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# The impact of corporate digital transformation on share price synchronisation

## --Based on disclosure and corporate governance perspectives

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**Abstract.** With the rapid development of the digital economy, digital transformation of firms has become an important factor affecting their operations and market performance. This study examines the impact of corporate digital transformation on stock price synchronisation, focusing on the mediating role of disclosure and corporate governance in it. Through empirical analyses of A-share listed companies in Shanghai and Shenzhen from 2010 to 2021, this paper finds that digital transformation significantly reduces firms' stock price synchronicity. Specifically, digital transformation reduces information asymmetry by enhancing the transparency of firms' disclosure and the efficiency of corporate governance, which reduces the synchronisation of firms' share prices with market volatility. In addition, this paper finds that digital transformation has a more significant impact on manufacturing and high-tech firms. This study not only enriches the theoretical research on the impact of corporate digital transformation, but also provides practical references for corporate managers and policy makers.

**Keywords:** corporate digital transformation; share price synchronisation; disclosure; corporate governance.

## 1. Introduction

In 2022, US retail giant Amazon launched the Amazon Automated Brand System, which utilises artificial intelligence and machine learning technology to help brands and manufacturers protect their intellectual property and brand reputation more effectively. In recent years, the importance of enterprise digital transformation has been highlighted in China, with the Action for the Construction of Digital China and the Guiding Opinions on the Action for Promoting the Development of Big Data putting forward a series of policy initiatives to support the development of the digital economy, making clear the status and importance of digital transformation in the national development strategy. Under the leadership of General Secretary Xi Jinping, the government regards digital transformation as a key initiative to promote economic transformation and upgrading and achieve high-quality development, and provides solid policy support and guidance for the digital transformation of enterprises.

Corporate stock price synchronicity is an important research topic in finance, which has attracted widespread attention at both the practical and theoretical levels with the development of globalisation and information technology (Morck et al., 2000; You Jiaxing et al., 2006). Stock price synchronisation reflects the correlation between the stock price fluctuations of different firms, i.e. whether they show similar upward and downward trends at the same time. This concept reflects the overall operation of the market, the risk transmission mechanism, and the efficiency of information transfer, and is of great significance for corporate operations, investor decision-making and government regulation (Wenwen et al., 2017). Specifically, at the practical level, research on corporate share price synchronicity has focused on the impact of market behaviour and financial policies on share price synchronicity. Some practical studies have found that corporate share price synchronicity is affected by market sentiment and investor behaviour (Yuan Rongli et al., 2022). For example, when market risk sentiment is high, investors are more inclined to concentrate their

investment in large-cap stocks, creating a high degree of share price synchronisation among large-cap stocks. On the contrary, in the case of stable or optimistic market sentiment, investors are more willing to pursue differentiated investments, which reduces the stock price synchronisation among individual stocks (Yu, Qiuling and Zhu, Hong, 2015). At the theoretical level, scholars have proposed various theoretical models to explain the formation mechanism of corporate stock price synchronisation. Among them, the information transmission theory is one of the more classical explanations. The theory argues that stock price synchronicity is the result of the transmission and reaction of information in the market, and the lower the efficiency of information transmission in the market, the higher the stock price synchronicity.

Digital transformation, as an application of information technology, enhances the efficiency of information acquisition and transmission. This increased efficiency helps to reduce information asymmetry, enabling market participants to access and understand the operating conditions of firms more quickly and thus make more rational investment decisions. As a result, digital transformation may exacerbate share price synchronisation, i.e. the increased correlation between a firm's share price and the overall market trend. This is due to the rapid flow and sharing of market information, which allows firms' idiosyncratic information to be reflected in share prices more quickly, leading to an increased synchronisation of individual stock price movements with overall market fluctuations. In exploring the impact of firms' digital transformation on the level of information disclosure and corporate governance, and how this impact reduces stock price synchronisation by enhancing the quality of information disclosure and improving corporate governance structure, thus revealing its underlying logic. Specifically, this paper will use A-share listed companies in Shanghai and Shenzhen from 2010 to 2021 as the research object to explore the impact of corporate digital transformation on financial disclosure and textual disclosure, as well as to examine the role of digital transformation, including the roles and responsibilities of the board of directors, and the degree of improvement of internal control mechanisms. In order to gain a deeper understanding of the mechanism of the impact of digital transformation on share price synchronisation, this paper will focus on the mediating role of information disclosure (information asymmetry). Specifically, this paper will explore how digital transformation affects share price synchronisation by improving the quality of information disclosure and reducing information asymmetry, which in turn affects share price synchronisation. In addition, this paper will consider the role of analyst tracking in this process, and how analysts, as information intermediaries, can convey and interpret firm information related to digital transformation, thereby affecting share price synchronisation. Also, this study will examine the moderating effect of external governance mechanisms and governance environments on the relationship between digital transformation and share price synchronisation. This includes analysing the differences in the impact of digital transformation on information disclosure and information asymmetry under different governance environments and governance structures, and how these differences further affect share price synchronicity.

The innovations of this paper are: ① It enriches the understanding of the impact of digital transformation on enterprises, especially the mechanism of its role in information disclosure and corporate governance. Through in-depth research on how digital transformation affects enterprises' disclosure behaviour and corporate governance practices, this paper provides more effective management suggestions for enterprises, more scientific regulatory guidance for regulators, and also more accurate information interpretation for investors, thus promoting the healthy development of the capital market. ② With the new perspective of digital transformation information disclosure and corporate governance level as the mediating effect, it explores the economic consequences of corporate digital transformation affecting the capital market, and specifically empirically examines that the quantity, structure and tone of corporate digital transformation information disclosure will alleviate information asymmetry, and then improve the level of corporate governance, increase the efficiency of information transmission in the capital market, and reduce the synchronicity of the stock price.

In what follows, this paper will explore in detail the mechanism of digital transformation's impact on information disclosure and corporate governance, and further analyse how it plays a role by affecting share price synchronicity, providing theoretical and practical support for the sustainable development of enterprises and the efficient operation of capital markets.

## 2. Theoretical analysis and research hypotheses

The stock market being a market of information, its price fluctuations reflect the process of information exchange and gaming in the market. Stock price synchronicity is regarded as an indicator of firm-specific information in the capital market, which reflects the extent to which stock prices contain firm-level idiosyncratic information that distinguishes them from their peers and the market as a whole. The information efficiency viewpoint suggests that share price synchronisation is high, and Lu Chao and Shen Yufei (2021) show that share prices incorporate less firm-specific information, and that firm share prices fail to reflect the true value of the firm. With the rapid development of digital technology, the organisational structure, business methods, operational efficiency and sustainability of enterprises have undergone comprehensive and profound changes. The wide application of digital technology has become one of the most important indicators for assessing the future development prospects of enterprises, and the information related to the technological innovation of enterprises has attracted much attention. In this paper, we will explore the relationship between digital transformation and stock price synchronicity, and analyse it in terms of both information disclosure and corporate governance.

Digital transformation, as a comprehensive strategic change, implies the wide application and deep integration of information technology in enterprises. This transformation will not only affect the internal operation of enterprises, but also change the mode of interaction between enterprises and the external environment. In this process, enterprises usually strengthen their information systems and data management, and improve the quality and timeliness of information disclosure. However, at the same time, digital transformation may also trigger a series of changes, such as organisational restructuring and business model innovation, which may affect an enterprise's financial performance and market pricing. Firstly, digital transformation may lead to fluctuations in an enterprise's financial performance. Especially in the early stage of transformation, enterprises may need to invest a large amount of resources in information system construction and personnel training, and these expenditures may have a certain degree of negative impact on the enterprise's financial performance, such as reducing profits or increasing liabilities. Such financial fluctuations will cause concern among investors, which will increase the uncertainty and volatility of share prices and lead to a reduction in share price synchronisation. Second, digital transformation may change the mode of interaction between firms and the market. With the continuous advancement of digital technology, the corporate disclosure mechanism is undergoing a profound change. This change not only improves the frequency and quality of corporate disclosure, but also enhances the transparency and accessibility of information. In these ways, digital transformation may fundamentally change the mode of interaction between enterprises and markets.

In summary, digital transformation may reduce share price synchronisation by affecting firms' financial performance and market interaction patterns, leading to increased share price uncertainty. Therefore, this paper proposes research hypothesis 1:

H1: Firms' digital transformation is negatively correlated with stock price synchronisation.

It has been pointed out that an important factor in the formation of the synchronisation of share prices of listed companies is the asymmetry of information within and outside the company, which can lead to the failure of the company's share price to fully absorb idiosyncratic information, thus causing individual stocks to fluctuate in tandem with the market. Digital transformation has improved the comprehensiveness, timeliness and transparency of corporate information disclosure through information technology applications and changes in management models. Enterprises are able to disclose more timely and comprehensive idiosyncratic information about their business operations,

financial position and other aspects of their business, enabling investors to better understand their operations, future plans and risk management. Increased disclosure reduces information asymmetry, and investors are able to support their investment decisions with efficient and reliable external public information. The incorporation of real idiosyncratic information in the market improves the information efficiency of the market and facilitates investors to accurately assess the value of the firms, leading to an increase in the effective information content of the stock. As a result, the stock price movement of the underlying company becomes more and more detached from the overall market trend, making the stock price less synchronised. In this paper, we will specifically analyse how digital transformation affects information disclosure, and thus stock price synchronicity, from both financial data disclosure and non-financial textual information disclosure.

On the one hand, digital transformation has made enterprises pay more attention to the quality and transparency of financial disclosure. The support of digital technology has enabled enterprises to disclose financial data in a more timely and accurate manner, providing investors with more realistic and comprehensive financial information. This timely disclosure of financial information helps investors to more accurately assess the value of the enterprise and reduces information asymmetry, which in turn reduces share price synchronisation. In addition, digital transformation also promotes the diversification of the forms of financial information disclosure, for example, through data visualisation and interactive reporting forms, which makes financial information easier to understand and use, improves the efficiency of information transmission, and further reduces share price synchronicity. On the other hand, in addition to financial information, digital transformation has also promoted the disclosure of non-financial textual information by enterprises, including information on their strategic planning, market positioning, innovation capability, social responsibility and other aspects. Through digital technology, enterprises are able to disclose non-financial textual information more fully, helping investors to understand more comprehensively the enterprise's operating conditions and development prospects, and when investors can use market information to accurately assess the enterprise's value, so as to make investment decisions, the market's capital allocation efficiency is higher, when the share price synchronicity is lower. Therefore, this paper proposes research hypothesis 2:

H2: Firms' digital transformation acts on stock price synchronisation by affecting corporate disclosure.

Digital transformation has had a significant impact on the governance structure and mode of operation of enterprises. According to Li et al. (2018), digital transformation improves the efficiency of information management and decision-making within firms by increasing information transparency. This not only enhances the transparency and effectiveness of corporate governance (Smith & Zhang, 2020), but also facilitates communication and monitoring between management and shareholders (Wang et al., 2019), which further improves the internal control and monitoring mechanisms of the firm and reduces the occurrence of agency problems (Jensen & Meckling, 1976).

An optimised corporate governance structure helps to reduce information asymmetry within the firm, enabling firms to better monitor and manage internal risks (Bhagwat & Sharma, 2021). For example, by establishing digital decision support systems and risk management platforms, firms can better monitor and manage the behaviour of internal personnel and reduce risks and vulnerabilities in corporate governance (Chen & Hsu, 2019). This enhanced level of corporate governance, in turn, improves stock price information content, enhances investor trust in the firm, reduces uncertainty, and lowers stock price synchronisation (Davies & Hillegeist, 2018). Therefore, this paper proposes research hypothesis 3:

H3: Corporate digital transformation acts on share price synchronisation by influencing the level of corporate governance

## 3. Research design

### 3.1. Data selection and description

This paper selects the data of A-share listed companies in Shanghai and Shenzhen from 2010 to 2021 as the initial research sample and treats this data as follows: firstly, financial companies are excluded; secondly, samples with ST and period delisting are excluded; thirdly, companies with IPOs in the examined years are excluded; and fourthly, in order to reduce the impact of outliers, this paper performs 1% and 99% shrinkage on all continuous variables at the micro level processing. The raw data are obtained from the Cathay Pacific database (CSMAR), while the data of the relevant firms' annual reports are obtained from the official websites of the Shenzhen Stock Exchange and the Shanghai Stock Exchange.

### 3.2. Selection and description of variables

#### 3.2.1. Explained variables

This study uses share price synchronisation as an explanatory variable to measure the relationship between firms' share prices and market indices. The following model was used to estimate the share price synchronisation of firms based on the methodology of *Morck* et al:

$$Ri,t = \alpha i + \beta iRM,t + ei,t$$

where.$R_{i,t}$ is the weekly return of firm i, and $R_{M,t}$ is the weekly return of the market index for the same period. Through the regression equation (1), the coefficient of determination is calculated $R^2$ , which represents the goodness of fit between the company's stock and the market index, i.e., the proportion of the firm's stock price that is explained by market movements.

Subsequently, this paper calculates the share price synchronisation indicator of the company based on equation (2):

$$\mathrm{SYN1} = \ln\left(\frac{R^2}{1-R^2}\right)$$

where$R^2$ is the portion of stock price changes in model (1) that can be explained by the market index. The higher the value of this indicator, the higher the degree of synchronisation of the company's share price with the market index and the relatively low information content; on the contrary, the lower the value of this indicator, the lower the synchronisation of the company's share price with the market index, indicating that the company has a higher quality of information disclosure and corporate governance.

In the calculation of the share price synchronisation indicator, market indices use a wide range of composite market indices, such as the CSI 300 index. The composite market index can reflect a wider range of market changes and can more accurately measure the synchronisation of a company's share price. The calculation of the above indicators provides an important basis for subsequent analysis of the impact of corporate digital transformation on share price synchronisation.

#### 3.2.2. Core explanatory variables

This study adopts enterprise digital transformation as an explanatory variable, referring to the methods of Wu Fei et al. (2021) and Li Zheng et al. (2023), and captures keywords in the text content of each enterprise's annual report from the five dimensions of artificial intelligence technology, big data technology, cloud computing technology, blockchain technology, and the use of digital technology to obtain the number of keywords involved in "digitalisation". The number of word frequencies of the keywords involving "digitalisation" is obtained, and the variable DCG is defined in logarithmic form, i.e. DCG=ln(number of word frequencies of the keyword "digitalisation" + 1).

The way of defining digital transformation in this paper adopts the classic literature practice of Wu Fei et al. (2021), in accordance with the four aspects of artificial intelligence technology, big data

technology, cloud computing technology, blockchain technology and so on as the basis of the selection of the crawler data, and further crawls 42 word frequencies of artificial intelligence, business intelligence, image understanding, etc., based on python to the listed companies of the annual reports of the text extracted to form a pool of data, and classified and aggregated Summed to form the final total number of word frequencies.

### 3.2.3. Control variables

In examining the impact of corporate digital transformation on stock price synchronisation, the following control variables are included in this paper in order to exclude other factors from interfering with the results of the study:

1) Financial Leverage (Lev). This variable reflects the level of financial leverage of a firm, measured using the ratio of total liabilities at the end of the period to total assets at the end of the period. Higher financial leverage may affect a firm's risk-taking and capital structure, which may have an impact on stock price synchronisation.

2) Net profit margin on total assets (ROA). This indicator is used to measure the profitability of a business and is calculated as net profit divided by the average balance of total assets. A higher ROA usually implies higher profitability for the firm, which may reduce the synchronisation of the share price with market volatility.

3) Cashflow ratio (Cashflow). This variable reflects a firm's cash flow profile and is calculated as net cash flow from operating activities divided by total assets. Higher cashflow ratios generally indicate that a firm has a better cashflow position, which helps to reduce the degree to which its share price is in sync with the market.

4) Tobin's Q (TobinQ). This indicator is used to measure the market value of a firm relative to its assets and is calculated as (market capitalisation of outstanding shares + number of non-outstanding shares x net assets per share + book value of liabilities) / total assets. A higher Tobin's Q indicates a better growth of the business, which may have an impact on the synchronisation of the share price.

5) Years listed (ListAge). This variable measures the duration of a firm's existence in the stock market and is calculated by subtracting the current year from the year of listing, plus one, and taking the natural logarithm. Firms that have been listed for a longer period of time may have more sophisticated disclosure mechanisms, which have a different impact on share price synchronisation.

(6) Number of directors (Board). This indicator measures the size of a firm's board of directors and is calculated as the natural logarithm of the number of board members. Larger board size may reflect better corporate governance mechanisms and have an impact on share price synchronisation.

### 3.3. Empirical modelling

In order to test the non-linear relationship of share price synchronisation of firms' digital transformation, a two-way fixed effects model is chosen in this paper. The model can effectively control for unobservable firm-specific and time-specific effects that may affect stock price synchronisation. The specific model is as follows (3):

$$\text{SYN1i,t} = \alpha 0 + \alpha 1 \text{dii} i + \beta \text{Controlsi},t + \sum \text{Industry} + + \sum \text{Year} + \epsilon$$

where $SYNi,t$ denotes the first $i$ firm at time $t.d$iii of the stock price synchronization is the coefficient of the first $i$ firm's digital transformation indicator, the coefficient is expected to be$\alpha 1$ to be negative, indicating that firms with higher levels of digital transformation have lower stock price synchronisation.$Controlsi,t$ A series of control variables are included, such as financial leverage ($Lev$ ), total net asset margin ($ROA$ ), cash flow ratio ($Cashflow$ ), Tobin's Q ($TobinQ$ ), number of years on the market ($ListAge$ ) and board size (($Board$ ), which are variables designed to control for other firm characteristics that may affect stock price synchronisation.$\sum Industry$ and $\sum Year$ represent industry fixed effects and year fixed effects, respectively, to control for the effects of

macroeconomic conditions and policy changes on stock price synchronisation across industries and years.$\epsilon_{i,t}$ are the error terms. By introducing industry and year fixed effects, the model captures industry and time-specific effects and thus more accurately estimates the impact of digital transformation on share price synchronisation.

### 3.4. Descriptive statistics

Table 1 presents the results of the full sample descriptive statistical analysis of this paper. The sample size is 8180 and the mean value of the explanatory variable digital transformation (dii) is 1.388 with a standard deviation of 1.446, with values ranging from 0.000 to 5.094, which shows a high degree of variability, reflecting significant differences in the degree of digital transformation among different companies. The mean value of the explanatory variable stock price synchronisation is -0.844. which is significantly different from the maximum value of 0.825, indicating a certain degree of variability in the correlation between changes in the stock prices of listed companies in the sample data and the average changes in the market. Information disclosure (idq) has a mean value of 3.035, a standard deviation of 0.614, a minimum value of 1.000, and a maximum value of 4.000. this indicates that most firms have a high level of information disclosure with a moderate degree of discrete. Corporate governance quality (cgq) has a mean value of 0.221, a standard deviation of 0.675 and a range of values from -0.849 to 2.155, which indicates a wide variation in the level of corporate governance.

**Table 1.** Results of descriptive statistical analysis

| variable name | Number of variables | average value | (statistics) standard deviation | minimum value | maximum values |
|---|---|---|---|---|---|
| SYN1 | 8180 | -0.844 | 0.750 | -6.026 | 0.825 |
| dii | 8180 | 1.388 | 1.446 | 0.000 | 5.094 |
| idq | 8180 | 3.035 | 0.614 | 1.000 | 4.000 |
| cgq | 8180 | 0.221 | 0.675 | -0.849 | 2.155 |
| Lev | 8180 | 0.383 | 0.194 | 0.047 | 0.843 |
| ROA | 8180 | 0.045 | 0.067 | -0.255 | 0.232 |
| Cashflow | 8180 | 0.048 | 0.070 | -0.150 | 0.238 |
| TobinQ | 8180 | 2.047 | 1.254 | 0.910 | 8.520 |
| ListAge | 8180 | 1.856 | 0.779 | 0.000 | 3.296 |
| Board | 8180 | 2.089 | 0.187 | 1.609 | 2.485 |

## 4. Empirical results and analyses

### 4.1. Benchmark regression: enterprise digital transformation and share price synchronisation

Model 1 demonstrates the results of the baseline regression between firms' digital transformation and share price synchronisation, where the digital transformation indicator (dii) has a significant negative impact on share price synchronisation, with a regression coefficient of -0.193, and is significant at the 1% significance level. This indicates that for every unit increase in firms' digital transformation, share price synchronisation will significantly decrease by 0.193 units. This result suggests that corporate digital transformation has a significant inhibitory effect on reducing share price synchronisation. The reason behind this may lie in the fact that digital transformation enhances firms' disclosure and transparency, improves investors' understanding of firms' true value, and reduces the synchronisation of firms' share prices with the overall market. In Model 2, additional control variables are added. The negative impact of digital transformation (dii) remains significant with a coefficient of -0.187 and is significant at the 1% level. In addition, debt level (Lev), return on assets (ROA) and Tobin's Q (TobinQ) also show a significant negative impact on share price synchronisation with coefficients of -0.229, -0.669 and -0.094, respectively, which are all significant at the 1% level. The results indicate that firms with high debt levels, high profitability and high firm growth are less likely to experience higher share price synchronisation. On the other hand, the age of listed companies

(ListAge) has a significant positive effect on share price synchronisation with a coefficient of 0.110, indicating that the longer the listing period, the higher the share price synchronisation. This may be due to the fact that older firms are more susceptible to the overall macroeconomic and industry trends in the market and thus exhibit higher share price synchronisation. Board size (Board) is not significantly associated with share price synchronisation.

**Table 2.** Benchmark regression results

| | (1) | (2) |
|---|---|---|
| VARIABLES | SYN1 | SYN1 |
| dii | -0.193*** | -0.187*** |
| | (-31.418) | (-31.032) |
| Lev | | -0.229*** |
| | | (-5.486) |
| ROA | | -0.669*** |
| | | (-5.775) |
| Cashflow | | -0.106 |
| | | (-0.976) |
| TobinQ | | -0.094*** |
| | | (-15.065) |
| ListAge | | 0.110*** |
| | | (10.910) |
| Board | | 0.030 |
| | | (0.837) |
| Constant | -0.576*** | -0.538*** |
| | (-52.872) | (-6.814) |
| Observations | 8,180 | 8,180 |
| R-squared | 0.338 | 0.372 |
| Year FE | YES | YES |
| Industry FE | YES | YES |
| F test | 0 | 0 |

Note: T-statistics in parentheses, ***, **, ** indicate 1%, 5% and 10% significance levels, respectively.

### 4.2. Robustness tests

In order to verify the robustness of the benchmark regression results, this paper conducts a robustness test in terms of replacing the explanatory variables and changing the estimated model to ensure that the impact of firms' digital transformation on share price synchronisation is not affected by specific parameter settings.

#### 4.2.1. Replacement of explanatory variables

First, the effect of digital transformation on share price synchronisation under different indicators is examined by replacing the explanatory variables from share price synchronisation indicator SYN1 to SYN2. In the regression results in Table 4, the negative impact of digital transformation indicator (dii) on share price synchronisation SYN2 remains significant with a regression coefficient of -0.125, which is significant at 1% significance level. Among the control variables, debt level (Lev), return on assets (ROA) and Tobin's Q (TobinQ) all show a significant negative impact on SYN2, significant at 1% and 5% significance levels, respectively. Listing Age (ListAge), on the other hand, exhibits a positive effect on SYN2 and is significant at the 1% significance level. The results after substituting variables are consistent with the benchmark regression, further suggesting that digital transformation of firms has a significant dampening effect on reducing share price synchronisation.

**Table 3.** Results of replacing explanatory variables

| | (1) |
|---|---|
| VARIABLES | SYN2 |
| dii | -0.125*** |
| | (-20.787) |
| Lev | -0.117*** |
| | (-2.819) |
| ROA | -0.237** |
| | (-2.042) |
| Cashflow | 0.075 |
| | (0.697) |
| TobinQ | -0.066*** |
| | (-10.600) |
| ListAge | 0.093*** |
| | (9.205) |
| Board | -0.002 |
| | (-0.049) |
| Constant | -0.224*** |
| | (-2.842) |
| Observations | 8,180 |
| R-squared | 0.253 |
| Year FE | YES |
| Industry FE | YES |
| F test | 0 |

Note: T-statistics in parentheses, ***, **, ** indicate 1%, 5% and 10% significance levels, respectively.

### 4.2.2. Changing the estimation model

Second, robustness is tested by changing the method of estimating the model. In this paper, the regression is conducted by replacing from the OLS model to other estimation models. In the regression results in Table 5, the negative impact of the digital transformation indicator (dii) on stock price synchronisation (SYN1) remains significant, with a coefficient of -0.187, which is significant at the 1% significance level. The direction of the impact of the control variables remains consistent with the results of the benchmark regression: the level of debt (Lev), return on assets (ROA) and Tobin's Q (TobinQ) all show a significant negative impact on SYN1, while the age at listing (ListAge) shows a significant positive impact. The results after changing the estimated model are consistent with the benchmark regression, which verifies the robustness of the model.

In summary, the robustness test methods by replacing the explanatory variables and changing the estimated model both yielded consistent conclusions with the benchmark regression, further illustrating the robustness of the effect of firms' digital transformation on reducing share price synchronisation under different parameter settings.

**Table 4.** Results of changing the estimation model

| | (1) |
|---|---|
| VARIABLES | SYN1 |
| dii | -0.187*** |
| | (-31.032) |
| Lev | -0.229*** |
| | (-5.486) |
| ROA | -0.669*** |
| | (-5.775) |
| Cashflow | -0.106 |
| | (-0.976) |
| TobinQ | -0.094*** |
| | (-15.065) |
| ListAge | 0.110*** |
| | (10.910) |
| Board | 0.030 |
| | (0.837) |
| Constant | -1.079*** |
| | (-10.436) |
| Observations | 8,180 |
| R-squared | 0.372 |
| F test | 0 |

Note: T-statistics in parentheses, ***, **, ** indicate 1%, 5% and 10% significance levels, respectively.

## 5. Mechanism testing and heterogeneity analysis

### 5.1. Mechanism testing

This study explores the mechanism of corporate digital transformation on stock price synchronicity from two aspects: corporate governance level and information disclosure, and analyses their mediating effects therein. Among them, Tables 6 and 7 show the regression results of including corporate governance level in the regression model as a mediating variable and information disclosure in the regression model as a mediating variable, respectively, while Tables 8 and 9 show the regression results of heterogeneity analysis based on industry characteristics and heterogeneity analysis based on technology attributes, respectively.

#### 5.1.1. Level of corporate governance

Firstly, model (1) verifies the negative relationship between digital transformation (dii) and share price synchronisation (SYN1) with a coefficient of -0.187 and significant at the 1% significance level, in line with the benchmark regression results. Model (2) uses corporate governance level (cgq) as an explanatory variable and finds that digital transformation has a positive and significant effect on corporate governance level with a coefficient of 0.016 and significant at 1% level of significance. This result suggests that digital transformation helps to improve the level of corporate governance and enhance corporate transparency and regulation. Finally, model (3) incorporates the level of corporate governance into the regression model as a mediating variable and finds that the level of corporate governance has a significant negative effect on stock price synchronisation with a coefficient of -0.034 and a significance level of 1%. Meanwhile, the coefficient of digital transformation is slightly reduced but still significantly negative, indicating that the level of corporate governance partially mediates the effect of digital transformation on share price synchronisation. Therefore, digital transformation reduces share price synchronisation by improving corporate governance level.

**Table 5.** Results of including corporate governance level as a mediating variable in the regression model

| | (1) | (2) | (3) |
|---|---|---|---|
| VARIABLES | SYN1 | cgq | SYN1 |
| dii | -0.187*** | 0.016*** | -0.186*** |
| | (-31.032) | (2.784) | (-30.943) |
| cgq | | | -0.034*** |
| | | | (-2.865) |
| Lev | -0.229*** | -0.368*** | -0.241*** |
| | (-5.486) | (-9.329) | (-5.754) |
| ROA | -0.669*** | 0.275** | -0.660*** |
| | (-5.775) | (2.505) | (-5.696) |
| Cashflow | -0.106 | -0.356*** | -0.118 |
| | (-0.976) | (-3.467) | (-1.086) |
| TobinQ | -0.094*** | -0.026*** | -0.094*** |
| | (-15.065) | (-4.458) | (-15.195) |
| ListAge | 0.110*** | -0.414*** | 0.096*** |
| | (10.910) | (-43.434) | (8.592) |
| Board | 0.030 | -0.087** | 0.027 |
| | (0.837) | (-2.538) | (0.756) |
| Constant | -0.538*** | 1.348*** | -0.493*** |
| | (-6.814) | (18.023) | (-6.124) |
| Observations | 8,180 | 8,180 | 8,180 |
| R-squared | 0.372 | 0.302 | 0.372 |
| Year FE | YES | YES | YES |
| Province FE | YES | YES | YES |
| F test | 0 | 0 | 0 |

Note: T-statistics in parentheses, ***, **, ** indicate 1%, 5% and 10% significance levels, respectively.

### 5.1.2. Disclosure of information

Model (1) also shows a negative relationship between digital transformation and stock price synchronisation with a coefficient of -0.187 and significant at 1% significance level. Model (2) with disclosure quality (idq) as an explanatory variable shows that digital transformation has a significant positive effect on disclosure quality with a coefficient of 0.039 and significant at 1% significance level. This finding suggests that digital transformation improves the quality of firms' disclosure and ensures more comprehensive, timely and transparent information dissemination. Model (3) incorporates disclosure quality as a mediating variable in the regression model and finds that disclosure quality has a significant negative impact on stock price synchronisation with a coefficient of -0.106 and significant at 1% significance level. Meanwhile, the negative coefficient of digital transformation is slightly reduced but still significantly negative, indicating that disclosure quality partially mediates the effect of digital transformation on share price synchronisation. That is, digital transformation reduces share price synchronisation by improving disclosure quality.

The mechanism effect analysis above reveals that both the level of corporate governance and the quality of information disclosure play an important mediating role in the impact of firms' digital transformation on share price synchronisation. Digital transformation can improve the level of corporate governance and the quality of information disclosure, thus reducing stock price synchronicity. This suggests that firms can promote digital transformation to optimise corporate governance and disclosure mechanisms, enhance information transparency and mitigate share price synchronicity with the market.

**Table 6.** Results of including disclosure as a mediating variable in the regression model

| | (1) | (2) | (3) |
|---|---|---|---|
| VARIABLES | SYN1 | idq | SYN1 |
| dii | -0.187*** | 0.039*** | -0.182*** |
| | (-31.032) | (6.900) | (-30.409) |
| idq | | | -0.106*** |
| | | | (-8.966) |
| Lev | -0.229*** | 0.024 | -0.226*** |
| | (-5.486) | (0.608) | (-5.452) |
| ROA | -0.669*** | 3.241*** | -0.326*** |
| | (-5.775) | (29.916) | (-2.687) |
| Cashflow | -0.106 | 0.215** | -0.083 |
| | (-0.976) | (2.121) | (-0.770) |
| TobinQ | -0.094*** | 0.006 | -0.093*** |
| | (-15.065) | (1.106) | (-15.027) |
| ListAge | 0.110*** | -0.049*** | 0.105*** |
| | (10.910) | (-5.219) | (10.427) |
| Board | 0.030 | 0.127*** | 0.044 |
| | (0.837) | (3.770) | (1.214) |
| Constant | -0.538*** | 2.628*** | -0.260*** |
| | (-6.814) | (35.583) | (-3.080) |
| Observations | 8,180 | 8,180 | 8,180 |
| R-squared | 0.372 | 0.179 | 0.378 |
| Year FE | YES | YES | YES |
| Province FE | YES | YES | YES |
| F test | 0 | 0 | 0 |

Note: T-statistics in parentheses, ***, **, ** indicate 1%, 5% and 10% significance levels, respectively.

## 5.2. Heterogeneity analysis

In order to further analyse the possible variability of the impact of firms' digital transformation on share price synchronicity across samples with different characteristics, this paper carries out a heterogeneity analysis by grouping the samples according to industry characteristics and technological attributes.

### 5.2.1. Industry characteristics: manufacturing and non-manufacturing industries

Firstly, Referring to Zhu Kang, Tang Yong (2023), the sample is divided into two groups of manufacturing and non-manufacturing for regression analyses based on the industry characteristics of the firms with reference. Based on the regression results of manufacturing and non-manufacturing industries (Tables (1) and (2)), it can be seen that there is a significant difference in the effect of firms' digital transformation (dii) on stock price synchronisation across industries. For manufacturing firms, the coefficient of digital transformation is -0.211 and is significant at the 1% significance level (t-value of -31.309). This indicates that digital transformation of manufacturing firms significantly reduces share price synchronisation, suggesting that digital transformation helps to improve information transparency and hence reduce share price synchronisation in manufacturing firms.

In contrast, the coefficient of digital transformation for non-manufacturing firms is -0.117, which is also significant at the 1% significance level (t-value of -9.269). Although the effect of digital transformation on share price synchronisation for non-manufacturing firms is also negative, its absolute value is smaller than that of the manufacturing sector. This may be due to the fact that the effect of digital transformation is slightly less effective in reducing share price synchronisation in non-manufacturing firms due to their relatively diverse business models and operating environments.

**Table 7.** Results of heterogeneity analysis based on industry characteristics

| | (1) | (2) |
|---|---|---|
| VARIABLES | Manufacturing | Non-Manufacturing |
| dii | -0.211*** | -0.117*** |
| | (-31.309) | (-9.269) |
| Lev | -0.232*** | -0.232*** |
| | (-4.695) | (-3.024) |
| ROA | -0.599*** | -0.714*** |
| | (-4.135) | (-3.633) |
| Cashflow | -0.005 | -0.320* |
| | (-0.037) | (-1.734) |
| TobinQ | -0.094*** | -0.090*** |
| | (-12.738) | (-7.813) |
| ListAge | 0.093*** | 0.136*** |
| | (7.817) | (7.210) |
| Board | 0.007 | 0.038 |
| | (0.169) | (0.552) |
| Constant | -0.403*** | -0.800*** |
| | (-4.370) | (-5.368) |
| Observations | 5,647 | 2,533 |
| R-squared | 0.383 | 0.347 |
| Year FE | YES | YES |
| Industry FE | YES | YES |
| F test | 0 | 0 |
| Empirical p-value | 0.000*** | |

Note: T-statistics in parentheses, ***, **, ** indicate 1%, 5% and 10% significance levels, respectively.

Tests for differences between groups were obtained by Boolslrapping 1000 times to obtain the Empirical p-value (Empirical p-value), the same as in the table below.

### 5.2.2. Technology attributes: High-tech enterprises and non-high-tech enterprises

Secondly, referring to Wu Fei et al. (2021), the sample is divided into two groups of high-tech and non-high-tech firms for regression analysis based on the firms' technological attributes. As can be seen from the results in Table 2, digital transformation has the same significant negative relationship on stock price synchronisation in both groups. For the high-tech enterprise group, the coefficient of digital transformation is -0.226, which is significant at 1% significance level. For the non-high-tech firms group, the coefficient of digital transformation is -0.123, which is significant at the 1% significance level. The difference in the coefficients of the two groups shows that digital transformation has a stronger inhibitory effect on the stock price synchronisation of high-tech firms. This may be due to the fact that high-tech enterprises are more likely to apply emerging technologies to improve the efficiency and transparency of information disclosure in the process of digital transformation, which enables investors to more accurately assess the value of the enterprise and thus reduces the stock price synchronicity.

**Table 8.** Results of heterogeneity analysis based on S&T attributes

| | (1) | (2) |
|---|---|---|
| VARIABLES | HighTech_1=1 | HighTech_1=0 |
| dii | -0.226*** | -0.123*** |
| | (-33.304) | (-10.613) |
| Lev | -0.141*** | -0.348*** |
| | (-2.889) | (-4.909) |
| ROA | -0.684*** | -0.742*** |
| | (-5.213) | (-3.575) |
| Cashflow | -0.249* | 0.092 |
| | (-1.863) | (0.533) |
| TobinQ | -0.071*** | -0.135*** |
| | (-10.173) | (-11.893) |
| ListAge | 0.066*** | 0.169*** |
| | (5.493) | (10.021) |
| Board | 0.005 | 0.033 |
| | (0.115) | (0.516) |
| Constant | -0.308*** | -0.761*** |
| | (-3.411) | (-5.482) |
| Observations | 4,842 | 3,338 |
| R-squared | 0.447 | 0.333 |
| Year FE | YES | YES |
| Province FE | YES | YES |
| F test | 0 | 0 |
| Empirical p-value | 0.000*** | |

Note: T-statistics in parentheses, ***, **, ** indicate 1%, 5% and 10% significance levels, respectively.

## 6. Conclusions and insights

In order to investigate the impact of corporate digital transformation on stock price synchronisation, this paper conducts an empirical analysis using the data of Chinese A-share listed companies from 2010 to 2021 as a sample. It is found that digital transformation significantly reduces firms' share price synchronisation, which verifies hypothesis H1. this suggests that digital transformation reduces information asymmetry by improving firms' disclosure quality and corporate governance level, which in turn reduces share price synchronisation. This paper finds through mechanism testing that digital transformation plays an important mediating role in reducing share price synchronisation by improving corporate governance level and information disclosure quality. The application of digital technology not only improves the quality of disclosure of financial and non-financial information, but also enhances the transparency and efficiency of internal corporate governance and decision-making. This finding is validated in the heterogeneity analyses of manufacturing and non-manufacturing industries, and high-tech and non-high-tech enterprises. Specifically, the impact of digital transformation is more significant in the manufacturing sector, which may be due to the fact that manufacturing firms rely more on accurate disclosure and efficient governance mechanisms to optimise production and operational processes. Meanwhile, high-tech firms reduce share price synchronisation more significantly in the digital transformation process due to their higher level of technology application.

The findings of this study have important implications for business managers, investors and policy makers.

Firstly, for corporate managers, promoting digital transformation is an important way to enhance the quality of corporate governance and information disclosure. Enterprises should increase their investment in digital technology, optimise the construction of information systems and enhance their data management capabilities in order to improve the transparency of their operations and management efficiency, thereby reducing share price synchronicity and enhancing the market's trust

in and recognition of the enterprise. Second, for investors, focusing on the degree of digital transformation of an enterprise can serve as an important indicator for assessing the future development potential and investment value of an enterprise. Enterprises with a higher degree of digital transformation tend to have more transparent information disclosure, better governance structure and lower share price synchronisation, so that investors can more accurately judge the true value of the enterprise and make more rational investment decisions. Finally, for policymakers, the government should continue to support and guide enterprises in their digital transformation, and promote the widespread application of digital technologies in enterprises by formulating relevant policies and measures. In particular, more policy concessions and financial support should be provided to manufacturing and high-tech enterprises to encourage them to accelerate the digital transformation process, so as to enhance the transparency and efficiency of the overall market and promote the healthy development of the capital market.

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