

Research on Digital Transformation and Corporate Financial Asset Allocation Strategy

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ABSTRACT

The new-generation information technology revolution is profoundly changing the economy and society, and promoting industrial innovation and leapfrogging. China actively promotes the synergistic development of industrial digitization and digital industrialization, which has significantly increased the scale of the digital economy. In this context, the digital transformation of enterprises has become a key issue, and the strategic choice of financial asset allocation, as an important factor affecting the operational performance, investment and financing decisions, and innovation activities of enterprises, has attracted much attention. This study constructs the framework of "financial asset allocation behavior-digital transformation", based on the data of A-share listed companies in Shanghai and Shenzhen from 2012 to 2019, and empirically analyzes it by using the fixed effect and threshold model, and finds that the relationship between the allocation of financial assets and the digital transformation is in an inverted U-shape: moderate allocation and digital transformation have an inverted U-shape relationship. It is found that the relationship between financial asset allocation and digital transformation is "inverted U-shaped": moderate allocation promotes transformation, while excessive inhibits it. Short-term financial assets play the role of "reservoir" and support the transformation, while long-term financial assets may produce crowding-out effect. Financing constraints and financial return thresholds also have differentiated impacts on the relationship. This study provides new perspectives and theoretical support for enterprises to optimize resource allocation and achieve sustainable development.

KEYWORDS

Digital transformation; Financial asset allocation; Financing constraints, Financial return thresholds

1. INTRODUCTION

With the deepening of the new generation of information technology revolution, the economy and society are experiencing far-reaching digitalization changes, providing unprecedented opportunities for industrial innovation and leapfrogging [1]. Through the implementation of the digital economy development strategy and the 14th Five-Year Plan, China has actively promoted the synergistic development of industrial digitization and digital industrialization, which has led to a 3.8-fold expansion of the digital economy from RMB 11.2 trillion yuan to RMB 53.9 trillion yuan between 2012 and 2023 (see Figure 1).

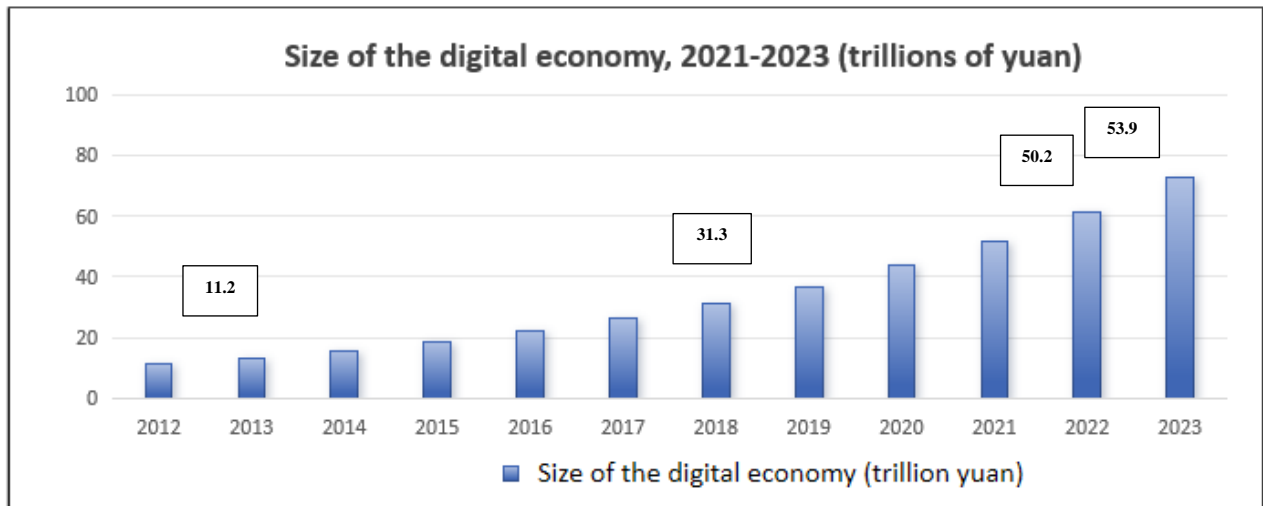


Figure 1. Size of the digital economy, 2021-2023 (trillions of yuan)

(Data source: <http://www.caict.ac.cn/kxyj/qwfb/bps/202408/P020240830315324580655.pdf>)

In this context, the "14th Five-Year Plan for the Development of the Digital Economy" emphasizes the importance of digital transformation and upgrading of enterprises, and promotes intelligent and collaborative new production methods [2]. As a key element of modern economy, the allocation behavior of financial resources significantly affects the business performance, investment and financing decisions and innovation activities of enterprises. Especially when the real return rate is low, enterprises tend to increase the proportion of financial assets to seek high returns and alleviate capital pressure. The allocation of financial assets of enterprises in digital transformation shows complexity: moderate investment can promote technological innovation and industrial upgrading, while excessive financialization may inhibit real investment and innovation vitality. This study aims to explore the influence mechanism of digital transformation on the financial asset allocation strategy of enterprises, analyze its role in innovation investment, and put forward the "inverted U-shape" association hypothesis by constructing the research framework of "Financial Asset Allocation Behavior-Digital Transformation" and the "inverted U-shape" association hypothesis from the perspective of the "inverted U-shaped" association hypothesis. By constructing a research framework of "financial asset allocation behavior-digital transformation", proposing the "inverted U-shaped" correlation hypothesis, and expanding from the perspectives of financial asset maturity structure and heterogeneity, this study provides new perspectives and theoretical support for enterprises to optimize resource allocation and achieve sustainable development.

2. IMPACT MECHANISM AND RESEARCH HYPOTHESIS

2.1. Analysis of Impact Mechanism

Enterprise digital transformation is a dynamic, long-term change process, which requires scientific and reasonable allocation of resources and the provision of continuous financial investment. Financial asset allocation plays an important role in this process, and its "reservoir" and "investment alternative" motives have a complex impact on digital transformation. Financial assets can relieve capital pressure and provide stable support for digital transformation due to their advantages in return period, liquidity and adjustment cost [3]. If the rate of return of financial investment is higher than that of real investment, enterprises may invest more funds in the financial sector, crowding out the space for real investment and R&D innovation and inhibiting the transformation process. The maturity structure of financial assets also has an impact on the transformation process. Short-term assets provide flexible capital reserves, but may interfere with project promotion due to speculative arbitrage; long-term assets are weak in liquidity, which makes it difficult to support digitization projects in a timely manner

and may crowd out physical investment. Financing constraints and financial return thresholds also affect the relationship, with financing constraints prompting firms to accumulate endogenous funds to avoid the risks of digital upgrading, while higher financial returns may reinforce the "investment substitution" motive and create a crowding-out effect.

2.2. Research Hypotheses

Based on the in-depth impact mechanism analysis of the complex relationship between enterprise financial asset allocation strategy and digital transformation, this paper puts forward the following research hypotheses. Financial assets have different effects on enterprise digital transformation in the process of allocation due to their dual motives of "reservoir" and "investment alternative" [4]. Moderate allocation of financial assets can ease the pressure of enterprise funds, providing the necessary support for the digital transformation, while excessive allocation may crowd the entity investment and R & D innovation resources, inhibiting the transformation process, therefore, the hypothesis H1: the level of allocation of financial assets on the digital transformation of the "inverted U-shaped" relationship. The term structure of financial assets has a significant impact on the transformation, short-term assets due to its liquidity and flexibility to help cope with the risk of uncertainty in the transformation, but may also be due to speculation and arbitrage to interfere with the project; long-term assets due to the high cost of adjustment, liquidity is weak, and may crowd out the entity's investment resources, which is detrimental to the depth of the transformation, so it is hypothesized that H2a: the moderate allocation of short-term financial assets to promote the transformation, H2b: the excessive allocation of short-term financial assets to inhibit the transformation, H2b: the excessive allocation of short-term financial assets to inhibit the transformation, H2b: the excessive allocation of short-term financial assets to inhibit the transformation. financial assets over-allocation inhibits transformation, H2c: long-term financial assets inhibit transformation. Financing constraints and the level of financial returns are also important factors affecting the relationship between the two, financing constraints prompt enterprises to rely on endogenous funds to promote the transformation, while financial returns to enhance the "investment substitution" motivation may be strengthened, resulting in a crowding-out effect on the digital transformation, which further enriches the complexity of the relationship between the allocation of enterprise financial assets and digital transformation.

3. RESEARCH DESIGN

3.1. Data Source and Variable Definition

This study is based on the data of A-share listed companies in Shanghai and Shenzhen during the period from 2012 to 2019, in which the financial data are derived from CSMAR database, and the digital transformation information is obtained by parsing the textual content of the annual reports of enterprises. The sample screening process is rigorous, excluding the financial and real estate industries, ST, *ST and terminated enterprises, and dealing with missing values and outliers, and finally obtaining a valid sample of 1982 enterprises with 15,856 observations. As for the definition of variables, we use word frequency statistics and quantification to deal with the textual content involving "digital transformation" in the annual reports of enterprises, focusing on the three dimensions of "ABCD" core technology, production and organization process and business scene innovation, and constructing the digital transformation index ("digital"). digital). The level of financial asset allocation (fin) is measured by the proportion of financial assets to total assets, and subdivided into short-term (sfin) and long-term financial assets (lfin). Control variables include firm size (size), leverage (cl), capital density (cd), return on assets (roa), equity concentration (first) and percentage of independent directors (indir), which are designed to exclude other potential influences. Financing constraints (sa) and financial returns (fi) are introduced as threshold variables, which are measured by the sa index and the share of financial channel profits to total profits, respectively, in

order to analyze in-depth the differential impact of financial asset allocation on digital transformation under different conditions.

3.2. Model Construction and Research Methodology

This study aims to comprehensively explore the impact of corporate financial asset allocation on digital transformation, for which a benchmark regression model is constructed: $digital_{i,t} = \alpha + \beta_1 fin_{i,t} + \beta_2 fin2_{i,t} + \sum_i \gamma_i control_{i,t} + \sigma_i + \tau_i + \varepsilon_{i,t}$. The model takes the degree of digital transformation of enterprises ($digital_{i,t}$) as the dependent variable, which is quantified by the frequency of digitized keywords in the annual reports of enterprises using text analysis; takes the level of financial asset allocation ($fin_{i,t}$) and its squared term ($fin2_{i,t}$) as the independent variables, reflecting the direct effect of financial asset allocation and the potential "inverted U-shape" relationship respectively; and The model also incorporates ($control_{i,t}$) variables such as firm size, leverage, capital intensity, return on assets, equity concentration, and the proportion of independent directors to comprehensively consider firm characteristics. The same model also introduces individual fixed effects (σ_i) and time fixed effects (τ_i) to control for unobservable firm heterogeneity and macro factors. To further analyze the stage-specific characteristics of the impact of financial asset allocation on digital transformation, this study constructs a threshold model with financing constraints (sa) and financial returns (fi) as the threshold variables, divides the sample into three intervals by setting different thresholds D1 and D2, and adopts different slope values α_1 , α_2 , and α_2 to capture the digital transformation impact of financial asset allocation at different levels of differentiated impacts. This study expects to reveal the stage characteristics and internal mechanism of the impact of corporate financial asset allocation on digital transformation through the threshold model, which provides empirical support for optimizing the financial asset allocation strategy and promoting digital transformation.

Table 1. Variable definitions and measures

Variable type	Variable name	Notation	Specific meaning
Explanatory variable	Digital transformation	digital	Syllabus processing word frequency
explanatory variable	Level of financial asset allocation	fin	(Short-term financial assets + Long-term financial assets)/Total assets
	Enterprise size	size	The total assets of the enterprise are taken as the natural logarithm
	Leverage	cl	Total liabilities/total assets
	Capital intensity	cd	Net fixed assets/total assets
Control variable	Return on assets	roa	Net profit/total assets
	Shareholding concentration	first	Shareholding of top 1% shareholders
	Percentage of independent directors	indir	Number of independent directors/number of directors
Threshold variables	Financing constraints	sa	Absolute value of sa index
	Financial gains	fi	(Gain on change in fair value + investment income + foreign exchange gain + other comprehensive income)/total profit

4. EMPIRICAL RESULTS AND ANALYSIS

4.1. Descriptive Statistics

The results of descriptive statistics show that the mean value of the degree of enterprise digital transformation (digital) is 0.023, and the minimum and maximum values are 0 and 0.293 respectively, which reveals the significant differences in the process of digital transformation of different enterprises and the relatively low level of the overall transformation, and highlights the necessity and urgency of deepening the integration of digital technology and industrial structure. The mean value of the financial asset allocation level (fin) is 0.243, with a fluctuation range of 0.032 to 0.752, which reflects the diversity and differences in enterprises' financial asset allocation strategies (see Table 2). The statistical properties of the control variables are consistent with the established literature, providing robust data support for subsequent in-depth analysis.

Table 2. Variable statistics

Variant	Brochure	Average value	Standard deviation	Minimum value	Maximum value
digital	15856	0.023	0.047	0.000	0.293
fin	15856	0.243	0.154	0.032	0.752
fin2	15853	0.083	0.106	0.001	0.568
size	15856	22.30	1.303	14.930	28.640
cl	15856	0.425	0.204	0.008	0.994
cd	15856	0.233	0.167	0.000	0.954
first	15856	0.341	0.150	0.003	0.900
roa	15856	0.033	0.071	-0.902	0.580
indir	15856	0.379	0.065	0.181	0.800

Table 3. Benchmark regression

	-1	-2	-3	-4
	digital	digital	digital	digital
fin	-0.014*** (0.002)	0.047*** (0.007)	0.049*** (0.006)	0.037*** (0.006)
fin2		-0.103*** (0.009)	-0.084*** (0.009)	-0.072*** (0.009)
size	0.013*** (0.000)		0.016*** (0.000)	0.014*** (0.001)
cl	0.001 (0.002)		-0.012*** (0.002)	0.002 (0.002)
cd	-0.013*** (0.003)		-0.024*** (0.003)	0.003 (0.003)
first	-0.032*** (0.004)		-0.066*** (0.003)	-0.034*** (0.004)
roa	-0.013*** (0.003)		-0.027*** (0.003)	-0.013*** (0.003)
indir	0.007* (0.004)		0.007 (0.004)	0.002 (0.004)
cons	-0.262*** (0.012)	0.021*** (0.001)	-0.306*** (0.008)	-0.287*** (0.011)
Individual effect	Containment			Containment
Time effect	Containment			Containment
N	15855	15855	15855	15855
R2	0.242			0.246

Note: ***, **, and * denote significant at 1%, 5%, and 10% statistical levels, respectively; standard errors are in parentheses; R2 is the within-group fit. Same as below.

4.2. Benchmark Regression Analysis

The fixed effects model regression results show (see Table 3) that there is a non-linear relationship between financial asset allocation and digital transformation. In the linear regression equation, the level of financial asset allocation (*fin*) is negatively correlated with the degree of digital transformation (*digital*) at the 1% significance level, suggesting that an increase in the size of financial investment generally inhibits digital transformation. By introducing the square term of *fin* (*fin*²) to explore the nonlinear association, the empirical results show that the coefficient of *fin* is 0.047 (1% significance), while the coefficient of *fin*² is -0.103 (1% significance), which is a quadratic function of the preliminary confirmation of the existence of an "inverted U-shape" relationship between the financial asset allocation and digital transformation. This quadratic property tentatively confirms the existence of an "inverted U-shaped" relationship between financial asset allocation and digital transformation. After further introducing control variables and controlling for individual and time effects, the coefficients of *fin* and *fin*² remain positive and negative respectively, which verifies the robustness of the "inverted U-shape" relationship. As for the control variables, firm size has a significant positive effect on digital transformation, indicating that the scale effect plays a supporting role in the transformation process; while the return on total assets is negatively significant with digital transformation, which may reflect that firms are more motivated to carry out transformation and upgrading in the case of bottlenecks in the development of their main business.

To enhance the credibility of the empirical results, this paper further implements the utest test (see Table 4). The test not only reconfirms the "inverted U-shaped" relationship between financial asset allocation (*fin*) and digital transformation (*digital*), but also accurately defines the extreme point of the relationship as 0.261, which passes the significance test at the 1% level and strengthens the statistical validity of the findings. Specifically, when the allocation of financial assets is below the threshold of 26.1%, financial assets can effectively promote the transformation and upgrading of digital devices; however, once the proportion of financial assets exceeds this threshold, its inhibitory effect on digital transformation gradually comes to the fore. This finding strongly supports the H1 hypothesis proposed in this paper.

Table 4. Utest test

	lower	upper
	Bound (floor)	Bound (Upper limit)
Interval	0.0303	0.763
Slope	0.034	-0.073
t-value $P > t $	5.748	-9.271
	4.88e-09	9.62e-21

4.3. Endogeneity Test

In the process of exploring the relationship between financial asset allocation and digital transformation, in order to cope with the possible endogeneity problem, this study adopts the instrumental variable method and the propensity score matching method for rigorous testing. For the instrumental variable method, lagged one period and lagged two periods of financial asset allocation are selected as instrumental variables, and IV-GMM method is applied for empirical analysis. The test results show that the p-value of Hansen J-statistic exceeds 0.05, indicating that there is no over-identification problem, and the instrumental variables all pass the weak instrumental variable test, confirming their validity. After effectively controlling for endogeneity, the coefficients of *fin* and *fin*² are positively and negatively significant, providing strong support for the "inverted U-shape" theoretical hypothesis. In order to avoid potential sample selection bias, the propensity score matching method is used, with all control variables as covariates, and the experimental and control groups are divided according to whether the level of financial asset allocation exceeds the extreme point, and the

calipers are set within 0.01. The regression results of the matched samples show that the coefficients of *fin* and *fin2* are positive and negative, respectively, after effectively controlling for endogeneity. The regression results of the matched samples show that the coefficients of the core explanatory variables are still significant, implying that the inverted U-shaped association pattern between the level of financial asset allocation and digital transformation remains after the sample selection bias is resolved (see Table 5).

Table 5. Endogeneity test results

	(1) digital	(2) digital
<i>fin</i>	0.099*** (0.013)	0.036*** (0.008)
<i>fin2</i>	-0.155*** (0.019)	-0.063*** (0.012)
<i>cons</i>	-0.057*** (0.009)	-0.452*** (0.013)
Control variable	Yes	Yes
HansenJ	5.221	
P-value	0.073	
N	11891	12057
R2	0.109	0.224

4.4. Robustness Tests and Exploration of Variability in the Term Structure of Financial Assets

To enhance the robustness of the findings, this paper takes several measures to deal with potential disturbances. Specifically, the original indicators are replaced with digital transformation indicators from the CSMAR digital economy database, aiming to reduce the effects of subjectivity and exogenous financial shocks. By controlling for lagged effects, the dynamic relationship between financial asset allocation and digital transformation in the lagged period is analyzed in depth. The regression analysis is re-run after excluding the sample data of the 2015 stock market crash event to exclude the interference of abnormal events. The robustness test results show that the coefficients of key variables *fin* and *fin2* maintain their original signs and significance, further confirming the stability and reliability of the "inverted U-shaped" relationship. Further exploring the impact of differences in the maturity structure of financial assets on digital transformation, the results show that there is a linear positive relationship between short-term financial assets and digital transformation, which is mainly due to the fact that short-term financial assets act as a "reservoir" to provide financial security for digital transformation, which verifies hypothesis H2a. The relationship between long-term financial assets and digital transformation still maintains an "inverted U-shaped" relationship, indicating that long-term financial investment above a certain level will have a crowding-out effect and hinder digital transformation, which verifies hypothesis H2c (see Table 6).

Table 6. Regression results for financial asset maturity differences

	(1) digital	(2) digital	(3) digital
<i>sfin</i>	0.040** (0.017)	0.026*** (0.008)	
<i>sfin2</i>	-0.051 (0.056)		
<i>lfin</i>			0.042*** (0.007)
<i>lfin2</i>			-0.046*** (0.014)
<i>cons</i>	-0.277*** (0.012)	-0.277*** (0.012)	-0.287*** (0.012)
Control variable	Yes	Yes	Yes
Individual effect	Containment	Containment	Containment
Time effect	Containment	Containment	Containment
N	15856	15856	15856
R2	0.240	0.240	0.242

5. CONCLUSIONS AND RECOMMENDATIONS

The empirical analysis of this study reveals that there is an "inverted U-shaped" relationship between the level of enterprise financial asset allocation and digital transformation. Adequate allocation of financial assets promotes digital transformation, provides stable financial support, and promotes intelligent and collaborative production; while over-allocation crowds out physical investment and R&D funds and inhibits the transformation process. Short-term financial assets are mainly used as a "reservoir" to provide flexible funds for digital transformation, while long-term financial assets may inhibit transformation due to their weak liquidity [5]. This study enriches the theory of financial asset allocation and digital transformation, and provides empirical support for enterprise strategy optimization. It is suggested that enterprises should allocate financial assets moderately according to the needs of their main business, especially non-state-owned enterprises and high-tech enterprises need to be alert to the risk of over-financialization. The government should balance financial development and regulation, alleviate corporate financing constraints through measures such as tax cuts and fee reductions and the development of science and innovation funds, and at the same time create a digital ecosystem, build a new type of infrastructure, promote the integration of industry, academia, and research, and comprehensively support the digital transformation of enterprises. Future research could be expanded to include unlisted companies and small and medium-sized enterprises, as well as an in-depth exploration of the specific application of new technologies in digital transformation and their impact on financial asset allocation strategies.

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