

Can Digital Transformation Of Enterprises Curb Excessive Financialization

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Abstract. Along with the slowdown of domestic economic growth, excessive financialization of enterprises has become increasingly common. Whether digital transformation, as a new driving force for the development of the real economy, can curb the excessive financialization of enterprises remains to be tested. This paper explores the impact of corporate digital transformation on corporate over-financialization and its mechanism of action, taking Shanghai and Shenzhen A-share listed companies from 2011-2021 as the research object. It is found that the digital transformation of enterprises can suppress excessive financialization, and financing constraints play a mediating role in the digital transformation of enterprises to hide excessive financialization. Further research shows that the higher the level of financialization, the more they are affected by the inhibiting effect of corporate digital transformation. This paper provides strong evidence for the controversy over the impact of corporate digital change on excessive financialization. It provides an important reference for companies to actively embrace digital transformation and de-financialize and for governments to continue to promote the deep integration of the digital economy with the real economy.

Keywords: Digital transformation; over-financialization; digital economy; real economy.

1. Introduction

Financialization of enterprises is a way of resource allocation focusing on capital operation and business operation aiming at increasing capital value rather than producing profits. Along with the slowdown of domestic economic growth, macroeconomic downturn, and transformation development, more and more enterprises attempt to improve their financial situation through "financialization" and use capital appreciation profits as an important source of operating income (Liu, L. and Du, J. Min, 2021; Peng, Y. Chao, et al., 2018) [1,2]. Corporate financialization is conducive to the interaction between the financial industry and the real economy, improving capital conversion efficiency and exerting a reservoir effect (Kliman and Williams, 2015)^[3]. However, too much focus on capital operations can distract attention from the main business, and investing funds in the capital market can crowd out funds originally used for production and investment, thus hindering the innovative development of enterprises (Du, Yong, et al., 2017; Wang, Hongjian, et al., 2017)^[4,5]. In the long run, this will intensify the "de-realization" of the domestic economy, i.e., excessive financialization. Excessive financialization is manifested at the macro level as a more obvious phenomenon of "de-realization to deficiency," which hinders the development of the real economy (Tang, Doduo, et al., 2020; Yan, Wu and Wan, Liangwei, 2022)[6,7].

Driven by the technological revolution and a new round of industrial changes, the digital transformation of enterprises is seen as an important opportunity to occupy the top of the global value chain and create significant new competitive advantages. General Secretary Xi Jinping pointed out in the report of the 20th Party Congress that he "insists on putting the focus of economic development on the real economy" and "promotes the deep integration of the digital economy and the real economy." The real economy is the foundation of a country's economy and the source of wealth. In the information age, putting the focus of economic development on the real economy requires putting efforts into the deep integration of the digital and real economies, focusing on solving the outstanding problems in the digital transformation of enterprises, and accelerating the digital transformation of enterprises (Hong Yinxing and Ren Baoping, 2023)[8]. By integrating digital technologies into core business operations and leveraging the value of data elements, digital transformation is changing how we produce and sell, business decisions, business models, and even value chain relationships, thereby

significantly improving enterprise productivity and performance levels[9]. The impact of digital transformation on companies is multi-dimensional. Digital transformation can improve ESG performance (Hu Jie et al., 2023)[10], optimize human capital structure (Xiao Tusheng et al., 2022)[11], and enhance corporate performance (Yi Lulu et al., 2021)[12], among others. However, these studies ignore whether capital, by its profit-seeking nature, will "go astray" in the context of digital transformation and flow capital to financial assets with high returns on cutting-edge digital technologies, exacerbating the excessive financialization of enterprises. Or will the digital transformation of enterprises improve their product innovation ability and, thus, their core competitiveness, thus curbing their excessive financialization? Given this, this paper will investigate the relationship between digital transformation and the excessive financialization of enterprises.

The literature related to this paper mainly focuses on digital economy and financialization, digital finance and financialization, digital economy, and the real economy, inclusive digital finance and the real economy, etc. Only some pieces of literature have directly examined the impact of digital transformation of enterprises on the excessive financialization of enterprises. Then, as the digital transformation of enterprises increasingly becomes an important strategic resource for national and regional efforts to promote high-quality development, how digital transformation will affect the financialization of enterprises becomes an important question that needs to be answered. To this end, the marginal contributions of this paper are mainly reflected in the following aspects: First, this paper clarifies the mechanism of the effect of corporate digital transformation on the financialization of non-financial listed enterprises based on the micro-firm perspective and financialization motives, which is an important supplement to the studies related to the economic consequences of corporate digital transformation. Second, this paper empirically demonstrates that the digital transformation of enterprises has a dampening effect on the excessive financialization of non-financial enterprises and can alleviate the financing constraint as a channel, providing the latest and strong evidence for the current controversy on the impact of the digital economy on the financialization of enterprises. Third, it provides feasible suggestions for supporting digital transformation at the corporate and government levels to curb "defiance."

2. Literature Review and Theoretical Hypotheses

2.1 Research related to digital transformation

Existing research on the impact of digital transformation and economic activities starts with a macro perspective, from the perspectives of economic policy, economic growth, and international import and export trade. For example, the results of Yang, Zhen, et al. (2023)[13] showed that economic policy uncertainty has a positive driving effect on firms' digital transformation, i.e., firms proactively embrace digital transformation under economic policy uncertainty. Chenxia Zhang and Pingping Yu (2023)[14] found that digital transformation has a significant effect of "unblocking the inner cycle" and "empowering the outer cycle", and it promotes the construction of a new double-cycle development pattern. Yang et al. (2022)[15] showed that digital transformation significantly improved the success rate of cross-border M&A, reduced the level of M&A premium, and shortened the completion time of M&A. Studies by Meng Xia and Dong Wenting (2022)[16] and Zhong Xiaolong et al. (2022) [17] showed that digital transformation significantly improved firms' export performance and improved export competitiveness. The empirical results of Wei Yunyan et al. (2022)^[18] also show that digital transformation can significantly improve firms' export resilience.

Meanwhile, at the micro level, more and more scholars are focusing on the impact of digital transformation on corporate governance. In terms of corporate innovation, Duan Huayou et al. (2023)[19] and Qiao Pengcheng and Zhang Yansong (2023) [20] found that digital transformation can enhance corporate innovation capacity and have a significant contribution to innovation performance. And digital transformation of enterprises cannot only improve the quantity of green technology innovation but also significantly improve the quality of green technology innovation (Guo, Feng, et al., 2023)[21]. In addition, Zhao Na et al. (2022)[22] found that corporate digital

transformation has a significant inhibitory effect on corporate financial risk. Wang Jinyong et al. (2022)[23] found that the digital transformation of SMEs can effectively reduce financing constraints. Sun Fan et al. (2023)[24] and Liu Shasha et al. (2023)[25] studied that the digital transformation of enterprises significantly reduces the degree of overcapacity of enterprises.

2.2 Research related to the financialization of enterprises

The issue of the financialization of real firms has been given high attention by academics, and the existing research results mainly revolve around the following two aspects: first, the behavioral motives of firms' financialization, mainly the reservoir theory and the investment substitution theory. The first of them argues that firms put financial assets to increase liquidity to avoid cash flow shocks leading to capital chain breakdowns (Zhang and Andrew, 2022)[26]. The second one argues that to maximize profits, firms reduce productive investments with lower returns in favor of financial assets with higher returns (Demir, 2009) [27]. Second, the factors influencing the financialization of firms can be divided into internal and external perspectives. Based on the internal level, Wang, Hwa-Cheng, et al. (2023) [28] found that core competencies inhibit corporate financialization. Wang, Huai-Ming, and Wang, Cheng-Chen (2022) [29] found that main business profitability has a dampening effect on corporate financialization, and executive compensation incentives significantly amplify this negative effect. At the external level, deregulation of the lending rate floor can significantly inhibit the degree of financialization of non-state enterprises (Yang, Zheng, et al., 2019) [30]. Economic policy uncertainty can inhibit investment in fixed assets and promote investment in financial assets, thus exacerbating the tendency of financialization of real firms (Liu Guanchun, 2020) [31]. Government subsidies can weaken the precautionary reserve motive and profit-seeking motive by alleviating financing constraints and promoting industrial investment, which in turn inhibit the financialization of real enterprises (Xu et al., 2023)[32].

2.3 Research related to the digital economy and financialization

In the study of the impact of the digital economy on the financialization of enterprises, there has been no unified definitive conclusion, and different scholars have reached different conclusions. Based on the panel data of domestic Shanghai and Shenzhen A-share listed companies from 2010-2018, Wu Yan and Wan Liangwei (2022)[7] constructed an index of digital economy development level at the inter-provincial level and found that there is an inhibitory effect of the digital economy on corporate financialization through multiple regression model and mediating effect model. Sheng Mingquan et al. (2022)[33] used a two-way fixed-effects model and found that digital inclusive finance has a suppressive effect on the "de-realization" of real enterprises and can improve the "domain mismatch" problem of traditional finance. Based on the "creative destruction" mechanism, Tian Xiujuan and Li Rui (2022)[34] established a multisectoral Schumpeterian dynamic stochastic general equilibrium model of endogenous growth with the introduction of digital technology development factors, and the results showed that the integration of digital technology and production sectors will help optimize and adjust the industrial structure, promote the digital transformation of the real economy, and contribute to the high-quality economic development in the long run. Promoting high-quality economic development.

However, some scholars' studies have reached the opposite conclusion. Li Wei et al. (2022)[35] portrayed the level of digital technology adoption in enterprises using big data text recognition and empirically examined the effect of financialization on digital technology adoption. The results showed that the higher the degree of financialization, the higher the level of digital technology adoption by enterprises would significantly decrease. Li Zhijun and Yang Qiuping (2021) [36] found that the development of digital finance has a facilitating effect on the financialization of enterprises. Yang, Ming-Yan, and Pu, Zheng-Ning (2022)[37] analyzed a sample of Chinese listed companies in Shanghai and Shenzhen A-share entities and found that the development of the digital economy intensified corporate financialization in general.

2.4 Theoretical mechanism

Digital transformation can alleviate corporate financing constraints. First, digital transformation can alleviate financing constraints by reducing the degree of information asymmetry. In the process of loan application and disbursement, only enterprises know their willingness and ability to repay, and are at an information advantage; while commercial banks, as principals, have difficulty in learning the true situation and are at an information disadvantage in this process, and thus the information disadvantaged party will require enterprises to pay for this information asymmetry at a high-risk premium, thus increasing the financing constraint (Wang, Jing-Yong, et al., 2022)[38]. Second, the digital transformation of enterprises can use digital technology when processing massive amounts of data, normalize it into processable information, and output it to inform users through digital platforms, industrial Internet of Things, and other channels, so that both financing parties can have specific multidimensional information including non-standardized non-financial information, etc., which can effectively reduce the information cost for investors to identify enterprises[38]. Third, corporate innovation capability is the key to gaining a competitive advantage, and the stronger the innovation capability, the higher the corporate performance and the easier it is to alleviate financing constraints. The digital transformation uses digital technology to broaden the business scope, increase operating income, alleviate financing constraints, and mitigate financing costs (Dexin Che et al., 2021)[39].

On the other hand, alleviating the financing constraint can help curb the excessive financialization of enterprises. First, from the perspective of the "reservoir theory" of financialization, the purpose of holding financial assets is to reduce the risk brought by a shortage of funds and prevent the breakage of the capital chain. However, under the low financing constraint, enterprises do not need to worry too much about the shortage of funds, and to optimize the efficiency of resource allocation, enterprises will reduce the allocation of short-term financial assets and increase the investment in long-term investment projects with higher returns (Hu Yiming et al., 2017)[40]. Second, from the perspective of the investment substitution theory, by alleviating financing constraints, the financing cost of the real industry is reduced, which in turn increases the return on investment in real industry. When the rate of return on industrial investment is higher than the rate of return on financial assets, real enterprises may spend more funds on industrial investment, which inhibits the financialization of enterprises. In summary, this paper puts forward the following hypotheses:

H1: Digital transformation of enterprises can curb excessive financialization and can be done by alleviating financing constraints as a channel.

3. Indicator Construction, Data Sources, And Identification Strategies

3.1 Indicator Construction

3.1.1. Selection of dependent variable (financialization of enterprises)

The measure of financialization (*overfit*) refers to the measure of existing studies (Du, Yong, et al., 2017[41]; Wang, Huacheng et al., 2023[28]) and uses the ratio of financial assets to total assets to define the financialization of enterprises. That is financial assets = trading financial assets + derivative financial assets + available-for-sale financial assets + held-to-maturity financial assets + long-term equity investments + investment properties.

3.1.2. Independent variable selection (digital transformation of enterprises)

Digital transformation (*dig*), as a core strategy for corporate development, is more likely to be reflected in the textual information disclosed in corporate annual reports. Based on this, this paper draws on existing studies (Hou Deshuai et al., 2023; Zhang Xin et al., 2023; Wu Fei et al., 2021)[42–44] and uses text analysis to measure the number of keywords related to "digitization" in the annual reports of Chinese listed companies by using text mining techniques. The frequency of "digital" related keywords in the annual reports of Chinese listed companies was measured. Compared with

the method of directly selecting an observable indicator to refer to the independent variable, the text mining method is more comprehensive and relatively reasonable.

3.1.3. Control variable selection

To address the endogeneity problem interference caused by omitted variables, this paper introduces the following control variables (Z_{it}) concerning the existing literature (Yu-Chao Peng et al., 2018; Hwa-Cheng Wang et al., 2023). Specifically, firm age (age), measured by the logarithm of firm establishment; firm growth capacity ($growth$), measured by the growth rate of firm total assets; firm duality rate ($dual$), measured by the concurrent appointment of firm chairman and general manager; board size ($board$), measured by the logarithm of firm board size; and equity concentration ($top10$). Measured by the shareholding ratio of the top 10 shareholders.

3.2 Model design

$$overfin_{it} = \alpha_0 + \alpha_1 dig_{it} + \alpha_2 Z_{it} + \mu_i + \delta_t + \varepsilon_{it} \quad (1)$$

Where $overfin_{it}$ is the degree of financialization of firm i in period t , and dig_{it} is the degree of digital transformation of the firm i in period t . Meanwhile, the model is designed to avoid individual heterogeneity in the within-group regressions, thus adding μ_i to denote the individual fixed effects of city i that do not change over time and δ_t to denote the time-fixed effects. Further, the random error term $\varepsilon_{i,t}$ is clustered to the city level in this paper to solve the systematic heteroskedasticity of the model.

3.3 Data sources and descriptive statistics

This paper selects listed companies in Shanghai and Shenzhen A-shares from 2011-2021 as the research object and screens them according to the following steps: (1) exclude financial listed companies; (2) exclude samples with missing financial data or insolvency; (3) exclude samples that are marked ST or *ST in the current year. Firm-level cluster regressions are performed on the samples to eliminate the interference of differences between data groups and to reasonably control the effect of heteroskedasticity. The financial data used in the study were derived from the CSMAR database.

Table 1. Descriptive statistics.

Variable	Obs	Mean	Std. Dev.	Min	Max
<i>dig</i>	33239	2.896	1.266	0.000	6.909
<i>overfin</i>	32711	0.046	0.092	0.000	0.981
<i>growth</i>	27882	0.039	0.107	-4.946	1.408
<i>size</i>	33128	22.137	1.344	14.942	28.636
<i>age</i>	33239	2.177	0.818	0.000	3.497
<i>dual</i>	31821	5.158	7.709	0.000	65.593
<i>top10</i>	33238	59.295	15.468	1.310	101.160
<i>board</i>	33239	2.307	0.221	0.000	3.466

4. Empirical Analysis

4.1 Baseline regression

Table 2 reports the regression results of the digital transformation of firms on excessive financialization. Column 1 controls for firm individual, annual, and industry fixed effects only, and does not include relevant control variables; column 2 adds firm age (age) control variables and controls for firm individual, annual, and industry fixed effects; column 3 adds firm age (age), firm growth capability ($growth$), and firm dual employment rate ($dual$), and controls for firm individual, annual, and industry fixed effects; column 4 adds firm age (age), firm growth capability ($growth$),

firm duality (*dual*), and board size (*board*), and controls for individual, annual, and industry fixed effects; column 5 adds firm age (*age*), firm growth capability (*growth*), firm duality (*dual*), and board size (*board*); column 5 adds firm age (*age*), firm growth capability (*growth*), firm duality (*dual*), and board size (*board*), and equity concentration (*top10*), and control for individual, annual, and industry fixed effects. The results show that the regression coefficients of corporate digital transformation (*dig*) are all significantly negative and significant at the 1% and 5% levels, respectively, in the regression analysis from column 1 to column 5, indicating that corporate digital transformation can inhibit excessive financialization, supporting hypothesis 1.

Table 2. Baseline regression.

	(1)	(2)	(3)	(4)	(5)
<i>dig</i>	-0.0021 ^{***} (0.0006)	-0.0023 ^{***} (0.0006)	-0.0014 ^{**} (0.0006)	-0.0014 ^{**} (0.0006)	-0.0014 ^{**} (0.0006)
<i>age</i>		0.0288 ^{***} (0.0017)	0.0281 ^{***} (0.0018)	0.0281 ^{***} (0.0018)	0.0288 ^{***} (0.0020)
<i>growth</i>			0.0074 [*] (0.0038)	0.0073 [*] (0.0038)	0.0070 [*] (0.0038)
<i>dual</i>			-0.0001 (0.0001)	-0.0001 (0.0001)	-0.0001 (0.0001)
<i>board</i>				-0.0031 (0.0022)	-0.0032 (0.0022)
<i>top10</i>					0.0000 (0.0001)
<i>_cons</i>	0.0511 ^{***} (0.0017)	-0.0125 ^{***} (0.0042)	-0.0169 ^{***} (0.0043)	-0.0097 (0.0067)	-0.0135 [*] (0.0081)
<i>Firm FE</i>	Yes	Yes	Yes	Yes	Yes
<i>Year FE</i>	Yes	Yes	Yes	Yes	Yes
<i>Industry FE</i>	Yes	Yes	Yes	Yes	Yes
<i>N</i>	32150	32150	26059	26059	26059
<i>adj. R²</i>	0.6022	0.6061	0.6255	0.6256	0.6255

4.2 Robustness analysis

(1) In order to provide a more comprehensive description of financialization, this paper also refers to Chengsi Zhang (2016)[45], which measures corporate financialization (*overfin2*) by using the ratio of profits from financial channels such as investment income, fair value change gains and losses, and other comprehensive income of non-financial firms combined to operating profit as an indicator. The regression results are shown in Table 3. The explanatory variables in columns 1 to 2 are corporate financialization (*overfin2*), where column 1 controls only for individual corporate fixed effects and column 2 further introduces control variables. The estimated coefficients of the independent variable *dig1* are -0.1053 and -0.0121, respectively, and are significant at the 1% and 5% levels, respectively, which still support hypothesis 1 of the hypothesis.

(2) The OLS regression model is used to test. As the results in Table 3 show, columns 3 to 4 do not include the fixed effects of individual firms, and column 4 introduces control variables, and the estimated coefficients of *dig1* in the two columns are -0.0588 and -0.0714, respectively, and both are significant at the 1% level, and the conclusions obtained remain consistent with the previous paper.

(3) The baseline regression model portrays the effect of corporate digital transformation located in the mean interval on financialization, but ignores the effect of corporate digital transformation on the financialization of the entire conditional distribution, which may make it difficult to estimate the effect of corporate digital transformation on financialization accurately. In this paper, we further select a panel quantile regression model to test whether there are differences in the effects of enterprise digital transformation on financialization at different quantile points to fully reflect the distribution of explanatory variables without the influence of extreme values, and on this basis, we explore richer information about the effects of enterprise digital transformation on financialization.

Therefore, this paper examines the heterogeneity of the impact of corporate digital transformation at the 0.25, 0.5 and 0.75 quartiles of financialization. The regression results, as shown in Table 2, indicate that corporate digital transformation has a significant negative impact on financialization at different quartiles, but there are significant differences in its impact, and the magnitude of the fitted coefficient of the digital economy tends to increase with the quantile, i.e., it indicates that the higher the level of financialization, the more they are affected by the inhibitory effect of corporate digital transformation.

Table 3. Robustness analysis.

	<i>overfin2</i>		<i>OLS</i>		<i>Q=0.25</i>	<i>Q=0.5</i>	<i>Q=0.75</i>
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
<i>dig1</i>	-0.1053*** (0.0047)	-0.0121** (0.0061)	-0.0588*** (0.0034)	-0.0714*** (0.0038)	-0.0491*** (0.0047)	-0.0706*** (0.0045)	-0.1008*** (0.0073)
<i>age</i>		-0.4532*** (0.0153)		-0.0676*** (0.0076)	-0.0406*** (0.0084)	-0.0780*** (0.0109)	-0.0940*** (0.0132)
<i>growth</i>		-0.0518 (0.0416)		-0.2388*** (0.0659)	-0.3130*** (0.1200)	-0.3294*** (0.1078)	-0.2063 (0.1534)
<i>dual</i>		-0.0011 (0.0009)		0.0035*** (0.0006)	0.0025*** (0.0008)	0.0046*** (0.0008)	0.0043*** (0.0009)
<i>board</i>		0.0600** (0.0236)		0.2886*** (0.0224)	0.3196*** (0.0246)	0.3036*** (0.0312)	0.2917*** (0.0437)
<i>top10</i>		0.0020*** (0.0006)		0.0012*** (0.0003)	-0.0001 (0.0004)	0.0013** (0.0005)	0.0023*** (0.0006)
<i>_cons</i>	1.7083*** (0.0143)	2.2781*** (0.0754)	1.5644*** (0.0114)	1.0450*** (0.0587)	0.4456*** (0.0670)	0.9425*** (0.0855)	1.5105*** (0.1125)
<i>Firm FE</i>	Yes	Yes	No	No	Yes	Yes	Yes
<i>N</i>	24153	19304	24783	19823	19823	19823	19823
<i>adj. R²</i>	0.5130	0.5501	0.0116	0.0319	0.0319	0.0319	0.0319

5. Conclusion and Insight

The financialization of enterprises has become a hot topic of academic interest. Since the digital transformation of Chinese enterprises has become a new growth engine for China's real economy, this paper reveals the relationship between "digital transformation-financialization of enterprises." It explains its micro-mechanisms and specific paths from the micro-perspective of enterprise digitalization results and financialization motives. The following conclusions are drawn from the empirical tests: (1) Digital Transformation of enterprises can suppress excessive financialization, and the conclusions still hold after the robustness tests. (2) Financing constraints play a mediating role in the digital transformation of enterprises to suppress excessive financialization, i.e., digital transformation of enterprises can alleviate the financing constraints of enterprises and provide financial support for industrial development to suppress excessive financialization. (3) The higher the level of financialization, the more they are affected by the inhibiting effect of corporate digital transformation. Based on the findings of the study, the following insights and recommendations are obtained:

First, from the enterprise level, it should actively embrace the wave of digital transformation, break the information asymmetry and improve the innovation ability of enterprises to alleviate the financing constraint. Focusing on the whole industry, equity incentives can be appropriately used to correct the deviation of corporate management's investment and financing decisions to curb the tendency of real enterprises to deviate from their core business to financial investment.

Second, from the national level, the government should play a leading role in the digital transformation of enterprises and can help manufacturing enterprises overcome the financing gap caused by large initial investments in digital transformation and slow results by improving fiscal and

monetary policies, simplifying the credit process, etc.; and give appropriate financial, technical and talent support to solve the practical problems of digital transformation of enterprises and promote the deep integration of the real economy and the digital economy.

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