

# Corporate Data Asset Disclosure and Annual Report Tone Management

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**Abstract.** Against the backdrop of corporate digital transformation, this study focuses on the strategic value of data factors in corporate operations. Using A-share listed companies in Shanghai and Shenzhen from 2012 to 2023 as the research sample, we construct a corporate data asset indicator and empirically examine the relationship between the extent of corporate data asset disclosure and annual report tone management. The findings reveal that corporate data asset disclosure encourages executives to engage in annual report tone management, primarily through three mechanisms: exacerbating corporate performance volatility, increasing transaction costs, and intensifying earnings management. Heterogeneity tests indicate that the positive effect of data asset disclosure on tone management is more pronounced in high-tech enterprises, firms with higher financing constraints, and those where executives have an information technology background. The conclusions not only expand research on the economic consequences of data asset disclosure but also provide empirical evidence for regulators to emphasize the economic transmission effects of data elements and the textual characteristics of disclosures, thereby contributing to the improvement of corporate data governance systems and disclosure supervision mechanisms.

**Keywords:** data asset disclosure; annual report tone; performance volatility; transaction costs; earnings management.

## 1. Introduction

In 2023, the State Council emphasized in the *"Data Elements ×" Three-Year Action Plan (2024–2026)* the need to leverage the amplifying, overlapping, and multiplier effects of data elements to build a digital economy with data as a key factor. Data has become a new resource for stable economic performance and high-quality corporate development. Existing literature finds that the development of the digital economy not only enhances labor income share (Lu et al., 2025)[1], promotes common prosperity (Peng et al., 2025)[2], but also alleviates financing constraints (Xue, 2024)[3] and significantly increases corporate value (Yi, 2024)<sup>[4]</sup>. Therefore, as the main actors in economic activities, enterprises' digital transformation is not only an adaptive adjustment to technological paradigm shifts but also a strategic choice for optimizing value chains and building sustainable competitive advantages.

Information disclosure, as a critical bridge connecting market participants and stakeholders, directly influences market efficiency and resource allocation. Compared to structured data, unstructured textual information offers significant advantages in terms of information density, expression forms, and informational content. Particularly in China's high-context communication environment, tone, as an important representation of implicit information, has become a key dimension affecting decision-makers' cognitive judgments. Strategic information disclosure through tone management by executives has become a common practice. However, given that data asset disclosure is a capital-intensive, long-cycle, and high-uncertainty strategy, executives often have incentives to manage annual report tones to secure financing and alleviate operational pressures. Thus, in the context of digital transformation, the impact of corporate data asset disclosure on annual report tone management has emerged as a noteworthy issue.

This study examines the relationship between the extent of corporate data asset disclosure and annual report tone management using A-share listed companies in Shanghai and Shenzhen from 2012 to 2023 as the sample. The findings show that corporate data asset disclosure promotes executive tone management in annual reports, primarily through three mechanisms: exacerbating performance

volatility, increasing transaction costs, and intensifying earnings management. The positive effect is more pronounced in high-tech enterprises, firms with higher financing constraints, and those where executives have an IT background. The potential contributions of this study include: First, it enriches the micro-level economic consequences of corporate data assets, unveiling the "black box" of how data asset disclosure influences tone management and providing new insights into the economic effects of data assets. Second, it expands research on annual report tone management. Executive sentiment can be conveyed to stakeholders through annual report tones, and this study explores the influencing factors of executive sentiment from the perspective of data asset disclosure, offering new solutions to curb manipulative tone practices. Third, the study has practical implications. The conclusions provide empirical evidence for regulators to emphasize the economic transmission effects of data elements and the textual characteristics of disclosures, thereby improving corporate data governance systems and disclosure supervision mechanisms.

## 2. Theoretical Analysis

This study aims to investigate the impact of corporate data asset disclosure on annual report tone. On the one hand, the application of data assets can enhance corporate efficiency and standardization in R&D, production, and sales, thereby curbing executives' manipulation of annual report tones. On the other hand, based on impression management theory, firms may manipulate textual tones in more subtle ways to serve their interests.

### 2.1 Theoretical Logic of Data Asset Disclosure Inhibiting Executive Tone Management

Data asset disclosure can inhibit annual report tone management by improving disclosure quality and information transparency. Existing research shows that recording book value, accumulated depreciation, and impairment provisions for data assets can comprehensively reflect their value, enhancing the informational value and efficiency of financial statements (Zhao, 2024)[5], reducing information asymmetry between firms and investors, and making it harder for executives to falsify information. Additionally, digital management can improve the comparability and transparency of financial information, subjecting corporate behavior to greater scrutiny.

Data asset disclosure can inhibit tone management by boosting executive confidence. Firms with higher levels of data asset disclosure typically have advanced digital capabilities, and executives with deeper understanding of data assets are more likely to believe in their value creation, leading to objective and truthful disclosures. Moreover, digitally advanced firms prioritize innovation and R&D, and stakeholders have a better understanding of such firms, positively influencing stock liquidity (Wu et al., 2021)[6] and bond financing costs (Niu et al., 2024)[7], which in turn reinforces executive confidence in the real value of data assets.

Data asset disclosure can inhibit tone management by enhancing internal controls. Increased data asset disclosure reflects the intelligent and process-driven nature of corporate management. From the perspective of the five components of internal control, firms can use big data and cloud computing to build risk assessment models, improving risk identification. In terms of information and communication, systems like ERP and CRM enable data sharing and faster internal and external communication. The internal environment benefits from automation in production and operations, providing decision-making references (Cheng, 2024)[8]. Control activities are strengthened through technologies like voice recognition and identity verification, improving permission management efficiency (Liu, 2023)[9]. Internal oversight is enhanced through digital tools enabling cross-departmental and cross-regional supervision. Improved internal controls drive firms to report truthfully. Based on this, we propose the following hypothesis:

**H1a:** Corporate data asset disclosure inhibits executive tone management in annual reports, i.e., higher data asset disclosure is associated with more negative tones.

## 2.2 Theoretical Logic of Data Asset Disclosure Promoting Executive Tone Management

Data asset disclosure increases performance pressure, promoting tone management. Regulations requiring data asset disclosure subject firms to greater scrutiny, incentivizing them to manipulate tones to protect their reputation. Additionally, due to national policies, investors generally favor digitally advanced firms. However, data assets involve high investment and long payback periods, and the mismatch between input and output for early-stage transforming firms may negatively impact performance (Liu et al., 2021)[10], forcing executives to "embellish" textual tones.

Data asset disclosure increases transaction costs, promoting tone management. Digital transformation is a long-term process involving significant costs. In the early stages, firms must allocate substantial funds to software upgrades, R&D personnel hiring, and training. The transformation also entails business process reengineering (Cui, 2021)[11], redesigning workflows, and adjusting organizational structures, all of which increase costs. Disclosure-related expenses, such as data collection, compilation, and auditing, further add to costs. To maintain their market position, some firms may manipulate tones using more uplifting language.

Data asset disclosure increases earnings management, promoting tone management. As a new production factor, China lacks unified regulations for data asset disclosure. The complexity of data assets, covering business processes, strategic planning, and technology R&D, grants executives greater discretion in disclosure. Sophisticated algorithms and codes facilitate the concealment of earnings management, increasing opportunities for manipulation. Prior research (Huang & Huang, 2019)[12] shows that increased earnings management leads to more positive vocabulary in annual reports. Based on this, we propose the following hypothesis:

**H1b:** Corporate data asset disclosure promotes executive tone management in annual reports, i.e., higher data asset disclosure is associated with more positive tones.

## 3. Research Design

### 3.1 Sample Selection and Data Sources

The initial sample consists of A-share listed companies from 2012 to 2023. Since 2012 is regarded as the "Big Data Year" and the starting point of corporate digital transformation, it holds particular significance. The sample was processed as follows: (1) Excluding ST and PT firms; (2) Excluding financial firms; (3) Excluding missing values; (4) Winsorizing continuous variables. The final sample comprises 11,366 observations. Data on data asset information disclosure levels were sourced from the CNRDS Data Asset Research Database, while other data came from the CSMAR Database. Industries were classified according to the CSRC 2012 secondary classification.

### 3.2 Variable Definitions

**Core Explanatory Variable:** Data asset disclosure level (*Dataasset*). Following Yuan et al. (2022)<sup>[13]</sup> and Niu et al. (2024)<sup>[14]</sup>, seed words such as "data asset" and "data resource" were used. Similar words were expanded using the Word2Vec neural network model, retaining high-similarity terms to construct a word set. The frequency of these words in annual reports was counted to calculate the data asset disclosure level, with higher values indicating greater disclosure.

**Dependent Variable:** Net optimistic tone of annual reports (*Tone*). Following Xie and Lin (2015)<sup>[15]</sup>, the tone was measured as the difference between the number of positive and negative words divided by their sum. Higher values indicate a more optimistic tone.

**Control Variables:** Following Ma and Chen (2024)<sup>[16]</sup>, control variables include firm size (*Size*), profitability (*Roa*), leverage (*Lev*), growth (*Growth*), listing age (*Age*), proportion of independent directors (*Indep*), ownership nature (*Soe*), CEO duality (*Dual*), largest shareholder ownership (*Top1*), operating cash flow (*Cash*), stock return (*Ret*), book-to-market ratio (*Btm*), year (*Year*), and industry (*Ind*).

### 3.3 Model Specification

To test the hypotheses, the following model was established:

$$Tone_{it} = \beta_0 + \beta_1 Dataasset_{it} + \sum \beta_i Controls_{it} + Year_t + Ind_m + \delta_{it} \quad (1)$$

Where  $Tone_{it}$  represents the net optimistic tone of firm  $ii$  in year  $tt$ ,  $Dataasset_{it}$  represents the data asset disclosure level,  $Controls_{it}$  is the set of control variables,  $Year$  and  $Ind$  represent year and industry fixed effects, and  $\delta$  is the error term. The coefficient  $\beta_1$  is of primary interest. If  $\beta_1$  is positive, H1b is supported; otherwise, H1a is supported.

## 4. Empirical Results

### 4.1 Descriptive Statistics

Table 1 reports the descriptive statistics of each variable. For the variable  $Tone$ , the minimum value is  $-0.001$ , the maximum value is  $0.740$ , and the median is  $0.037$ , indicating that the overall tone of enterprises' annual reports is optimistic. For  $Dataasset$ , the minimum value is  $0$ , the maximum value is  $0.12$ , and the standard deviation is  $0.018$ . The varying degrees of data asset disclosure across enterprises may be related to the fact that some enterprises have not yet paid attention to the application and disclosure of data assets, which is consistent with the description by Niu Biao et al. (2024) [7].

Table 1 Descriptive Statistics Results

Variables	Sample	Average	Median	Standard Deviation	Minimum	Maximum	Range
<i>Tone</i>	11366	0.0370	0.0370	0.0150	-0.00100	0.0740	0.0750
<i>Dataasset</i>	11366	0.00600	0	0.0180	0	0.120	0.120
<i>Size</i>	11366	23.00	22.83	1.288	20.60	26.72	6.126
<i>Roa</i>	11366	0.0420	0.0380	0.0510	-0.155	0.196	0.351
<i>Lev</i>	11366	0.467	0.471	0.186	0.0860	0.862	0.776
<i>Growth</i>	11366	0.157	0.101	0.330	-0.432	1.926	2.358
<i>Age</i>	11366	2.537	2.565	0.516	1.609	3.401	1.792
<i>Indep</i>	11366	0.375	0.357	0.0540	0.333	0.571	0.238
<i>Soe</i>	11366	0.430	0	0.495	0	1	1
<i>Dual</i>	11366	0.243	0	0.429	0	1	1
<i>Top1</i>	11366	0.340	0.319	0.149	0.0880	0.742	0.653
<i>Cash</i>	11366	0.0560	0.0530	0.0640	-0.121	0.242	0.364
<i>Ret</i>	11366	0.108	-0.0300	0.506	-0.543	2.163	2.706
<i>Btm</i>	11366	0.657	0.649	0.266	0.140	1.236	1.096

### 4.2 Benchmark Regression Analysis

Table 2 reports the benchmark regression results. Columns (1)-(3) are respectively the regression results without control variables, the regression results with control variables, and the regression results with control variables and controlling for year and industry. The regression coefficients of  $Dataasset$  are all significantly positive at the 1% level, indicating that the level of corporate data-asset information disclosure is significantly positively correlated with the tone management of corporate annual reports, and Hypothesis H1b is established.

Table 2 Benchmark Regression Results

Variable	Tone		
	(1)	(2)	(3)
<i>Dataasset</i>	0.1482*** (11.5908)	0.1513*** (11.2682)	0.1121*** (7.2060)

<i>Size</i>		0.0000 (0.0963)	-0.0002 (-0.7059)
<i>Roa</i>		0.0318*** (6.6590)	0.0280*** (6.2078)
<i>Lev</i>		0.0009 (0.5285)	0.0011 (0.6506)
<i>Growth</i>		0.0029*** (5.9835)	0.0032*** (7.0347)
<i>Age</i>		-0.0005 (-0.8921)	-0.0013** (-2.2159)
<i>Indep</i>		0.0056 (1.1981)	-0.0005 (-0.1187)
<i>Soe</i>		0.0028*** (4.2699)	0.0039*** (5.7601)
<i>Dual</i>		0.0007 (1.2708)	0.0001 (0.2317)
<i>Top1</i>		-0.0019 (-1.0259)	0.0002 (0.0948)
<i>Cash</i>		-0.0093*** (-2.8537)	-0.0063** (-2.0096)
<i>Ret</i>		0.0000 (0.0140)	0.0011*** (3.4506)
<i>Btm</i>		-0.0018 (-1.5545)	-0.0022 (-1.6360)
<i>Constant</i>	0.0360*** (125.7590)	0.0333*** (5.2376)	0.0417*** (5.7688)
<i>Industry</i>	Controlled	Controlled	Controlled
<i>Year</i>	Controlled	Controlled	Controlled
<i>Observations</i>	11,366	11,366	11,366
<i>R-squared</i>	0.030	0.051	0.172

Note: \*\*\*, \*\*, and \* represent significance levels of 1%, 5%, and 10%, respectively.

### 4.3 Robustness Tests

#### 4.3.1 Substitution of Dependent Variable

Refer to the research of Price (Price et al., 2012) [17] and Dong Mingqing and Zhang Jiawei (Dong Mingqing and Zhang Jiawei, 2023) [18], the dictionary method is used to obtain the positive tone of the annual report Tone2, that is, the proportion of positive words to the total number of words in the annual report; the negative tone of the annual report Tone3, that is, the proportion of negative words to the total number of words in the annual report. Replace the Tone variable and re-conduct the regression, the results are shown in columns (1)-(2) of Table 3. The coefficients of Tone2 and Tone3 are both significantly positive at the 1% level, consistent with the benchmark regression results, and the test results hold.

#### 4.3.2 PSM Propensity Score Matching

To exclude the influence of internal corporate reasons on the results, the PSM propensity score matching method is used. First, calculate the median of the data asset information disclosure level by year and industry, and replace the value of the data asset information disclosure level greater than the median with 1, representing a higher degree of corporate data assetization, otherwise replace it with 0. Then, conduct a logit regression with all control variables as covariates, estimate the propensity score, and perform a nearest-neighbor 1:1 matching without replacement, setting the caliper value to 0.05. Finally, put the selected samples into the benchmark regression for testing. The test results are

shown in column (3) of Table 3, and the coefficient is still significantly positive at the 1% level, proving the previous benchmark regression results.

### 4.3.3 One-period Lag of Independent Variable

Take the previous-period data asset disclosure level as the explanatory variable of the current period, re-conduct the matching regression with other related variables. The results are reported in column (4) of Table 3. There is still a positive relationship between the degree of data asset disclosure and the net optimistic tone of the annual report, strengthening the causal relationship between the two.

Table 3 Robustness Test Results

<i>Variables</i>	(1)	(2)	(3)	(4)
	<i>Tone2</i>	<i>Tone3</i>	<i>Tone</i>	<i>Tone</i>
<i>Dataasset</i>	0.9537*** (8.1945)	-0.0585*** (-7.3611)	0.0972*** (5.9469)	0.1123*** (6.1373)
<i>Constant</i>	0.2925*** (5.8167)	0.0509*** (16.3827)	0.0498*** (6.1726)	0.0416*** (4.7809)
<i>Control variable</i>	Controlled	Controlled	Controlled	Controlled
<i>Year</i>	Controlled	Controlled	Controlled	Controlled
<i>Industry</i>	Controlled	Controlled	Controlled	Controlled
<i>Observations</i>	11,366	11,366	5,606	7,165
<i>R-squared</i>	0.216	0.271	0.196	0.178

Note: \*\*\*, \*\*, and \* represent significance at the levels of 1%, 5%, and 10%, respectively.

### 4.4 Instrumental Variable Test

To avoid reverse causality, this paper uses the instrumental variable regression method for testing. Refer to the research of Zeng Qingsheng (Zeng Qingsheng et al., 2018) [19] and Zhao Yuliang (Zhao Yuliang, 2020) [20], the average value of data-asset information disclosure of other enterprises in the same province and the same year is used as the endogenous variable. In the test results, the F-statistics value is 91.32, which can serve as an instrumental variable. The regression data is reported in Table 4. The coefficient of data-asset information disclosure is significantly positive at the 1% level, consistent with the benchmark regression result.

Table 4 Robustness Test—Results of Instrumental Variable Test

<i>Variables</i>	(1)	(2)
	<i>first</i>	<i>second</i>
	<i>Dataasset</i>	<i>Tone</i>
<i>DataassetLv</i>	0.102*** (2.969)	
<i>Dataasset</i>		0.966** (2.145)
<i>Constant</i>	-0.012*** (-3.140)	0.053*** (6.832)
<i>Control variable</i>	Controlled	Controlled
<i>Industry</i>	Controlled	Controlled
<i>Year</i>	Controlled	Controlled
<i>Observations</i>	11,364	11,364
<i>R-squared</i>	0.435	

Note: \*\*\*, \*\*, and \* represent significance at the levels of 1%, 5%, and 10%, respectively.

## 5. Further Research

### 5.1 Mechanism Test

Based on the theoretical analysis above, it is hypothesized that increased disclosure of data asset information may lead to greater corporate performance volatility, higher transaction costs, and more opportunities for earnings management, thereby affecting the tone of management’s annual reports. Referring to the research of Wang Fusheng (Wang Fusheng and Li Xu, 2016) [21], this paper measures corporate performance volatility using Risk, defined as the three-year volatility of return on total assets (ROA) adjusted for annual industry effects. A higher Risk value indicates greater performance volatility. Following Li Weibing (Li Weibing and Zhang Xing, 2023) [22], transaction costs are calculated as the sum of selling expenses, administrative expenses, and financial expenses divided by total assets—higher Exp values indicate higher transaction costs. Based on Chi Guohua (Chi Guohua and Lou Xinyue, 2021) [23], accounting information transparency is measured by Opaque, which is the sum of the absolute values of discretionary accruals over the past three years using the modified Jones model. Therefore, this paper establishes the following model for verification through mechanism testing:

$$Risk_{it} = \beta_0 + \beta_1 Dataasset_{it} + \sum \beta_i Controls_{it} + Year_t + Ind_m + \delta_{it} \quad (2)$$

$$Exp_{it} = \beta_0 + \beta_1 Dataasset_{it} + \sum \beta_i Controls_{it} + Year_t + Ind_m + \delta_{it} \quad (3)$$

$$Opaque_{it} = \beta_0 + \beta_1 Dataasset_{it} + \sum \beta_i Controls_{it} + Year_t + Ind_m + \delta_{it} \quad (4)$$

Among them,  $Risk_{it}$ ,  $Exp_{it}$ , and  $Opaque_{it}$  represent corporate performance volatility, transaction costs, and earnings management at time t, respectively.  $Dataasset_{it}$  is the explanatory variable,  $Controls_{it}$  is the set of control variables,  $Year$  and  $Ind$  represent year and industry respectively, and  $\delta$  is the random error term.

The regression results of the mechanism are shown in the columns of Table 5. The regression coefficients of data-asset information disclosure are all significantly positive at the 5% level, verifying the theoretical analysis.

Table 5 Results of Mechanism Test

Variables	(1)	(2)	(3)
	Risk	Exp	Opaque
Dataasset	0.1255** (2.4647)	0.1400** (2.0097)	0.2695** (2.3468)
Constant	0.0798*** (7.5017)	0.2374*** (9.2855)	0.2717*** (7.4392)
Control variable	Controlled	Controlled	Controlled
Industry	Controlled	Controlled	Controlled
Year	Controlled	Controlled	Controlled
Observations	8,571	11,366	11,366
R-squared	0.186	0.453	0.145

Note: \*\*\*, \*\*, and \* represent significance levels of 1%, 5%, and 10%, respectively.

### 5.2 Heterogeneity Analysis

In order to deeply understand the mechanism of action and further explore under what circumstances the degree of data-asset disclosure has a more obvious impact on the tone of annual reports, this paper conducts heterogeneity analysis from three aspects: whether it is a high-tech enterprise, the degree of financing constraints, and whether senior executives have an information-technology background.

### 5.2.1 Whether it is a high and new technology enterprise(s)

Since high-tech enterprises have a larger proportion of R&D investment, more advanced equipment technology, and stronger data dependence, it is generally believed that high-tech enterprises have a higher degree of digitization. Data assets are their core competitiveness, and in order to maintain a competitive advantage in the market, enterprises tend to disclose a more optimistic tone. This paper uses Hte to measure whether an enterprise is a high-tech enterprise, assigning 1 if it is, and 0 otherwise. The results are reported in columns (1)-(2) of Table 6, verifying the expectation.

### 5.2.2 Financing constraints

In the research of Cheng Xinsheng (Cheng Xinsheng et al., 2012) [24], it is pointed out that the greater the financing constraints of an enterprise, the more it tends to transmit positive signals through non-financial information. The disclosure of data assets is an important non-financial information. Therefore, it can be expected that in enterprises with large financing constraints, the disclosure of data assets has a more significant impact on the tone of annual reports. This paper follows the construction research of Hadlock and Pierce (Hadlock and Pierce, 2010) [25] and uses the Sa index to measure the financing pressure of enterprises. Group the Sa index by the median value by industry and year. If it is greater than the median, the financing constraint is high, and the value is 1; if it is less than the median, the value is 0. The results are reported in columns (3)-(4) of Table 6. Enterprises with high financing constraints tend to make the tone of annual reports more optimistic by disclosing data assets.

### 5.2.3 Whether senior executives have an information-technology background

The personal experiences and knowledge backgrounds of senior executives play an important role in corporate decision-making. Their knowledge structure often determines the enterprise's attitude towards and response strategies for new things. If senior executives have sufficient IT knowledge, then they have a higher recognition of the value of data assets, a stronger willingness to disclose data assets in the annual report, and convey a more optimistic attitude. Referring to the research of Liu Xilu (Liu Xilu et al., 2023) [26], ChairmanIT is used to represent the chairman's information-technology background. If such a background exists, it is recorded as 1, otherwise 0. The results are shown in columns (5)-(6) of Table 6, confirming the expectation.

Table 6 Results of Heterogeneity Analysis

Variable	High-tech Enterprise		Financing Constraints		Senior Executive's IT Background	
	(1)	(2)	(3)	(4)	(5)	(6)
	Yes	No	High Pressure	Low Pressure	Yes	No
<i>Dataasset</i>	0.1359*** (15.2319)	0.1782*** (10.6749)	0.0862*** (6.4720)	0.1348*** (9.4358)	0.0891*** (4.4481)	0.1289*** (11.5628)
<i>Constant</i>	0.0492*** (7.9147)	0.0396*** (10.8038)	0.0495*** (9.4269)	0.0269*** (4.0577)	0.0356 (1.5328)	0.0425*** (10.6394)
<i>Control Variables</i>	Controlled	Controlled	Controlled	Controlled	Controlled	Controlled
<i>Industry</i>	Controlled	Controlled	Controlled	Controlled	Controlled	Controlled
<i>Year</i>	Controlled	Controlled	Controlled	Controlled	Controlled	Controlled
<i>Observations</i>	3,310	8,056	5,520	5,846	411	10,955
<i>R-squared</i>	0.183	0.108	0.192	0.185	0.411	0.168
<i>Difference P-value</i>	0.0525*		0.0130**		0.0809*	

Note: \*\*\*, \*\*, and \* represent significance at the levels of 1%, 5%, and 10%, respectively.

## 6. Conclusions and Implications

This paper takes the sample data of A-share listed companies from 2012 to 2023 as the research object and explores the relationship between corporate data-asset disclosure and annual-report tone

management. The study finds that data-asset disclosure has a positive effect on corporate annual-report tone management, making management tend to use optimistic words in text information. The mechanism test reveals that performance volatility pressure, increased transaction costs, and more earnings-management opportunities are the intermediary mechanisms affecting data-asset disclosure and the net optimistic tone of annual reports. Through heterogeneity analysis, when enterprises are high-tech enterprises, have high financing constraints, or senior executives have an information-technology background, the positive impact of data-asset disclosure on annual-report tone management is stronger.

This research has the following implications: First, on the one hand, enterprises should comply with the needs of era development, respond to the call of market and technological changes, and actively promote their own digital transformation; on the other hand, they should strengthen self-discipline and fulfill social responsibilities. In addition, digital transformation is not an overnight process. Enterprises need to set digital-transformation plans according to their actual situations and complete them step-by-step and stage-by-stage. They should avoid being eager for quick success and ignoring the problem of transaction costs. Second, it should be realized that the application of data assets is not perfect but hides certain negative impacts. The government needs to play the role of a regulator. On the one hand, it should strengthen the supervision of the application and disclosure of data assets; on the other hand, it should improve relevant laws and regulations, always pay attention to market trends, and adjust management policies in a timely manner. Enterprises should also assume corresponding responsibilities, strictly abide by national standards, and improve self-regulatory systems. Third, investors should enhance their understanding of data assets. They should not only master the characteristics of data assets and market operation mechanisms but also pay attention to the deep-seated impacts and development trends behind them. They should timely study relevant policies issued by the state, maintain a clear mind in investment, and make rational and wise decisions.

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