

# *Impact of Enterprise Digital Transformation on Enterprise Investment Structure*

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**Abstract:** As the flow of financial capital continues to expand, China's domestic non-financial enterprises have shifted virtual to real to a certain extent and have deepened the degree of digital transformation. In October 2022, China put forward a strategic plan to accelerate the construction of "Digital China", and promote enterprise restructuring through improving digital transformation. This paper explores the impact of enterprise digital transformation on the investment structure of Chinese A-share-listed non-financial enterprises in Shanghai and Shenzhen, taking the A-share-listed non-financial enterprises in Shanghai and Shenzhen from 2011 to 2021 as the research sample. The empirical analysis finds that enterprise digital transformation improves the investment structure of enterprises and promotes enterprises to "shift from virtual to real". Based on this analysis, a heterogeneity analysis is conducted, and it is found that under different internal environments, such as the nature of different shareholdings, the influence of enterprise digital transformation on enterprise investment structure is different.

**Keywords:** Digital transformation, Enterprise investment structure, Nature of shareholding

## 1. Introduction

With the passage into the digital age, Under the influence of 5G, Internet of Things(IoT), cloud computing and other digital technologies, digital technology has gradually become the dominant way of technology [1]. In October 2022, China put forward a strategic plan to accelerate the construction of "Digital China", and "digital transformation" has become an important factor driving the rapid and high-quality development of enterprises. Under the leadership of national policies, many industries have introduced policies related to digital transformation [2].

In recent years, the tendency of financialization of firms and its negative impact have received much attention. The wide gap between the real investment rate and the financial investment rate is an important incentive for non-financial enterprises to increase their holdings of financial assets and reduce their real investment [3]. At the macro level, the excessive inflow of funds into the virtual economy to the real economy is not enough, resulting in the price of assets and their intrinsic value are not matching, and the problem of polarization between the rich and the poor aggravated [4]; At the micro level, excessive financialization will reduce the service function of the real economy, inhibit enterprise innovation, and even damage the main business of enterprises. At present, China is in an important period of structural transformation, excessive financialization and financial investment inhibit the development of the real economy, which is not conducive to the smooth progress of the

transformation. Therefore, it is particularly important to explore the factors affecting the investment structure of enterprises and promote the transformation of enterprises from "virtual" to "real".

Digital transformation, as a high-level innovation transformation, develops new digital technology and support capabilities, covers a wide range of information channels, provides massive information for enterprise development and innovation, improves the problem of enterprise information asymmetry, reduces production costs, optimizes the production structure, and improves new ideas for enterprises to achieve high-quality development.

This paper investigates whether and how digital transformation affects the investment structure of enterprises, and explores its influence mechanism. This paper selects the panel data of China's A-share listed non-financial enterprises in Shanghai and Shenzhen during 2011-2021, uses EXCEL to organize the data, investigates the connection between digital transformation and enterprise investment structure through empirical analysis, and investigates the influence of digital transformation on enterprise investment structure under different equity nature through heterogeneity analysis.

The possible contribution of this paper is to explore the impact mechanism of digital transformation on enterprise investment structure from specific data, combined with the internal environment of enterprises, and to provide possible methods and perspectives to improve enterprise investment structure.

## 2. Theoretical Analysis and Research Hypothesis

By offering a variety of information channels and implementing new management techniques, improving the ability of enterprises to innovate and reducing the degree of asymmetric information, digital transformation can improve the limitations of enterprises in the real economy, such as time and space, which in turn reduces the cost of enterprises [5]; On the other hand, digital transformation makes it possible to ease the restrictions of enterprise financing, which in turn enables enterprises to innovate more effectively [6]. Therefore, digital transformation can affect the investment structure of enterprises in many ways. Therefore, this paper proposes the hypothesis:

H1: The digital transformation of enterprises can improve the investment structure of enterprises and promote their de-virtualization.

## 3. Methodology

### 3.1. Sample Selection and Data Sources

In this paper, Chinese A-share listed companies in Shanghai and Shenzhen are taken as the research objects, and 2011-2021 is selected as the research period to explore the impact of digital transformation on corporate investment structure. The initial sample is treated as follows: (1) financial companies are excluded (2) ST listed companies are excluded. The variables of digital transformation and enterprise investment structure in this paper are derived by manual collation, and the relevant financial data are obtained from CSMAR database.

### 3.2. Variable Definitions

#### 3.2.1. Explained Variable: Firms' Investment Structure (VTR)

The investment structure of an enterprise is defined as the degree of "de-virtualization" of the enterprise as determined by the real and financial investment rates. Compared with the previous year, if the enterprise's real investment rate increases while the financial investment rate decreases, this time the enterprise investment structure is defined as "shift virtual to real",  $VTR = \text{the absolute value}$

of the increase in the real investment rate + the absolute value of the decrease in the financial investment rate; if the enterprise's real investment rate decreases while the financial investment rate increases, this time the enterprise investment structure is defined as "shift real to virtual",  $VTR = -(\text{real investment rate} + \text{financial investment rate})$ . If the enterprise's real investment rate falls while the financial investment rate rises, then the enterprise's investment structure is defined as "de-realization to virtualization",  $VTR = -(\text{the absolute value of the decline in the real investment rate} + \text{the absolute value of the increase in the financial investment rate})$  [7]. There are positive and negative points of VTR, positive represents that the enterprise is out of virtual to real, and negative represents that the enterprise is out of real to virtual. The bigger the absolute value of VTR, represents that the enterprise is out of virtual to real (or out of real to virtual) to a greater extent.

In the above formula, entity investment rate = (net fixed assets + net construction in progress + engineering materials + net productive biological assets + net oil and gas assets + net intangible assets + development expenditure + long-term amortization expense)/total assets. Since the revised accounting standard for financial instruments has been implemented for listed companies in China since 2018, the formula for calculating the Financial Investment Rate(FIR) was adjusted according to the definition of financial assets: 2011-2017 FIR = (trading financial assets + derivative financial assets + other receivables + financial assets bought and sold back + non-current assets due within one year + loans and advances issued + other current assets + available-for Sale Financial Assets + Held-to-maturity Investments + Long-term Equity Investments + Investment Real Estate + Other Non-Current Assets)/Total Assets, 2018 Financial Investment Ratio = (Trading Financial Assets + Derivative Financial Assets + Other Receivables + Buyback Financial Assets + Contractual Assets + Non-Current Assets Maturing Within One Year + Loans and Advances Issued + Other Current Assets + Long-term Equity Investments + Investment Real Estate + Other Non-Current Assets + Other Investments in Equity Instruments)/Total Assets, 2019-2021 Financial Investment Ratio = (Trading Financial Assets + Derivative Financial Assets + Other Receivables + Buyback Financial Assets + Contractual Assets + Non-Current Assets Maturing Within One Year + Other Current Assets + Loans and Advances Issued + Long-Term Equity Investments + Investments in Real Estate + Other Investments in Equity Instruments + Other Non-Current Assets) Current Assets + Receivables Financing + Debt Investments + Other Debt Investments) / Total Assets[3].

In addition to the above situation where the real investment rate and the financial investment rate move inversely, there is also a situation where both increase and decrease at the same time. In this case, firms may show either as a shift virtual to real or as a shift real to virtual. This study does not discuss this situation in the main regression first, and it will be further discussed in the robustness test section.

### 3.2.2. Explanatory Variables: Digital Transformation(DT)

The scope of digital assets is what is meant by "digital transformation." The item is considered "digital technology" if the financial statements of a listed company's intangible assets include the terms "software," "network," "client," "management system," "intelligent platform," etc. and patents connected thereto. The detailed items will be defined as "digital technology intangible assets". If the financial statement intangible assets of a listed company contains keywords like "software," "network," "client," "management system," "intelligent platform," and other keywords related to digital economy technology and patents related to such technology. Then, a number of digital technology intangible assets of the same company in the same year will be summed up and calculated. Then total the intangible assets from all of the company's digital technologies in the same year and determine their share of the intangible assets for the current fiscal year, which serves as a proxy for the degree of the enterprise's digital transformation. The higher the value, the greater the degree of the company's digital transformation [8].

### 3.2.3. Control Variable

Based on the relevant influencing factors, this paper controls the following variables:(1) firm size (size); (2) gearing ratio (Lev); (3) return on assets (Roa); (4) net cash flow from operations (Cf); (5) proportion of shares held by the first biggest shareholder (Tophold); (6) proportion of independent directors (Pid); (7) total profit growth rate (Tpgr ) [9]; (8) Nature of shareholding (Nos).

### 3.3. Model Construction

To test the hypotheses, this paper constructs formula (1) for empirical testing:

$$VTR = \beta_0 + \beta_1DT + \sum \text{Controls} + \sum \text{Ind} + \sum \text{Year} + \varepsilon \quad (1)$$

In the model, VTR is the structure of corporate investment, DT is digital transformation, and Controls are control variables. The regression results are mainly concerned with positivity, negativity and significance. If it is significantly positive, it demonstrates that digital transformation can further develop undertaking speculation structure and elevate ventures to shift virtual to real; if it is significantly negative, it indicates that digital transformation promotes enterprises to "shift virtual to real".

## 4. Result Analysis

### 4.1. Empirical Analysis

#### 4.1.1. Descriptive Statistics

Table 1 shows the descriptive statistics of the main variables. Among them, the average value of enterprise investment structure VTR1 is -0.0193, indicating that most enterprises prefer financial investment to real investment, generally showing a trend of "shift real to virtual"; the minimum value is -1.237, and the maximum value is 1.345, with a large difference in the investment structure. The average value of digital transformation DT is 0.0703, showing that the proportion of digital assets is about 7.03%.

Table1: Descriptive statistics.

VARIABLES	(1) N	(2) mean	(3) sd	(4) min	(5) max
VTR1	11,610	-0.0193	0.140	-1.237	1.345
DT	11,610	0.0703	0.184	0	1
size	11,610	22.41	1.995	0	28.64
lev	11,610	0.449	0.202	0.00906	1.957
tophold	11,610	34.00	16.78	0	89.41
Pid	11,608	0.376	0.0567	0.167	0.800
roa	11,610	0.0359	0.0822	-3.994	0.786
tpgr	11,610	-2.452	301.5	-29,590	6,246
cf	11,610	1.408e+09	1.051e+10	-4.346e+10	3.596e+11

#### 4.1.2. Correlation Analysis

Table 2 shows the results of the analysis of the correlation of the variables. Among them, the correlation coefficient between the variable enterprise investment structure (VTR1) and digital transformation (DT) is 0.0229, which initially indicates that digital transformation can promote enterprises to move away from virtual to real. Meanwhile, the correlation coefficients of other control variables are less than 0.5, showing that there is no multicollinearity in the regression of this paper.

Table 2: Correlation analysis.

	VTR1	DT	size	lev	tophold	Pid	roa	tpgr	cf
VTR1	1								
DT	0.0229	1							
size	-0.0148	0.00580	1						
lev	0.0179	0.0488	0.308	1					
tophold	0.00240	0.0474	0.124	0.0453	1				
Pid	0.0108	0.00920	0.0187	0.00830	0.0414	1			
roa	-0.0625	-0.0115	0.0321	-0.322	0.0879	-0.0287	1		
tpgr	0.00690	0.00790	0.00950	-0.00100	0.0205	-0.00810	0.0314	1	
cf	-0.0119	-0.0132	0.214	0.0502	0.132	0.0503	0.0269	0.00120	1

#### 4.1.3. Regression Analysis

In the basic regression analysis, the influence of enterprise digital transformation on enterprise investment structure is examined mainly through the multiple regression test of Model 1.

The regression results are shown in Table 3, where the explanatory variable is enterprise investment structure (VTR1) and the explanatory variable is digital transformation (DT), and the first column is the result of the analysis after controlling the relevant influencing factors. Among them, the regression coefficient of the explanatory variable digital transformation (DT) is 0.017, which is significant at the 5% level, verifying hypothesis H1, that is, the undertaking digital transformation can improve the enterprise investment structure and promote the enterprise to shift virtual to real.

Table 3: Regression analysis.

VARIABLES	(1) VTR1
DT	0.017** (2.33)
size	-0.001 (-1.25)
lev	0.000 (0.02)
tophold	0.000 (0.94)
Pid	0.023 (0.99)
roa	-0.106*** (-6.25)
tpgr	0.000

Table 3: (continued).

	(0.94)
cf	-0.000
	(-0.93)
Constant	-0.008
	(-0.45)
Observations	11,608
R-squared	0.005

Note: t-statistics in parentheses

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

#### 4.1.4. Robust Test

In the main regression, this paper only considers the situation of the real investment rate rising and financial investment rate falling or real investment rate falling and financial investment rate rising, but in reality, there will also be the situation of both increasing and decreasing at the same time, and when the enterprise is in these two situations can be equally shifted virtual to real or shifted real to virtual.

Therefore, on the basis of the main regression VTR1, replace the explanatory variables, supplement the real investment rate and financial investment rate increase and decrease at the same time, defined as the generalized enterprise investment structure (VTR2). When the real investment rate and financial investment rate increase at the same time, VTR2 = the number of increase in the real investment rate - the number of increase in the financial investment rate; when the real investment rate and the financial investment rate decrease at the same time, VTR2 = the number of decrease in the financial investment rate - the number of decrease in the real investment rate.

As shown in Table 4, the regression coefficient of the explanatory variable Digital Transformation (DT) in the regression with VTR2 as the explanatory variable is 0.013, which is significant at the 5% level and the same as the main regression conclusion, indicating that the results are robust.

Table 4: Robust test.

VARIABLES	(1) VTR2
DT	0.013**
	(2.22)
size	0.001
	(1.56)
lev	0.002
	(0.29)
tophold	-0.000
	(-0.79)
Pid	-0.002
	(-0.15)
roa	-0.003
	(-0.21)
tpgr	-0.000

Table 4: (continued).

	(-0.78)
cf	-0.000
	(-0.98)
Constant	-0.016
	(-1.33)
Observations	9,399
R-squared	0.002

Note: Robust t-statistics in parentheses

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

## 4.2. Heterogeneity Analysis

The idea of the undertaking's own value essentially affects the asset portion and corporate administration of the venture, this paper as indicated by the idea of the shareholding will be partitioned into state-owned enterprises and private enterprises, and group regression [10]. The regression results are shown in Table 5.

The regression coefficient of digital transformation in state-owned enterprises is 0.0218, which is significant at the 5% level, but it is not significant in private enterprises, showing that digital transformation has a greater influence on the investment structure of state-owned enterprises.

Table 5: Heterogeneity analysis.

VARIABLES	(1)	(2)
	State-owned enterprises VTR1	Private enterprises VTR1
DT	0.0218** (0.00986)	0.00702 (0.0113)
size	-0.00220** (0.000979)	0.000873 (0.00111)
lev	0.0257** (0.0106)	-0.00787 (0.0117)
tophold	6.36e-05 (0.000114)	0.000151 (0.000133)
Pid	-0.00274 (0.0314)	0.0551 (0.0380)
roa	-0.00294 (0.0334)	-0.146*** (0.0217)
tpgr	4.33e-06 (4.25e-06)	-5.46e-07 (1.29e-05)
cf	-0 (0)	-0 (0)
Constant	0.0114 (0.0234)	-0.0515* (0.0282)
Observations	4,938	5,187
R-squared	0.004	0.010

Note: Standard errors in parentheses \*\*\* p<0.01, \*\* p<0.05, \* p<0.1

## 5. Conclusion

This paper investigates the influence of enterprise digital transformation on enterprise investment structure by taking recorded non-financial enterprises in Shanghai and Shenzhen from 2011 to 2021 as the research object.

The paper draws the following conclusions: a. Enterprise digital transformation, as an important transformation of information-enabled management in the digital era, can improve enterprise investment structure and promote enterprises to shift virtual to real. b. Under different internal environmental influences, such as state-owned enterprises and private enterprises, the influence of digital transformation on enterprise investment structure is different.

The opportunity to get better in this paper is that this paper just dissects the impact of the inward climate of endeavors on the return. Future exploration can begin from the outside climate of endeavors, like the degree of market guideline, and so on., to investigate the size and method of the impact of big business computerized change on big business venture structure in various cases.

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