively. Lower capital market transparency can directly harm the interest of investors, lead to capital market fraud scandals, reduce resource allocation efficiency, and even trigger financial crises (Gul, 2010). Therefore，improving the transparency of the capital market is essential to protect the interests of investors, ensure the stability of the capital market, and then improve the efficiency of the capital market.

The current literature mainly measures capital market transparency from two perspectives: the evaluation of information content and the performance of the capital market. Regarding information content evaluation, scholars have used the questionnaire method (AIMR

Disclosure Index, CIFAR Index, and T&D Index),[2] text analysis method (Loughran and McDonald, 2016; Zhu et al., 2023), and modeling method (Leuz and Wysocki, 2016) to construct corporate information transparency indicators. Corporate surplus information is commonly utilized to measure surplus management and accounting quality (Jones, 1991; Dechow et al., 2010; Chahine et al., 2015), which reflects the degree of management's manipulation of corporate surpluses through the quality of surplus information, and thus measures the transparency of the corporate information environment. Regarding capital market performance, most scholars use stock price synchronization to reflect the level of capital market transparency, but this measure is also controversial. For instance, Morck et al. (2000) argue that higher stock price synchronization implies a lower level of market transparency if stock prices are more dependent on industry and macro information. Conversely, Dasgupta et al. (2010) reason that in transparent capital markets, stock prices reflect unanticipated information about firms and therefore higher stock price synchronization suggests a higher level of market transparency. In addition, scholars use a series of proxy indicators to measure capital market transparency, such as analyst-related variables (Cheng et al., 2016; Bradley et al., 2017), voluntary disclosed information amount (Beyer et al., 2010; McCahery et al., 2016), and the frequency of news releases (Huang, 2022).

Based on our analysis, it is apparent that the current academic depiction of the transparency of listed companies still hinges on a single indicator. While these information quality measures do reflect effective capital market information content to a certain extent, they may lead to irrational behaviors of management that only remediate the information disclosure problems in specific areas in order to achieve a certain goal. Therefore, to comprehensively portray the transparency level of China's capital market, it is imperative to select appropriate indicators in light of the present information disclosure status of China's capital market. According to the data from the CSMAR database, disclosure violation penalties in China's A-share market accounted for 60% of all types of violation penalties from 2018 to 2022. These violations such as disclosure fraud, non-compliance, and delayed disclosure have not decreased in recent years,

[2] AIMR Disclosure Index is developed by Association for Investment Management and Research, CIFAR Index is developed by Center for International Financial Analysis and Research, and T&D Index (Transparency & Disclosure) is developed by Standard and Poor's.

hence exerting an unignorable impact on listed companies' information transparency and the overall information quality of China's capital market. Moreover, with the advancement of Internet technology, the role of social media such as newspapers and the Internet in information dissemination for listed companies should not be overlooked. Therefore, we argue that capital market transparency includes not only the quantity and quality of corporate information disclosure, but also the role of information dissemination by the news media as well as the regulatory penalties for information disclosure at the legal level. Thus, based on previous studies, this paper further incorporates news media reports and disclosure violations into the construction framework of Chinese capital market transparency indicators, with the aim of comprehensively portraying the level of transparency level and enhancing the overall information quality of the Chinese capital market.

In the existing literature, scholars have made a fuller discussion of the factors that influence capital market transparency from the perspectives of corporate governance, informal mechanisms, and macro factors. In terms of corporate governance, Baker et al. (2019), based on the perspective of internal corporate governance, discovered that when CFOs have greater power than CEOs, it results in more true surplus management, leading to less corporate information transparency. Moreover, strong social networks amongst board members accelerate the dissemination of corporate information (Amin et al., 2020). Institutional investors, analysts, and news media are important mechanisms for external corporate governance. Institutional investors and securities analysts possess more advantages than retail investors to interpret information paired with a lower cost of collecting inside information. In particular, analysts serving as information intermediaries between listed companies and investors, utilize their informational resources and professional knowledge in specific industries to process complex corporate information, which can effectively reduce the information processing costs and information asymmetry of information receivers (Jiang et al.,2016). And the news media, as a critical supervisor in the capital market, accelerates information dissemination in the trading market in a timely manner by collecting, screening, processing corporate information, and releasing it to a wide range of external stakeholders, which in turn serves to constrain management behavior (Bushee et al., 2010).

In terms of informal mechanisms, Taylor (2020) examines the relationship between political

connections and intra-firm informants, based on US government interventions during the financial crisis, and uncovers that firms with political connections are able to obtain information about program implementation in advance and make informed transactions, thus exacerbating the degree of informational asymmetry in the market. In terms of macro factors, capital market transparency can be affected by industry competitive pressures (Shi et al., 2018), the progress of information technology (Bartov et al., 2014), and external political uncertainty (Bermpei et al., 2022). For instance, the pressure of industry competition may incentivize management to commit to corporate governance, thereby improving firms' disclosure environment. Nevertheless, such pressure may also force management to disclose false financial information or obscure poor performance to alleviate corporates' financial distress. Overall, the research literature on the factors influencing capital market transparency has been relatively rich, but little direct research has been seen on corporate digital transformation and information transparency. We try to provide a novel method and explore the impact of digital transformation on Chinese capital market transparency, as well as its possible mechanisms.

Second, this study relates to the literature that examines the impact of digital transformation on corporate behaviors. Prior research has focused on the microeconomic consequences of digital transformation behaviors from different viewpoints, analyzing its impact on input-output efficiency (Mikalef and Pateli, 2017), business performance (Zhai et al., 2022), corporate risk-taking ability (Tian et al., 2022), crash risk (Wu et al., 2022), and dynamic capital structure (Niu et al., 2023). Nonetheless, none of them considers how the behavior of information providers, which significantly impacts the transparency level of the capital market, affects the quality of corporate disclosure and information dissemination efficiency in light of emerging digital technologies. Thus, under the background of digital economy, this paper discusses the impact of corporate digital transformation on China's capital market transparency from the perspective of information senders, which holds theoretical value and practical significance.

3. Hypothesis Development

With the transformation of China's economic development mode from "scale and speed" to "efficiency and quality", Chinese enterprises have entered an imperative stage of transformation (Gao et al., 2023). Corporate digital transformation, based on artificial

intelligence, blockchain, cloud computing, and other technologies, plays a crucial role in enhancing innovation and competitiveness, improving customer experience, establishing a flexible organizational structure, reducing costs, and achieving sustainable development. At a technical level, by introducing emerging digital technologies into the production decision-making system, corporate digital transformation promotes the transparency of production, sales, management, research, and development. It also pushes management to improve the quality of information supply and dissemination in the data chain of data search, data analysis and data transmission. This reduces the incentive for management to make self-serving decisions that harm the development of the company, and addresses the issue of information asymmetry (Lin et al., 2019). At a supervisory level, corporate digital transformation will inevitably lead to an increase in news media coverage and investor attention, which will also affect analysts' attention to listed companies (Bushee et al., 2010). As an important information processor and disseminator, news announcements released by the media can increase analysts' sources of public information, thus affecting the supply of security analysis services. Furthermore, media news coverage of these firms reinforces the role of external regulation of enterprises, thus restraining the behavior of management, mitigating their information manipulation incentives, and then improving the quality of corporate information disclosure. Based on the aforementioned analysis, this paper proposes a research hypothesis:

H1. Corporate digital transformation enhances China's capital market transparency.

From the perspective of information sender——the behavior of management, top management is the direct maker of corporate disclosure decisions, but also the corporate information sender whose behavior is closely associated with the capital market transparency. Information asymmetry theory and the top echelon theory suggest that management with information advantage conveys the company's value information to external stakeholders through financial reports and penalty announcements, thus the quality and content of information disclosure directly affects the decision-making behavior of investors. However, in order to obtain high remuneration, management control, industry recognition and good reputation, short-sighted management is inclined to selectively disclose "favorable" information or whitewash the company's financial statements during their tenure to present a "highly profitable" image. This false disclosure behavior decreases the quality of corporate

information disclosure as well as the efficiency of utilizing information by information recipients, and exacerbates the degree of information asymmetry between information senders and information recipients.

Corporate digital transformation reduces irrational management behavior in making disclosure decisions. In the course of promoting digital transformation, on the one hand, the development of Internet technology facilitates to analyze the big data generated in the production and operation process by using data mining technology and decision support systems. This process results in the objective consideration of current and future interests to correct the subjectivity of "decision-making by intuition", thereby decreasing the irrational behavior of information disclosure. On the other hand, the growth of information dissemination media and network communication platforms allows investors to access more non-financial information and broadens the channels to monitor corporate behavior. Management needs to fully consider the reaction of external information users when making disclosure decisions, which forces them to reduce the incentive to disclose false information. This will contribute to the improvement of corporate information transparency. Based on the aforementioned analysis, this paper proposes a research hypothesis:

H2. Corporate digital transformation promotes capital market transparency by reducing management myopia.

From the perspective of information sender——the behavior of analysts, securities analysts are important information collectors and information dissemination intermediaries in the capital market. By gathering private corporate information and processing it with their professional interpretation skills, they provide analytical reports as key decision-making references for external market participants. Bhushan (1989) proposed a model of supply and demand for security analysis services, which argues that the supply and demand curve determine analysts' follow-up of listed companies. Many scholars have analyzed the connection between the supply and demand of security analysis services and corporate disclosure based on this model. For example, Xu et al. (2013) found that the number of analyst follow-ups is positively correlated with the degree of disclosure.

Regarding the supply of security analysis services, the news reports of digital transformation enterprises by media provide an important information source for analysts and then reduce their

information collection costs. This enables analysts to comprehensively use traditional financial information and non-financial information to interpret corporate value information. Subsequently, they disseminate their professional judgment on corporate information to stakeholders through various outlets such as the network, newspapers, and magazines, effectively improving the information dissemination efficiency and reducing the information asymmetry between external investors and listed companies. Regarding the demand of security analysis services, corporate digital transformation has complicated the information environment of external stakeholders, and uncertainties of future profitability, internal organizational structure, and R&D input-output efficiency has increased the cost for investors to make correct decisions. Consequently, investors rely more on analysts' surplus forecasting reports, increasing the demand for analysts' reports. In addition, the advancement of enterprise digital transformation enables analysts to utilize big data analytics in analyzing corporate information and industry situations, increasing the accuracy of their surplus forecasts. Based on the aforementioned analysis, this paper proposes a research hypothesis:

H3. Corporate digital transformation promotes capital market transparency by increasing analyst attention.

4. Data and Research Methods

4.1. Sample and Data Sources

We empirically examine the impact of corporate digital transformation on China's capital market transparency, utilizing the data of all listed companies in the Chinese A-share market from 2010 to 2021. Data sources mainly includes two parts: 1) the index of corporate digital transformation, which is obtained by collecting and organizing the annual reports of A-share listed companies on the SSE and SZSE,[3] and then applying textual analysis. 2) the construction of the information transparency index of listed companies as well as other corporate financial data are obtained from the CSMAR database. We filter the research sample according to the following criteria: 1) we exclude firms in the financial industry. 2) we delete observations with anomalous listing status within the sample interval. 3) we exclude samples with missing

[3] SSE and SZSE stand for Shanghai Stock Exchange and Shenzhen Stock Exchange respectively.

observations of core variables. 4) we winsorise all continuous variables at the 1st and 99th percentiles to reduce the effect of outliers. In total, we obtain 28,317 firm-year observations.

4.2. Variable Measurement

4.2.1. Measurement of capital market transparency (*TRANS*)

To comprehensively assess China's capital market transparency, we select a series of indicators from the dimensions of the quality of information disclosure and the information intermediary's efficiency of information acquisition and dissemination, respectively. And we utilize the entropy method to construct a composite index of information transparency of Chinese listed companies (*TRANS*). Specifically, following prior literature (Dechow and Dichev, 2002; Zhong, 2018), we adopt the quality of corporate surplus (*EQ*), the number of voluntary disclosures (*VD*), and the number of penalties for disclosure violations (*Illegal*) to measure the quality of information disclosure. And we adopt analyst forecast accuracy (*Accuracy*), whether or not to hire "an International Big 4" as an annual report auditor (*Big4*),[4] and the frequency of news releases (*News*) to measure the information intermediary's efficiency of information acquisition and dissemination.

1) Corporate surplus quality (*EQ*). We calculate *EQ* based on model (1):

$$TCA_{i,t} / Asset_{i,t-1} = a_0 + a_1 CFO_{i,t-1} / Asset_{i,t-2} + a_2 CFO_{i,t} / Asset_{i,t-1} + a_3 CFO_{i,t+1} / Asset_{i,t} + a_4 \Delta REV_{i,t} / Asset_{i,t-1} + a_5 PPE_{i,t} / Asset_{i,t-1} + \varepsilon_{i,t} \quad (1)$$

where i and t denote the firm and the year, respectively. *TCA* denotes total current accruals, which equals to operating profit fewer operating cash flow plus depreciation and amortization expenses. *CFO* denotes operating cash flow. $\triangle REV$ is the amount of change in operating income. *PPE* is the total value of fixed assets. We deflate all of the above variables by dividing by average total assets. We first regress model (1) on the industry-year groupings and take the residuals as the manipulative accrued profits of the enterprises in the current year. We then compute the standard deviation of the residuals for the current year t and the previous four years, which is the surplus quality of the enterprise in the year t. Finally, *EQ* is multiplied by -1 for comparison with other indicators. A larger *EQ* represents a higher quality of corporate

[4] International Big 4: PwC, Deloitte, KPMG, EY.

surplus and a higher level of corporate information transparency.

2) Voluntary disclosure (*VD*). In view of the mandatory disclosure of performance forecasts such as "negative net profit" and "turnaround" in China, and the greater autonomy of management performance forecasts in other cases, following Brochet et al. (2015), we use the keywords "slight decrease", "slight increase", and "renewed profit" to screen and count the total number of management performance forecasts as a measure of corporate voluntary disclosure in the current year. The larger the *VD*, the higher the transparency of the enterprises' information.

3) Penalties for information disclosure violations (*Illegal*). We measure the quality of corporate information disclosure by the number of regulatory warnings and penalty records received from regulators such as CSRC, SSE and SZSE for listed companies in the current year.[5] The larger the *illegal*, the worse the corporate information transparency.

4) Analyst forecast accuracy (*Accuracy*). Analysts are crucial information intermediaries in the capital market, collecting and interpreting financial market information in an all-round way, making professional judgment and accurate forecasts of corporate surplus, and ultimately delivering real corporate information to external market participants. They play an important role in promoting reasonable stock pricing and improving the transparency of stock market information. We calculate analyst forecast accuracy as: (medium of various analysts' forecasts of *EPS* for the year- actual *EPS*)/ previous year's share price per share. Analyst forecast accuracy is calculated by multiplying the absolute value by -1. The higher the *Accuracy*, the greater the level of corporate information transparency.

5) Whether or not to hire "an International Big 4" as an annual report auditor (*Big4*). Although a company's decision to hire an auditor from the Big 4 does not necessarily guarantee a higher quality of financial reports, it may signify the company's motivation to engage highly skilled talent in auditing its annual report so as to provide external market participants with relatively accurate, reliable and readable financial information. This helps to improve the level of corporate information transparency. Hence, we assign a value of 1 to companies that hired "an international Big 4" during the year, and a value of 0 otherwise, to reflect the role of the

[5] CSRC stands for China Securities Regulatory Commission.

auditor as an information intermediary in improving companies' information transparency.

6) Frequency of news releases (*News*). The media outlets financial and non-financial news of enterprises through the Internet, newspapers, and magazines, allowing more market participants to access a large amount of positive and negative news at a lower cost. This in turn elevates the efficiency of information reception and supports investors in making sound investment decisions by utilizing richer information about enterprise operations. Therefore, we sum the total number of newspaper and network news articles of listed companies in the current year to measure the role of social media as an information intermediary in the dissemination of corporate information. The higher the *News*, the greater the level of corporate information transparency.

On the basis of the above six indicators, after regularizing the positive and negative indicators respectively, we employ the entropy method to assign weights to each indicator to construct a comprehensive index of information transparency of Chinese listed companies, *TRANS*, which takes values between 0 and 1. The larger the *TRANS*, the higher the level of capital market transparency.

4.2.2. Measurement of corporate digital transformation (*DT*)

Following Zhao et al. (2021) and Wu et al. (2022), we use text analysis and word frequency methods to build the index of corporate digital transformation. The first step, obtain the text of annual reports: we collect annual reports of A-share listed companies and convert them to text format using Python crawler. The second step, construct the initial lexicon: based on the existing literature, we integrate the keywords related to digital transformation as the initial lexicon of corporate digital transformation. The third step, expand the feature lexicon: we collect the government work reports of each year, segment the word via the Chinese word segmentation algorithm *Jieba* and count the word frequency. [6]Among the top 1,000 words with the highest total frequency, we manually filter out the words related to digitalization and expand them into the corporate digital transformation lexicon as feature words. This leads to the acquisition of 148 keywords related to digital transformation. We report the dictionary of digital

[6] The Python package *Jieba* is widely used for parsing Chinese texts.

transform keywords in Appendix B. The fourth step, count the word frequency: The *Jieba* algorithm is applied to the collected textual content of annual reports for word segmentation. Based on the participial lexicon constructed in the previous two steps, we perform thesaurus matching and sum up word frequency so as to construct a more comprehensive indicator of corporate digital transformation. In addition, we logarithmize the digital transformation word frequencies to better portray the degree of corporate digital transformation.

4.2.3. Control variables

Our study mainly controls for other factors that may affect the transparency of corporate information, the specific measurement of control variables are as follows: 1) Firm age (*FirmAge*): according to the year of establishment of the enterprise, calculate the establishment time of the firm in the sample observation year and take the natural logarithm; 2) Firm size (*Size*): the natural logarithm of the total assets of the enterprise; 3) Firm growth (*Growth*): Revenue Growth Rate, the ratio of the current year's revenue to the previous year's revenue minus 1; 4) Cashflow intensity (*Cashflow*): the ratio of the firm's cash and its cash equivalents to the firm's total assets; 5) Profitability (*ROE*): Return on Equity, the ratio of net profits to average shareholders' equity; 6) Book to market (*BM*): the ratio of the total ownership interest to the market value of the firm; 7) Aduit opinion (*Audit*): A value of 0 is assigned if the accounting firm issues a standard unqualified opinion, and 1 otherwise; 8) Institutional Investor Shareholding Ratio (*Inst*): the ratio of the number of shares held by institutional investors to the total number of shares of the enterprise; 9) Shareholding Concentration (*Top5*): the ratio of the number of shares held by the top five shareholders to the total number of shares of the enterprise; 10) Nature of equity (*SOE*): state-owned enterprises are assigned a value of 1, otherwise 0.

4.3. Model Construction

We study the impact of *DT* on the transparency of capital market using the following model:

$$TRANS_{i,t} = \varphi + \varphi_1 DT_{i,t} + \Sigma CVs + \Sigma Year + \Sigma \Pr o + \Sigma Ind + \varepsilon_{i,t} \quad (2)$$

where subscript i denotes firms and t denotes year. The dependent variable is the transparency of corporate information (*TRANS*), the core independent variable is corporate digital transformation (*DT*), and *CVs* are the aforementioned control variables. ε is the random

perturbation term of the model. *Year*, *Pro*, and *Ind* denote year, province, and industry fixed effects, respectively. Based on the previous theoretical analysis, we anticipate the regression coefficient of *DT* (φ_1) to be significantly positive, implying that corporate digital transformation contributes to enhancing transparency of China's capital market. All regression results in this paper use robust standard errors clustered at the firm level.

5. Results

5.1. Summary statistics

The descriptive statistics of the main variables are shown in Table 1. Table 1 shows that the mean value of the information transparency (*TRANS*) is 0.2184, the maximum value is 0.7859, and the minimum value is 0.0132, which indicates that there are some differences in information transparency among different enterprises. The standard deviation of the corporate digital transformation (*DT*) is 1.2584, which also shows obvious differences.

[Insert Table1]

5.2. Baseline regression

We employ a fixed effect model to regress the sample data, the baseline regression results are shown in Table 2. Specifically, column (1) controls only for year, province, and industry fixed effects. The regression coefficient of the core explanatory variable, corporate digital transformation (*DT*), is 0.0067 and passes the 1% statistical significance test. Column (2) incorporates firm-level control variables in addition to column (1), and the regression coefficient of *DT* shrinks but remains statistically significant (t-value of 2.60). Column (3) controls for firm and year fixed effects, and the regression coefficient of *DT* is significantly positive, consistent with the findings obtained in the first two columns. This indicates that there is a significant positive correlation between corporate digital transformation and information transparency, implying that digital transformation improves information transparency of the enterprises. The research hypothesis H1 of this paper is verified.

[Insert Table2]

5.3. Endogenous concern

5.3.1. Instrumental variable approach (IV)

The validity of the previous benchmark regression results may be challenged by endogeneity

concerns. On the one hand, corporate digital transformation increases information transparency; whereas on the other hand, firms with higher information transparency may also have a higher need to drive their own digital transformation to enhance the quality and capability of information disclosure. Following the studies of Han et al. (2019), we apply the instrumental variable approach (IV) to mitigate the endogeneity concern due to the possible reverse causality between corporate digital transformation and information transparency, and the results are shown in Table 3.

Column (1) employs the lagged *DT* as the core explanatory variable using a fixed effect regression. The underlying logic is that the improvement of enterprises' information transparency in the current year has no effect on the digital transformation in the previous year. If one-period lagged corporate digital transformation can still positively affect its current information transparency, it means that the main factor in this causal relationship is digital transformation. Column (1) shows that the regression coefficient of lagged *DT* is 0.0021, which passes the 10% statistical significance test and is consistent with the previous benchmark regression results.

Column (2) employs lagged *DT* as an instrumental variable using 2SLS regression. The second-stage regression results show that the coefficient on *DT* is slightly higher but of the same sign and remains statistically significant. Additionally, *Kleibergen-Paap rk LM* is significant at the 1% level, rejecting the original hypothesis of insufficient instrumental variable identification; *Kleibergen-Paap rk Wald F* exceeds the critical value of the Stock-Yogo weak instrumental variable identification test at the 10% significance level, rejecting the original hypothesis of weak instrumental variable. In summary, our test results underscore the reasonable reliability of the selected instrumental variables. After considering the endogeneity issues due to reverse causality, the positive effect of corporate digital transformation on capital market transparency remains valid, ultimately supporting our research hypothesis.

[Insert Table3]

5.3.2. Propensity score matching (PSM)

Furthermore, recognizing the possibility of other key variables influencing corporate information transparency, we apply propensity score matching (PSM) to mitigate the endogeneity issue caused by the possible omission of such variables in the model. We first

divide the sample into two groups, a high degree of *DT* subsample and a low degree of *DT* subsample, based on the mean value of *DT*. We then employ the control variables from the primary regression as matching variables and use the 1:1 nearest neighbor matching and the kernel matching to match the samples, respectively. Finally, we regress on the matched samples. The regression results in Table 4 reveal that whether applying 1:1 nearest-neighbor matching or kernel matching methods, the regression coefficients of *DT* remain significantly positive, indicating the robustness of our findings.

[Insert Table4]

5.4. Other Robustness Checks

To ensure the robustness of benchmark regression results, we conduct additional robustness tests, the results of which are presented in Table 5.

5.4.1. Decomposition of information transparency indicators

In order to provide a more nuanced analysis of the impact of digital transformation on information transparency, we decompose the comprehensive corporate information transparency indicators into two dimensions, namely, the quality of information disclosure and the role of information intermediaries in information dissemination. The regression results in columns (1) and (2) show that the regression coefficients of the information transparency sub-indicators are significantly positive at least at the 5% level. At the same time, digital transformation plays a greater role in improving the quality of corporate disclosure (the coefficient of 0.0084). we argue that, on the one hand, the use of digital technologies such as AI and IOT by enterprises for investment decision-making and performance assessment helps to reduce irrational behavior of the managements and significantly improves the quality of corporate disclosure. On the other hand, the use of Internet technologies to assess the quality of corporate financial information also helps investors understand corporate information in a timely manner, thereby reducing the degree of information asymmetry between listed companies and investors. This discrepancy results offer a novel research perspective for a deeper understanding the structural characteristics of capital market transparency.

5.4.2. Alternative measures of digital transformation

Following Zhao et al. (2021), we construct an alternative proxy for digital transformation

DIGI using text analysis and expert scoring method in this section. The regression results in column (3) indicate that the regression coefficient of *DIGI* is significantly positive at the 1% level, which proves that our regression results remain robust after replacing the measures of the core explanatory variables.

5.4.3. Excluding special events

Considering that the process and efficiency of corporate digital transformation may be affected by major international and domestic financial events and public safety incidents, which in turn affect the reliable information contained in stock prices, we exclude two important events in this section: the samples in 2015 to exclude the impact of the Chinese stock market crash, and the samples in 2020 to exclude the impact of the global COVID-19 pandemic. The regression results in column (4) demonstrate that the basic conclusion of our study, "corporate digital transformation improves information transparency", remains valid and robust, lending support to the benchmark regression results of our study.

5.4.4. Controlling for high-dimensional fixed effects

Furthermore, we introduce year, province, and industry interaction terms into the model. Column (5) shows that the regression coefficient of *DT* remains significantly positive at the 1% level after controlling for year, province, and industry fixed effects, providing additional evidence for the robustness and reliability of our findings.

[Insert Table5]

6. Additional Analysis

6.1. Channel test: management myopia and analyst attention

We further conduct a mechanism test to explore the intermediate path of the impact of corporate digital transformation on information transparency. Theoretical analysis suggests that the conduct of information senders plays a pivotal role in the information transparency of enterprises. Following Di Giuli and Laux (2022), we adopt a two-stage test to examine the mediating effect linking corporate digital transformation to market transparency from the perspectives of management myopia and analyst attention, respectively. The estimated equations are shown in model (3) and model (4). In the first stage, the impact of corporate digital transformation on the mechanism variable (*Med*) is estimated; in the second stage, the

predicted value of the mechanism variable derived in the first stage is applied ($\widehat{Med_{i,t}}$) to analyze its impact on enterprise information transparency.

$$Med_{i,t} = \alpha + \alpha_1 DT_{i,t} + \sum CVs + \sum Year + \sum \Pr o + \sum Ind + \varepsilon_{i,t} \quad (3)$$

$$TRANS_{i,t} = \beta + \beta_1 \widehat{Med_{i,t}} + \sum CVs + \sum Year + \sum \Pr o + \sum Ind + \varepsilon_{i,t} \quad (4)$$

where *Med* is the mechanism variable, *DT* is the index of corporate digital transformation, *TRANS* is the enterprise information transparency, and other variables are set as in model (2). Model (3) is the first-stage test, and the regression coefficient α_1 indicates the effect of *DT* on mechanism variables. Model (4) is the second-stage test, and the regression coefficient β_1 indicates the effect of management myopia and analyst attention driven by digital transformation on capital market transparency. When *Med* is management myopia, it is expected that α_1 in model (3) and β_1 in model (4) are significantly negative; when *Med* is analyst attention, it is expected that α_1 in model (3) and β_1 in model (4) are significantly positive.

6.1.1. The channel of management myopia (*Myopia*)

Under the motivation of seeking self-development and winning industry reputation, managements make "short-sighted" decisions, such as selectively disclosing "good news" or disclosing false financial information, thereby exacerbating the information asymmetry between information senders and receivers. Based on the text analysis method of Li (2010) and the Chinese lexicon of management myopia constructed by Brochet et al. (2015) and Hu et al. (2021), we use the lexicon method to construct a management myopia indicator. Specifically, we first extract the MD&A part of the annual report and apply *Jieba* to split the text and remove the stopwords. [7]Then, based on the management myopia lexicon, we calculate the ratio of the total word frequency of terms related to myopia to the total word frequency of MD&A and multiply it by 100 to obtain an indicator of management myopia (*Myopia*). The larger the

[7] The "Management Discussion and Analysis" part of the annual report of listed companies. Considering that listed companies usually describe and disclose their business situation and development plans in the MD&A part, this paper focuses on the text analysis of this part.

Myopia, the higher the degree of management myopia.

Columns (1) and (2) of Table 6 present the regression results with management myopia as the mechanism variable. It can be found that the regression coefficient of *DT* in the first-stage regression is significantly negative at the 1% level, which indicates that corporate digital transformation decreases the short-sightedness of management. In the second stage, the regression coefficient of $\widehat{Myopia}$ is significantly negative, which indicates that the less management myopia, driven by digital transformation, the higher level of information transparency, which is consistent with H2.

6.1.2. The channel of analyst attention (*Ana_Atten*)

Analysts employ their resources, connections, and analytical expertise to collect and process corporate information, and then predict future corporate surplus and create analyst reports, which decreases investors' information acquisition costs and enhances the efficiency of information transmission from listed companies to investors. We measure analyst attention (*Ana_Atten*) by taking the logarithm of the number of analysts who track and analyze the company in the current year plus one. The larger the *Ana_Atten*, the higher the analyst attention.

Columns (3) and (4) of Table 6 present the regression results with analyst attention as the mechanism variable. Again, it can be seen that the regression coefficient of *DT* in the first stage regression is significantly positive at the 1% level, indicating that *DT* increases analyst attention. In the second stage, the regression coefficient of $\widehat{Ana\_Atten}$ is significantly positive, which indicates that the higher analyst attention, driven by digital transformation, the higher level of information transparency, which is consistent with H3.

In summary, we show that reducing management myopia and increasing analyst attention are both important paths for digital transformation to improve corporate information transparency through a two-stage test.

[Insert Table6]

6.2. Cross-section analysis

In the benchmark regression analysis, we examine the impact of corporate digital transformation on capital market transparency from a full-sample perspective. The positive correlation between the two still holds after a series of robustness tests. Nevertheless, under

different internal characteristics and external environments of enterprises, there may be asymmetric effects of digital transformation on information transparency. Accordingly, we perform group tests on enterprise samples based on different firm attributes from the perspectives of both internal and external factors to obtain distinct conclusions.

6.2.1. Internal factors of a firm

In terms of internal factors of firms, we focus on the nature of firm equity and political affiliation to investigate whether there are differences in the role of corporate digital transformation in enhancing information transparency.

1) Nature of equity. Based on the ownership attributes of the actual controller, we divide the samples into SOEs and non-SOEs to conduct group regression tests. The results in columns (1) and (2) of Table 7 show that the regression coefficient of *DT* is significantly positive in the sample of non-SOEs, but has no significant effect on SOEs. We argue that SOEs have certain advantages in terms of access to financial resources, economic policies, and market share, resulting in their lack of incentivization for digital transformation. Therefore, they cannot obtain significant economic consequences through digital transformation. Moreover, SOEs are more likely to proactively disclose information due to strict government control and market supervision leading to no significant change in its disclosure level with digital transformation. While non-SOEs face fierce market competition, in the context of digital economy, the management has a stronger incentive to participate in digital transformation to enhance the core competitiveness of the enterprise, and thus obtain effective feedback loops in their digital transformation behavior.

2) Political connection. Researches have shown that politically connected firms have a supportive effect in alleviating financing constraints (Cheng et al., 2014) and obtaining tax incentives (Adhikari et al., 2006), and may also have a predatory effect in taking on too much corporate social responsibility (Gu et al., 2013) and reducing the efficiency of resource allocation (Ding et al., 2018), which in turn affects managements' decision-making behavior on enterprise development. Following Jia and Zhang (2010), we set a dummy variable of corporate political connection, which is assigned a value of 1 if the general manager or CEO has served in a government department or has been a deputy to the National People's Congress,

and 0 otherwise. Columns (3) and (4) of Table 7 provide the regression results of the subgroup tests based on corporate political connection. We can find that the impact of corporate digital transformation on information transparency is mainly found in the samples with lower political connections. One possible explanation is that more political connections have a sheltering effect on the disclosure environment of firms. By seeking political connections, the government relaxes the disclosure regulations on affiliated firms, and this circumvention of regulation reinforces management myopia, which in turn undermines the role of digital transformation in enhancing the transparency of capital market.

[Insert Table7]

6.2.2. External factors of a firm

In terms of external factors of firms, we investigate whether the role of corporate digital transformation in enhancing information transparency differs in the face of diverse external environments at the industry and regional levels, respectively.

1) Industry environmental uncertainty. The level of uncertainty of the external environment faced by firms affects the accuracy of analysts' forecasts surplus and management's incentives to engage in opportunistic behavior (He et al., 2023). Following Shen et al. (2012), we first use the standard deviation of firms' sales revenues over the past five years and adjust it at the industry level to obtain an indicator of listed companies' industry environmental uncertainty. Then, we divide the samples into higher and lower industry environmental uncertainty based on the median of industry environment uncertainty in order to conduct subgroup testing. Columns (1) and (2) of Table 8 provide evidences that corporate digital transformation enhances information transparency more significantly when firms face higher industry environmental uncertainty. One possible explanation is that higher uncertainty in the industry environment increases the cost of information collection for information recipients, making it difficult to make accurate investment decisions under the complex corporate information environment. Digital transformation can broaden information access channels for investors and analysts and provide digital technology support for information interpretation, enabling information users to gather more timely and accurate stock price information, which is conducive to the improvement of the level of corporate information transparency.

2) Regional level of marketization. The level of regional marketization where the enterprise

is located affects the outcome and process of digital transformation, which in turn has a different impact on the transparency of corporate information. Following Shi et al. (2017), we apply the entropy method to comprehensively measure five sub-indices: the relationship between the government and the market, the development index of non-state economy, the development index of the factor market, the development of the market intermediary organizations, and the index of legal environment. The composite indicator is then used to portray the institutional environment of the provinces where the enterprise is located. Columns (3) and (4) of Table 8 reveal that when the regional marketization level of the enterprise is relatively low, the enhancement effect of corporate digital transformation on information transparency is more significant, while no significant relationship exists between corporate digital transformation and information transparency for enterprises with a high level of regional marketization. We argue that in regions with a lower level of regional marketization, with the advancement of corporate digital transformation, online interactive platforms and big data technology facilitate external stakeholders to obtain more valid information on the value of enterprises, which significantly improves the transparency of corporate information.

[Insert Table8]

6.3. Economic consequences: the impact of corporate digital transformation on stock liquidity

Previous research has demonstrated that a firm's disclosure can have a positive effect on its ability to shape the information environment, reduce investor bias in estimating company-specific information, and thus increase stock liquidity (Balakrishnan et al., 2014). Building on this foundation, we further explore whether corporate digital transformation can enhance stock liquidity by improving information transparency. Specially, we employ stepwise regression to test for mediation effects:

$$Liquidity_{i,t} = \alpha + \alpha_1 DT_{i,t} + \sum CVs + \sum Year + \sum \Pr o + \sum Ind + \varepsilon_{i,t} \quad (5)$$

$$TRANS_{i,t} = \varphi + \varphi_1 DT_{i,t} + \sum CVs + \sum Year + \sum \Pr o + \sum Ind + \varepsilon_{i,t} \quad (6)$$

$$Liquidity_{i,t} = \beta + \beta_1 DT_{i,t} + \beta_2 TRANS_{i,t} + \sum CVs + \sum Year + \sum \Pr o + \sum Ind + \varepsilon_{i,t} \quad (7)$$

where *Liquidity* is the stock liquidity calculated by drawing on Wu et al. (2021), equals to the average of the sum of changes in the rate of return caused by the transaction amount per unit of

the stock on a certain trading day, and takes the opposite. Model (6) is consistent with the previous benchmark regression model (2). Model (7) is based on model (5) with the addition of the variable *TRANS*, and other variables are set as in the previous paper. We focus on the coefficients β_1 and β_2 to determine the existence of the mediation effect.

Table 9 presents the results of the mediation effect tests. Column (1) demonstrate that the regression coefficient of *DT* is significantly positive at the 1% level, implying that digital transformation contributes to improving stock liquidity. The results in column (2) are the same as the previous benchmark regression in Table 2, where digital transformation significantly contributes to capital market transparency. The coefficients of *TRANS* and *DT* in column (3) are both significantly positive at the 1% level, and the Z-statistic corresponding to the Sobel test for the mediation effect is 3.083, which is significant at the 1% level, suggesting that information transparency plays an essential role in mediating the impact of digital transformation on improving stock liquidity. Overall, the core conclusion that corporate digital transformation facilitates improvements in information transparency, can further promote stock market liquidity.

[Insert Table9]

7. Conclusions

Information transparency of listed companies is the core of maintaining the fairness of the capital market and an important way to protect the interests of minority investors. In the context of digital economy, it is crucial to utilize the emerging big data technologies and Internet platforms to improve the quality of corporate information disclosure and the dissemination efficiency of information intermediaries, and thus help improve the transparency of China's capital market. Based on the data of Chinese listed companies in the A-share market during 2010-2021, we find that corporate digital transformation improves the transparency of capital market. This baseline result still holds after considering endogeneity issues and conducting a series of robustness tests.

We further investigate the potential mechanisms and conduct cross-sectional tests. The results show that reducing management myopia and increasing analyst attention are possible mechanisms. Furthermore, we find that the enhancing effect of corporate digital transformation

on information transparency is more pronounced among non-SOEs, firms with low level of political connection, high level of industry environment uncertainty, and located in regions with low level of marketization. In addition, the analysis of economic consequences suggests that corporate digital transformation not only improves the level of capital market transparency, but also contributes to stock liquidity.

Our findings of this study shed light on the role of digital transformation in affecting information transparency of the enterprises. On the one hand, our study contributes to prior literature on the determinants of capital market transparency. It also contributes to prior literature related to the impact of digital transformation on corporate performance by suggesting its role in reducing management myopia and increasing analyst attention, two issues that improve the quality of information disclosure and the dissemination efficiency of information intermediation. On the other hand, our study provides certain policy insights for the construction of capital market transparency. Enterprises should emphasis the use of big data technology, Internet platforms, and other emerging technologies to enhance the quality of corporate disclosures. Moreover, enterprises should strengthen communications with external information users to reduce information asymmetry and help investors make correct investment decisions, thus improving capital market efficiency. In addition, as the features revealed for the Chinese capital market are also prevalent in many emerging economics, insights from this study can be applied to countries far beyond China.

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Tables

Table 1

Summary statistics.

Variable	N	Mean	Std	Min	Median	Max
TRANS	28,317	0.218	0.155	0.013	0.184	0.786
DT	28,317	2.766	1.258	0.000	2.708	5.811
FirmAge	28,317	2.844	0.346	1.609	2.890	3.497
Size	28,317	22.119	1.289	19.621	21.935	26.158
Growth	28,317	0.178	0.438	-0.569	0.107	2.951
Cashflow	28,317	0.048	0.070	-0.180	0.047	0.247
ROE	28,317	0.071	0.125	-0.618	0.076	0.378
BM	28,317	0.986	1.089	0.084	0.631	6.897
Aduit	28,317	0.972	0.164	0.000	1.000	1.000
Inst	28,317	0.381	0.239	0.000	0.388	0.879
Top5	28,317	0.539	0.154	0.200	0.542	0.887
SOE	28,317	0.376	0.484	0.000	0.000	1.000

This table shows the descriptive statistics of main variables. The detailed variable definitions are showed in Appendix A.

Table 2

Baseline regression: the impact of corporate digital transformation on Chinese capital market transparency.

Variables	(1)	(2)	(3)
	TRANS	TRANS	TRANS
DT	0.007***	0.003***	0.003***
	(5.59)	(2.60)	(2.91)
FirmAge		0.162***	0.167***
		(9.58)	(9.73)
Size		0.029***	0.028***
		(9.38)	(8.98)
Growth		-0.013***	-0.013***
		(-8.80)	(-9.12)
Cashflow		-0.008	-0.009
		(-0.78)	(-0.87)
ROE		0.047***	0.048***
		(7.19)	(7.16)
BM		-0.002	-0.003
		(-1.11)	(-1.17)
Aduit		0.007	0.007
		(1.25)	(1.28)
Inst		0.012**	0.010*
		(2.18)	(1.76)
Top5		-0.040***	-0.043***
		(-2.63)	(-2.90)
SOE		0.001	-0.003
		(0.06)	(-0.37)
_cons	0.125***	-0.876***	-0.857***
	(3.33)	(-9.95)	(-10.89)
Year FE	YES	YES	YES
Pro FE	YES	YES	NO
Ind FE	YES	YES	NO
Firm FE	NO	NO	YES
N	28,317	28,317	28,317
adj. R^2	0.130	0.165	0.154

This table presents the benchmark regression results for model (2):

$$TRANS_{i,t} = \varphi + \varphi_1 DT_{i,t} + \Sigma CVs + \Sigma Year + \Sigma \Pr o + \Sigma Ind + \varepsilon_{i,t}$$

The dependent variable for each column is information transparency (*TRANS*), the independent variable is corporate digital transformation (*DT*). The sample period is 2010-2021. Detailed variable definitions are reported in Appendix A. The significance levels of 10%, 5%, and 1% are represented *, **, and ***, respectively. The robust standard errors are clustered at firm level with t-statistics presenting in parentheses.

Table 3

Endogeneity concern: instrumental variable approach.

Variables	FE: L. DT as an independent variable	2SLS: L. DT as an instrumental variable
	(1)	(2)
	TRANS	TRANS
L. DT	0.002* (1.80)	
DT		0.005** (2.26)
Kleibergen-Paap rk LM statistic		1929.756*** [0.000]
Kleibergen-Paap rk Wald F statistic		2640.226 {16.38}
Hansen J statistic		0.000
N	24,224	24,188
adj. R^2	0.119	0.118

This table presents the results of endogeneity concern using the instrument variable approach. Column (1) employs lagged *DT* as the independent variable using a fixed effect regression, column (2) employs lagged *DT* as the instrumental variable using 2SLS regression. Detailed variable definitions are reported in Appendix A. The significance levels of 10%, 5%, and 1% are represented by *, **, ***, respectively. The robust z-statistics are presented in parentheses.

Table 4

Endogeneity concern: propensity score matching.

Variables	1:1 Nearest neighbor matching	Kernel matching
	(1)	(2)
	TRANS	TRANS
DT	0.006***	0.006***
	(4.18)	(5.45)
Controls	YES	YES
Year FE	YES	YES
Pro FE	YES	YES
Ind FE	YES	YES
N	15,009	28,307
adj. R^2	0.176	0.155

This table presents the results of endogeneity concern using propensity score matching. The dependent variable for each column is information transparency (*TRANS*). Column (1) uses the method of 1:1 nearest neighbor matching, column (2) uses the method of kernel matching. Detailed variable definitions are reported in Appendix A. The significance levels of 10%, 5%, and 1% are represented by *, **, ***, respectively. The robust standard errors are clustered at firm level with t-statistics presenting in parentheses.

Table 5

Other robustness checks.

Variables	Alternative measures of transparency		Alternative measures of DT	Excluding special events	Controlling fixed effect
	(1)	(2)	(3)	(4)	(5)
	TRANS1	TRANS2	TRANS	TRANS	TRANS
DT	0.008***	0.003**		0.002**	0.005***
	(3.85)	(2.26)		(1.99)	(4.27)
DIGI			0.003***		
			(2.64)		
Controls	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	NO
Pro FE	YES	YES	YES	YES	NO
Ind FE	YES	YES	YES	YES	NO
Year& Pro& Ind	NO	NO	NO	NO	YES
N	28,317	28,317	28,317	22,519	23,816
adj. R^2	0.216	0.029	0.165	0.203	0.200

This table presents other robustness checks results of alternative measures of transparency, alternative measures of *DT*, excluding special events, and controlling fixed effect. Detailed variable definitions are reported in Appendix A. The significance levels of 10%, 5%, and 1% are represented by *, **, ***, respectively. The robust standard errors are clustered at firm level with t-statistics presenting in parentheses.

Table 6

Channel tests: management myopia and analyst attention.

Variables	management myopia		analyst attention	
	(1)	(2)	(3)	(4)
	Myopia	TRANS	Ana_Atten	TRANS
DT	-0.003***		0.040***	
	(-3.09)		(4.01)	
$\widehat{\text{Myopia}}$		-0.489*		
		(-1.77)		
$\widehat{\text{Ana\_Atten}}$				0.052***
				(9.92)
Controls	YES	YES	YES	YES
Year FE	YES	YES	YES	YES
Pro FE	YES	YES	YES	YES
Ind FE	YES	YES	YES	YES
N	28,317	28,317	28,317	28,317
adj. R^2	0.064	0.165	0.268	0.165

This table presents the channel test results of management myopia and analyst attention based on model (3) and model (4):

$$Med_{i,t} = \alpha + \alpha_1 DT_{i,t} + \sum CVs + \sum Year + \sum \Pr o + \sum Ind + \varepsilon_{i,t}$$

$$TRANS_{i,t} = \beta + \beta_1 \widehat{Med}_{i,t} + \sum CVs + \sum Year + \sum \Pr o + \sum Ind + \varepsilon_{i,t}$$

Column (1) and column (2) present the results of channel tests of management myopia. Column (3) and column (4) present the results of the channel tests of analyst attention. Detailed variable definitions are reported in Appendix A. The significance levels of 10%, 5%, and 1% are represented by *, **, ***, respectively. The robust standard errors are clustered at firm level with t-statistics presenting in parentheses.

Table 7

Cross-section analysis: internal factors of a firm.

Variables	(1)	(2)	(3)	(4)
	Ownership property		Political Connection	
	SOE	Non-SOE	High	Low
	TRANS	TRANS	TRANS	TRANS
DT	0.001	0.003**	0.003	0.004**
	(0.53)	(2.23)	(1.45)	(2.41)
Controls	YES	YES	YES	YES
Year FE	YES	YES	YES	YES
Pro FE	YES	YES	YES	YES
Ind FE	YES	YES	YES	YES
N	10,638	17,679	9,216	19,101
adj. R^2	0.107	0.234	0.193	0.144

This table presents the results of cross-section analysis from the perspective of internal factors of a firm. Column (1) and column (2) present the results of grouping test of ownership property. Column (3) and column (4) present the results of grouping test of political connection. Detailed variable definitions are reported in Appendix A. The significance levels of 10%, 5%, and 1% are represented by *, **, ***, respectively. The robust standard errors are clustered at firm level with t-statistics presenting in parentheses.

Table 8

Cross-section analysis: external factors of a firm.

Variables	(1)	(2)	(3)	(4)
	Industry environment uncertainty		Regional marketization level	
	High	Low	High	Low
	TRANS	TRANS	TRANS	TRANS
DT	0.005***	0.000	-0.000	0.004***
	(3.37)	(0.10)	(-0.13)	(2.60)
Controls	YES	YES	YES	YES
Year FE	YES	YES	YES	YES
Pro FE	YES	YES	YES	YES
Ind FE	YES	YES	YES	YES
N	14,197	14,120	14,184	14,133
adj. R^2	0.162	0.182	0.123	0.183

This table presents the results of cross-section analysis from the perspective of external factors of a firm. Column (1) and column (2) present the results of grouping test of industry environment uncertainty. Column (3) and column (4) present the results of grouping test of regional marketization level. Detailed variable definitions are reported in Appendix A. The significance levels of 10%, 5%, and 1% are represented by *, **, ***, respectively. The robust standard errors are clustered at firm level with t-statistics presenting in parentheses.

Table 9

Further analysis: the economic consequences of corporate digital transformation on stock liquidity.

Variables	(1)	(2)	(3)
	Liquidity	TRANS	Liquidity
DT	0.028***	0.003***	0.027***
	(3.01)	(2.60)	(2.91)
TRANS			0.294***
			(4.18)
Controls	YES	YES	YES
Year FE	YES	YES	YES
Pro FE	YES	YES	YES
Ind FE	YES	YES	YES
Sobel test	Mediating variable: Information transparency 3.083*** Effective mechanism.		
N	28,317	28,317	28,317
adj. R^2	0.124	0.165	0.124

This table presents the regression results of the impact of digital transformation on the stock liquidity using stepwise regression model (5)- model (7):

$$Liquidity_{i,t} = \alpha + \alpha_1 DT_{i,t} + \sum CVs + \sum Year + \sum \Pr o + \sum Ind + \varepsilon_{i,t}$$

$$TRANS_{i,t} = \varphi + \varphi_1 DT_{i,t} + \sum CVs + \sum Year + \sum \Pr o + \sum Ind + \varepsilon_{i,t}$$

$$Liquidity_{i,t} = \beta + \beta_1 DT_{i,t} + \beta_2 TRANS_{i,t} + \sum CVs + \sum Year + \sum \Pr o + \sum Ind + \varepsilon_{i,t}$$

Detailed variable definitions are reported in Appendix A. The significance levels of 10%, 5%, and 1% are represented by *, **, ***, respectively. The robust standard errors are clustered at firm level with t-statistics presenting in parentheses.

Appendix A. Variable definitions

Variables	Definition
TRANS	A comprehensive index of information transparency of Chinese listed companies by the entropy method.
DT	The natural logarithm of the frequency of keywords related to digital transformation plus 1.
FirmAge	The natural logarithm of the establishment time of the firm in the sample observation year.
Size	The natural logarithm of the total assets.
Growth	The ratio of the current year's revenue to the previous year's revenue minus 1.
Cashflow	The ratio of the firm's cash and its cash equivalents to total assets.
ROE	The ratio of net profits to average shareholders' equity.
BM	The ratio of the total ownership interest to the market value.
Aduit	An indicator variable that equals 0 if the accounting firm issues a standard unqualified opinion, and 1 otherwise.
Inst	The ratio of the number of shares held by institutional investors to the total number of shares.
Top5	The ratio of the number of shares held by the top five shareholders to the total number of shares.
SOE	An indicator variable that equals 1 if the enterprise is state-owned, and 0 otherwise.
Myopia	The ratio of the total word frequency of terms related to myopia to the total word frequency of MD&A and multiply it by 100.
Ana_Atten	The natural logarithm of the number of analysts who track and analyze the company in the current year plus 1.
Liquidity	The average of the sum of changes in the rate of return caused by the transaction amount per unit of the stock on a certain trading day, and take the opposite.

Appendix B. The lexicon of enterprise digital transformation

Dimensions	Keywords related to digital transformation
1) Digital Technology Applications	
Artificial intelligence	Artificial Intelligence, Autonomous Driving, Bio-identification Technology, Business Intelligence, Deep Learning, Face Recognition, Identify Verification, Image Understanding, Investment Decision Assistant System, Machine Learning, Natural Language Processing, Semantic Search, Voice Recognition
Big data	Augmented Reality, Big Data, Credit Reporting, Data Center, Data Management, Data Mining, Data Network, Data Platform, Data Science, Data Visualization, Digital Communications, Digital Control, Digital Intelligence, Digital Marketing, Digital Network, Digital Technology, Digital Terminal, Digitization, Heterogeneous Data, Mixed Reality, Text Mining, Virtual Reality
Cloud computing	Brain-Like Computing, Cloud Computing, Cloud Ecology, Cloud IT, Cloud Platform, Cloud Services, Cognitive Computing, Eb-Level Storage, Fusion Architecture, Graph Computing, Green Computing, Information Physical System, In-Memory Computing, Internet of Things, Million Level Concurrent, Secure Multi-Party Computation, Stream Computing
Chain blocks	AI-Finance Contracts, Chain Block, Differential Privacy Technology, Digital Currency, Distributed Computing
Technical Practice Application	Digital Finance, Fintech, Internet Finance, Open Bank, Quantitative Finance, Unmanned Retail
2) Internet Business Model	B2B, B2C, C2B, C2C, E-Commerce, Industrial Internet, Internet, Internet Action, Internet Application, Internet Business Model, Internet Ecology, Internet Marketing, Internet Medical, Internet Mobile, Internet Model, Internet Platform, Internet Plus, Internet Service, Internet Solutions, Internet Strategy, Internet Technology, Internet Thinking, Mobile Internet, Mobile Payment, NFC Payment, O2O, Online and Offline, Third-Party Payment
3) Intelligent Manufacturing	Automatic Control, Automatic Detection, Automatic Monitoring, Automatic Production, Future Factory, High-end Intelligence, Industrial Cloud, Industrial Intelligence, Integrated Control, Integrated Solution, Integrated System, Integration, Intelligence Terminal, Intelligent Agriculture, Intelligent Control, Intelligent Cultural Tourism, Intelligent Customer Service, Intelligent Data Analysis, Intelligent Energy, Intelligent Environmental Protection, Intelligent Equipment, Intelligent Factory, Intelligent Fault Diagnosis, Intelligent Home, Intelligent Logistics, Intelligent Management, Intelligent Medical, Intelligent Mobile, Intelligent Production, Intelligent Robot, Intelligent Storage, Intelligent System, Intelligent Technology, Intelligent Transportation, Intelligent Wearable, Intelligentize, Life Cycle Management, Manufacturing Execution System, Mobile Intelligence, Network Alliance, Robo-Advisor, Smart Grid, Smart Manufacturing, Smart Marketing, Virtual Manufacturing, Virtualization
4) Modern Information Systems	Industrial Communication, Industrial Information, Information Center, Information Integration, Information Management, Information Network, Information Sharing, Information Software, Information System, Informatization, Intelligence Terminal