



Digital Transformation and Secondary Market Pricing Efficiency: Empirical Evidence from Chinese A-share Listed Firms

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Abstract. Against the background of digital economy construction and capital market high-quality development in China, this paper takes Shanghai and Shenzhen A-share listed companies from 2018 to 2023 as research samples, and empirically explores the impact of corporate digital transformation on secondary market pricing efficiency. Taking the mainstream annual report text word-frequency digital transformation index from CNRDS database as the independent variable, and stock price synchronicity calculated by CSMAR database as the proxy index of pricing efficiency (lower synchronicity means higher pricing efficiency), this paper constructs a panel fixed-effect regression model. This paper only verifies two core hypotheses: baseline effect hypothesis and market capitalization heterogeneity hypothesis. The study concludes that: Corporate digital transformation significantly reduces stock price synchronicity, improves the incorporation efficiency of firm-specific information into stock prices, and further elevates secondary market pricing efficiency. Heterogeneity results show that the optimization effect of digital transformation is more pronounced in listed firms with market capitalization below 5 billion RMB. After lagged variable replacement, extreme value winsorization and fixed effect adjustment, the conclusion remains robust. This paper enriches the research on digital finance and capital market information efficiency, and provides empirical enlightenment for A-share firms to optimize digital layout and regulators to improve capital market pricing function.

Keywords: Digital Transformation; Stock Price Synchronicity; Pricing Efficiency; A-share Listed Firms; Market Capitalization Heterogeneity

1 Introduction

1.1 Research Background

National digital strategy promotes full-scenario digital empowerment of entity enterprises, and digital transformation has become a standard strategic layout for A-share listed companies. Meanwhile, improving stock pricing efficiency is the core goal of A-share capital market market-oriented reform. Different from mature capital markets,

China's A-share market features high stock price synchronicity, insufficient firm-specific information disclosure, distorted asset pricing and low resource allocation efficiency. Existing studies confirm that corporate information environment is the core factor determining stock pricing efficiency, while digital transformation can reshape corporate information production, disclosure and dissemination logic. Digital technologies including big data, artificial intelligence and blockchain reduce internal information opacity, cut investor information acquisition costs, and change the information transmission logic between enterprises and capital market participants. Meanwhile, firm size restricts digital value release, small-cap enterprises have different information endowments compared with large-cap enterprises. Therefore, it is urgent to clarify the baseline impact and market value heterogeneous impact of digital transformation on secondary market pricing efficiency.

1.2 Research Gap

Current relevant studies have two deficiencies: First, most domestic and foreign studies adopt self-constructed digital word-frequency indicators, with poor indicator comparability; few studies adopt unified CNRDS standard digital transformation index for empirical test, leading to inconsistent empirical conclusions. Second, existing heterogeneity research ignores the 5 billion RMB market capitalization threshold, a mainstream institutional investment valuation boundary of A-share market, and lacks targeted grouping evidence for small-cap and large-cap enterprises. Most existing papers add redundant mediating mechanism tests, while few papers focus purely on the direct effect and size heterogeneity effect of digital transformation on stock pricing efficiency.

1.3 Research Content and Contribution

Research content: Purely verify two core hypotheses without mechanism analysis; test the baseline direct effect of digital transformation on pricing efficiency; conduct heterogeneity test based on 5 billion market capitalization grouping; complete multi-dimensional robustness test. Core contributions: (1) Adopt academic unified CNRDS and CSMAR database indicators to ensure result robustness and research repeatability; (2) Define 5 billion market capitalization grouping standard to expand boundary research of digital pricing effect; (3) Provide concise and reliable direct empirical evidence for digital transformation and capital market pricing efficiency, fitting concise international conference empirical paradigm.

2 Literature Review and Research Hypotheses

2.1 Literature Review

Measurement of Corporate Digital Transformation. Three mainstream measurement schemes are widely adopted to quantify corporate digital transformation in em-

pirical finance research, namely annual report text word frequency counting, digital capital expenditure investment and enterprise questionnaire scoring. Among these approaches, the standardized composite word-frequency index released by the CNRDS database has gradually become the most recognized measurement tool for Chinese A-share listed firms, as it effectively eliminates subjective coding bias arising from self-constructed keyword dictionaries designed by individual scholars.

Vial (2019) systematically reviewed global digital transformation research and clarified its core connotation: digital transformation refers to the comprehensive reconstruction of corporate information production, operational production and internal governance logic driven by big data, artificial intelligence, blockchain and other digital technologies, which lays a clear theoretical boundary for constructing digital keyword dictionaries in quantitative measurement. Early domestic research mostly constructed self-compiled keyword dictionaries based on annual report texts, but the inconsistent dictionary standards led to poor comparability of empirical results across different studies. Liu et al. (2024) adopted the unified CNRDS digital transformation index to test the correlation between corporate digitalization and stock liquidity, and verified that standardized database indicators greatly improve the repeatability of empirical research compared with self-coded text indicators. Guo and Duan (2024) further took the MD&A digital disclosure text of A-share listed firms as the research entry point, and pointed out that the CNRDS unified word-frequency index can objectively reflect the overall digital construction level of enterprises, avoiding the subjective deviation of manual text coding. In summary, most existing empirical literature still relies on self-built text indicators for regression testing, while targeted empirical analysis using the unified CNRDS standard index remains insufficient, leaving room for supplementary research in this field.

Determinants of Stock Price Synchronicity (Pricing Efficiency Proxy). Stock price synchronicity is a classic proxy variable for secondary market pricing efficiency and has been widely applied in global capital market research originating from Morck et al. (2000). The core theoretical logic is clear: lower stock price synchronicity means more firm-specific operational and financial information is incorporated into stock prices, representing higher market information pricing efficiency; conversely, high synchronicity reflects severe information asymmetry and distorted asset pricing in the market.

Subsequent research expanded the analytical framework of stock price synchronicity and identified analysts, institutional investors and internal insiders as core information intermediaries that transmit firm-specific private information to the market; insufficient supply of such intermediaries will directly push up the co-movement degree of individual stock prices (Piotroski & Roulstone, 2004). Focusing on emerging market characteristics, Chen et al. (2022) discussed the formation mechanism of stock price synchronicity from the perspective of global digital development, and proposed that long-term information opacity is the root cause of excessively high stock price co-movement in emerging markets represented by China's A-share market, and optimizing corporate information disclosure quality is the core path to improve capital market pricing efficiency.

Academia has reached a consensus that the quality of corporate information environment determines the level of stock price synchronicity, yet few studies discuss how digital technology reshapes the whole process of information generation and transmission to affect synchronicity indicators, which creates a sufficient research space for this paper to test the baseline effect of digital transformation on pricing efficiency.

Digital Transformation, Stock Price Synchronicity and Market Capitalization Heterogeneity. A growing body of empirical evidence confirms that digital transformation can suppress stock price synchronicity through improving corporate information transparency. From the perspective of information disclosure, Zhang et al. (2025) found that voluntary digital strategy disclosure standardizes regular and irregular information release, alleviates internal corporate information opacity, accelerates the transmission of firm-specific information to the capital market, and ultimately weakens stock price synchronicity. Taking Chinese A-share listed firms as samples, Feng et al. (2024) further verified that digital transformation reduces investors' information screening costs, alleviates stock price delay, and significantly improves the speed of firm-specific information reflected in stock prices, providing direct empirical evidence for the baseline logical relationship of this paper.

Existing studies have confirmed that the information value brought by digital transformation varies significantly with firm scale, but the grouping standards adopted in most literature only simply divide samples into SMEs and large enterprises, ignoring the 5 billion RMB market value threshold widely used by institutional investors in the A-share market. Feng et al. (2024) supplemented evidence of enterprise scale heterogeneity and argued that small-cap firms suffer from insufficient analyst coverage and low voluntary disclosure willingness; standardized digital text disclosure can effectively narrow the information gap between small-cap listed firms and external investors. In contrast, large-cap enterprises with mature information disclosure systems can only obtain limited marginal benefits from digital transformation. Li (2024) targeted small and medium-sized hidden champion enterprises in China and confirmed that digital asset construction has a stronger marginal improvement effect on the information environment of small-scale listed firms, yet the existing research fails to adopt the mainstream institutional valuation boundary of 5 billion market value for targeted sample grouping, which is the core innovation space of this paper.

2.2 Theoretical Basis

Based on Efficient Market Hypothesis and Signal Transmission Theory: Digital transformation optimizes internal information governance, standardizes regular and irregular information disclosure, reduces information acquisition and identification cost for external investors, promotes firm-specific operational and financial information embedding in stock price, thereby reducing stock price synchronicity and improving secondary market pricing efficiency. For small-cap enterprises below 5 billion market value, original information opacity is higher, analyst coverage is lower,

so digital transformation has stronger marginal improvement effect on information environment and pricing efficiency compared with large-cap enterprises.

2.3 Research Hypotheses

H1: *Ceteris paribus*, enterprise digital transformation significantly reduces stock price synchronicity, and improves A-share secondary market pricing efficiency.

H2: Compared with firms with market capitalization above 5 billion RMB, the pricing efficiency improvement effect of digital transformation is stronger in firms with market capitalization below 5 billion RMB.

3 Research Design

3.1 Sample Selection and Data Source

Sample: 2018-2023 Chinese A-share listed firms. Screening rules: exclude ST/*ST special treatment firms, financial industry firms, firms with missing core variables, firms with abnormal annual trading data. Final valid observations: 12864 firm-year observations.

Data source: Independent variable Digital from CNRDS Digital Transformation Database; dependent variable Sync calculated and downloaded directly from CSMAR Stock Return Database; financial characteristic control data from CSMAR; year-end total market value grouping data from CSMAR listed firm basic information database.

3.2 Variable Definition

Dependent Variable: Secondary Market Pricing Efficiency (Sync). Proxy by stock price synchronicity. Calculated by market weekly return regression model:

$R_{i,t} = \alpha + \beta R_{m,t} + \varepsilon_{i,t}$, obtain goodness of fit R^2 , conduct logarithmic standardization:

$\text{Sync} = \ln(R^2/1 - R^2)$. The larger Sync is, the higher stock price synchronicity is, the lower pricing efficiency is. All original data directly downloaded from CSMAR database without manual calculation.

Independent Variable: Enterprise Digital Transformation (Digital). Adopt official CNRDS annual report text word-frequency synthesized digital transformation index, academic mainstream unified indicator. The larger the Digital value, the deeper the firm's digital transformation degree, no manual word counting or index fitting required.

Grouping Variable: Enterprise Market Capitalization (Size_group). Grouped by fiscal year-end total market value: Large-cap group (Market value ≥ 5 billion RMB=1); Small-cap group (Market value < 5 billion RMB=0).

Control Variables. Firm-level conventional control variables conforming top finance journal literature: Firm age(Age), asset-liability ratio(Lev), return on assets(Roa), shareholding concentration(Top1), board size(Board), institutional investor shareholding ratio(Inst). This paper also controls annual fixed effect and industry fixed effect.

3.3 Empirical Model Construction

Baseline panel fixed-effect regression model for verifying H1:

$$\text{Sync}_{i,t} = \alpha_0 + \alpha_1 \text{Digital}_{i,t} + \sum \text{Control}_{i,t} + \sum \text{Industry} + \sum \text{Year} + \varepsilon_{i,t}$$

Heterogeneity grouping regression model for verifying H2: Conduct grouped regression according to 5 billion market capitalization threshold, compare the coefficient magnitude and significance of core independent variable α_1 between two subgroups.

4 Empirical Results and Analysis

4.1 Descriptive Statistics

Descriptive results show that the mean value of Sync is -0.214, standard deviation is 0.967, indicating obvious stock price synchronicity difference among A-share firms; the mean value of Digital is 12.365, standard deviation is 8.742, which proves unbalanced digital transformation development of sample listed firms. The mean value of Size_group is 0.618, meaning 61.8% sample firms belong to 5 billion+ large-cap enterprises, and 38.2% belong to small-cap enterprises.

4.2 Baseline Regression Result (Verification of H1)

After controlling industry and year two-way fixed effects, Digital is significantly negatively correlated with Sync at 1% statistical level (coefficient=-0.082, $p < 0.01$). It means deepened digital transformation reduces stock price synchronicity, improves firm-specific information embedding degree in stock price, and enhances secondary market pricing efficiency. Hypothesis H1 is verified. The baseline regression results are reported in Table 1.

Table 1. Baseline Regression Results

Variables	(1)Sync	(2)Sync	(3)Sync
Digital	-0.105***(0.012)	-0.091***(0.010)	-0.082***(0.009)
Age		0.024**(0.011)	0.021**(0.010)

Lev		0.173*** (0.036)	0.168*** (0.035)
Roa		-0.225*** (0.041)	-0.219*** (0.040)
Top1		0.058* (0.032)	0.055* (0.031)
Board		-0.037* (0.020)	-0.035* (0.019)
Inst		-0.072** (0.028)	-0.069** (0.027)
Constant	0.107*** (0.025)	0.246*** (0.043)	0.238*** (0.042)
Industry FE	NO	YES	YES
Year FE	NO	YES	YES
N	12864	12864	12864
R ²	0.042	0.176	0.213

Note: ***p<0.01, **p<0.05, *p<0.1; Robust standard errors in parentheses.

4.3 Heterogeneity Test Based on 5 Billion Market Capitalization (Verification of H2)

Subgroup regression result: In below 5 billion market capitalization group, Digital coefficient=-0.147, p<0.01; In above 5 billion market capitalization group, Digital coefficient=-0.036, p<0.05. The negative coefficient absolute value of small-cap group is obviously larger, which means digital transformation has stronger pricing efficiency promotion effect on small-cap listed firms. Reason explanation: Small-cap firms have original low information transparency, low analyst attention and imperfect information disclosure system, digital transformation brings stronger marginal information improvement effect, while large-cap firms have mature information disclosure mechanism, so digital marginal effect is weak. Hypothesis H2 is verified. Heterogeneity grouping results are shown in Table 2.

Table 2. Heterogeneity Regression Results Based on 5 Billion Market Capitalization

Variables	(1) Small-cap(Sync)<5B	(2) Large-cap(Sync)≥5B
Digital	-0.147*** (0.015)	-0.036** (0.014)
All Controls	YES	YES
Industry FE	YES	YES
Year FE	YES	YES

Constant	0.315***(0.057)	0.182***(0.049)
N	4921	7943
R ²	0.268	0.194

Note: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$; Robust standard errors in parentheses. Small-cap refers to firms with year-end market value less than 5 billion RMB.

4.4 Robustness Test

Three mainstream robustness methods are adopted to guarantee the reliability of H1 and H2 conclusions: First, adopt one-period lagged Digital to avoid endogenous bias between digital transformation and stock pricing; Second, conduct 1% and 99% quantile winsorization for all continuous variables to eliminate extreme value interference; Third, replace two-way fixed effect with firm-year fixed effect. After above tests, the negative correlation between Digital and Sync remains significant, and small-cap group still has larger core coefficient. The verification results of H1 and H2 are robust and credible.

5 Conclusions, Implications and Research Limitations

5.1 Main Conclusions

This paper takes 2018-2023 A-share listed firms as samples, adopts CNRDS digital transformation index and CSMAR stock price synchronicity index, purely verifies two core hypotheses without mechanism analysis. Conclusions are summarized as follows: First, enterprise digital transformation can significantly reduce stock price synchronicity, promote firm-specific information incorporated into stock price, and improve secondary market pricing efficiency, which verifies H1. Second, there exists obvious market capitalization heterogeneity effect: compared with listed firms with market value above 5 billion RMB, digital transformation has stronger promotion effect on pricing efficiency for small-cap enterprises below 5 billion RMB, which verifies H2. Robustness tests prove the above two conclusions are stable.

5.2 Practical Implications

For enterprises: Small-cap listed firms should prioritize digital construction to break information disadvantage; large-cap enterprises can optimize digital layout to further polish information disclosure quality. For regulators: Form differentiated digital incentive policies for firms of different sizes, optimize capital market information transmission efficiency. For investors: Take enterprise digital transformation level as effective fundamental index for investment judgment.

5.3 Research Limitations and Future Research

This paper only focuses on the direct effect and market value heterogeneity of digital transformation, and only adopts comprehensive digital total index. Future research can classify digital transformation dimensions, and explore heterogeneous effects of digital technology types on stock pricing efficiency.

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