



Research on the Impact of Executives' Academic Background on Financialization of Manufacturing Enterprises in the Context of Digital Transformation

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Abstract. In recent years, the state has paid great attention to the financialization of manufacturing enterprises, emphasizing the construction of a complete industrial chain to improve the development of China's manufacturing enterprises and prevent a large amount of capital from flowing into the financial industry, which could lead to the hollowing out of manufacturing. Executives often play a decisive role in the investment direction of enterprise funds, and with the rapid development of digitalization, which has become a trend, manufacturing enterprises are facing digital transformation. This paper studies the impact of executives' personal characteristics on the financialization of manufacturing enterprises in the digital context. Using a fixed-effects model for verification, the empirical results show that executives with an academic background reduce the financialization level of manufacturing enterprises. The regression results of adding the interaction term between digital transformation and academic background indicate that digital transformation enhances the inhibitory effect of academic-background executives on financialization.

Keywords: Academic Background of Executives; Digital Transformation; Manufacturing Enterprises; Financialization

1 Introduction

In recent years, the problem of enterprises shifting from the real economy to the financial sector has become increasingly severe. Against the backdrop of China's economic slowdown, listed companies often tend to invest in the financial industry, which offers higher returns, stronger liquidity, and faster cash conversion, rather than in the real economy and manufacturing—sectors characterized by long income cycles, lower returns, slower cash conversion, and higher production risks—in order to maintain attractive financial statements and sustain higher stock prices.

The real economy is the foundation of economic development, and manufacturing enterprises are crucial for addressing social and livelihood economic issues. Unlike the financial industry, manufacturing involves three links in the production and sales process: supply, production, and sales. This involves production and employment along

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the upstream and downstream of the industrial chain, providing a large number of jobs. Meanwhile, when enterprises engage in the upstream and downstream of the supply-production-sales industrial chain system, involving different enterprises or corporate structures, they have a significant role in boosting local economies. At the same time, enterprise products undergo continuous iteration in market competition, updating relevant product technologies and promoting scientific and technological development to a certain extent. The financial industry, however, is less effective in promoting employment and technological advancement.

In modern corporate systems, ownership and management are separated, meaning that enterprise executives and owners are often not the same person. This gives rise to principal-agent problems, where management may act in their own interests at the expense of the owners' interests. Supervising corporate executives has thus become one of the main challenges in modern corporate governance. For the supervision of executives of listed companies, operational performance evaluation is a key indicator, with the most intuitive metrics being the company's market value and financial indicators such as profit margin, return on assets, and return on equity in annual financial reports.

Enterprise executives play a decisive role in determining the direction of corporate capital investment. According to the upper echelons theory, the background characteristics of enterprise executives, such as age, gender, tenure, and educational background, influence their personal thinking patterns, which in turn have a profound impact on corporate decisions and strategic choices. Imprinting theory suggests that individuals or organizations go through an "environmental sensitive period" (a phase transition where the state of the focal entity changes from one stage to another) during their development. The environmental characteristics of these specific stages leave an "imprint" on individuals or organizations that matches the specific environment. Even if the subsequent environment changes, this imprint continues to influence individuals or organizations and affects their decision-making processes.

China's digital economy is currently experiencing rapid growth. Manufacturing enterprises are undergoing digital transformation, leveraging technologies such as big data, cloud computing, artificial intelligence, and blockchain. This enables them to integrate industrial resources to improve production efficiency, clarify information communication channels to enhance internal control quality, precisely meet customer needs to provide professional services, and improve product quality in both production and sales. Digital transformation has brought significant progress to manufacturing enterprises, enhancing their operational performance to some extent and alleviating the problem of insufficient earnings of real - economy enterprises during the economic slowdown. Meanwhile, digital transformation of manufacturing enterprises inevitably requires substantial consumption of available funds or realizable assets.

2 Literature Review and Theoretical Hypotheses

2.1 Related Research on the Impact of Executives' Academic Background on Enterprise Financialization

An executive's academic background refers to having worked in a university, research institution, or association engaged in research. This background implies that the executive has engaged in academic research for an extended period, during which scholars develop rigorous, pragmatic, and long-term-oriented characteristics, as well as systematic, critical, data-driven, and empirically oriented thinking patterns (Cai et al., 2024)[1]. From the perspective of fulfilling social responsibilities and environmental obligations, executive teams with higher education levels and companies managed by such teams demonstrate better growth in implementing corporate reforms, building reputation, enhancing corporate growth capabilities, and improving the quality of internal control (Cui et al., 2022)[2]. Additionally, scholar-executives have stronger moral senses and responsibility awareness, leading to greater self-discipline and a willingness to assume responsibilities toward both the enterprise and society. When making investment decisions, they tend to prioritize the long-term interests of the enterprise, reducing short-term financial arbitrage and increasing investment in core businesses and innovation (Zhao et al., 2025)[3].

2.2 Related Research on the Impact of Digital Transformation on Enterprise Financialization

Digital transformation involves the application of various digital technologies and devices, such as big data, cloud computing, artificial intelligence, and blockchain. Whether a company chooses to purchase, lease, or access these devices through ports, it requires corresponding expenditures, which involve the use of available funds or asset exchanges. In the performance of enterprises, digital transformation can improve the quality of internal control by enhancing internal transparency and the quality of information communication (Ling et al, 2022)[4]. It can also improve investment efficiency and innovation levels through more accurate investment budgets and market information matching (Du et al, 2023)[5]. At the same time, digital transformation can enhance enterprise service quality and performance by precisely matching production with customer needs (Gao et al, 2023)[6]. As the quality of internal control, innovation investment, and enterprise performance improve, the demand for enterprises to hold financial assets for hedging purposes decreases. Meanwhile, the increase in external real - economy investment and R & D levels also crowds out the funds available for financial investment. Therefore, digital transformation can restrain the financialization level of the manufacturing industry (Zhang et al, 2023)[7].

2.3 Literature Review and Hypothesis Formulation

In summary, executives with academic backgrounds tend to prioritize R&D, physical investment, and long-term strategies. Given that R&D and physical investments require

substantial capital, they crowd out holdings of financial assets. This leads to the hypothesis 1:

Executives with an academic background can mitigate the financialization level of manufacturing enterprises.

Digital transformation aligns with societal development trends, and Chinese listed manufacturing companies have either initiated or prepared for digital transformation. By improving internal control quality, corporate performance, investment efficiency, and innovation, while also consuming enterprises' available funds or short-term financial assets, digital transformation leads to the hypothesis 2:

Digital transformation can enhance the inhibitory effect of executives' academic backgrounds on financialization in manufacturing enterprises.

2.4 Innovations and Limitations

Previous research on the impact of executives' personal characteristics on enterprise financialization has primarily focused on factors such as financial backgrounds, age, gender, and overseas experience (Yuewen et al [8], 2020; Guizani [9], 2024; Zhang, 2024[10]). Although the concept of executives' academic backgrounds was proposed earlier, there is a lack of literature examining its specific impact on enterprise financialization. This study innovates by investigating the influence of executives' academic backgrounds on financialization in manufacturing enterprises and introducing the moderating effect of digital transformation in this relationship. However, it is limited to analyzing manufacturing enterprises, and future research could expand to other industries.

3 Research Design

3.1 Sample Data Selection and Model Selection

This paper selects data of Chinese A-share manufacturing listed companies, sourced from the China Economic Research Database (CSMAR), with insufficient data supplemented by the Wind Database. Data for manufacturing enterprises over 10 years (2010-2020) were selected, excluding ST, *ST, and PT data. Meanwhile, observations that remained missing after data supplementation and manual comparison were deleted, ultimately obtaining unbalanced panel data with 1,818 enterprise samples and a total of 14,498 observation data points. The Hausman test yielded a p-value of 0, strongly rejecting the null hypothesis of random effects, indicating a significant correlation between individual effects and explanatory variables. Therefore, a fixed effects model was chosen for model selection to ensure result consistency.

3.2 Variable Description

For the dependent variable, enterprise financialization, there are many measurement standards. Three common methods are the proportion of financial assets to total assets,

the proportion of financial income to total revenue, and the financial investment ratio of non-financial enterprises. This paper selects the first method, i.e., the proportion of financial assets to total assets, to measure the level of enterprise financialization. The financialization level (FZ) is calculated as: $\text{Financialization} = (\text{financial assets including transactional financial assets, derivative financial assets, net buyback financial assets, net loans and advances, net available-for-sale financial assets, net held-to-maturity investments, net investment real estate, net long-term equity investments, etc.}) / \text{total assets}$.

Explanatory Variables: For the explanatory variable, executives with academic background (BC), executives are determined to have an academic background and assigned a value of 1 if they have taught at a university, worked at a research institution, or engaged in research at an association; otherwise, they are assigned 0. In years where academic-background executives exist among enterprise executives, the executive academic background for that year is assigned 1; otherwise, 0. Ultimately, only 3,957 out of 14,498 observations were assigned a value of 1.

Moderating Variable: digital transformation (DT), evaluating digital transformation is difficult because enterprises do not disclose digital investment amounts or related digital transformation data in separate financial entries. Current evaluation methods for digital transformation include constructing a digital transformation lexicon and using machine learning and large language models to capture relevant vocabulary from enterprise annual financial reports for evaluation based on vocabulary occurrence frequency; measuring the level of digital transformation according to digital-related investment intensity, i.e., the proportion of digital investment in intangible assets to total assets; and manually summarizing the nature of subsidiaries held by the evaluated company, where the existence of subsidiaries using relevant digital technologies for profit indicates digital transformation. This paper uses machine learning and large language models to construct a digital transformation database and ultimately evaluates the level of digital transformation by summarizing relevant digital transformation vocabulary in annual reports.

Refer to existing research literature and take the following 9 control variables as the control variables of the empirical analysis model in this paper: Leverage ratio (Lev) = total liabilities / total assets, Enterprise scale (Size) = $\ln(\text{total assets})$, Operating income growth rate (SAL) = $(\text{ending operating income} - \text{beginning operating income}) / \text{beginning operating income}$, Total asset turnover rate (TAT) = $\text{operating income} / (\text{beginning total assets} + \text{ending total assets})$, Return on assets (ROA) = $\text{net profit} / \text{total assets}$, Cash holding level (Cash) = $\text{ending monetary funds} / \text{total assets}$, Enterprise age (Age) = $\ln(\text{observation year} - \text{enterprise establishment year})$, CEO duality(CEO): 1 if the CEO also serves as the chairman of the board, otherwise 0, Proportion of shares held by the largest shareholder (Top1): proportion of total share.

3.3 Empirical Model

Based on the above theoretical discussions and variable definitions and hypotheses, this paper constructs the following two models, using fixed effects models with individual effects fixed, to verify the impact of executives' personal characteristics on the level of enterprise financialization and the moderating role of digital transformation in the impact of executives' personal characteristics on the level of enterprise financialization.

$$FZit=\alpha 0+\alpha 1BCit+\sum \alpha j*Controls+\sigma it \tag{1}$$

$$FZit=\alpha 0+\alpha 1BCit+\alpha 2BC*DT+\sum \alpha j*Controls+\sigma it \tag{2}$$

3.4 Regression Results

The review of steps adopts a progressive regression approach, which first involves regression of independent and dependent variables, then adds control variables, and finally incorporates individual effects to construct a fixed-effects regression model. For moderating variables, an interaction term between the independent variable and digital transformation is first constructed, followed by direct fixed-effects regression.

As referenced in Table 1, Step 1 in the regression process represents ordinary regression, Step 2 represents regression with control variables added, and Step 3 represents regression with control variables and individual fixed effects incorporated. According to Table 1, the significance level of the data regarding executives' academic background increases with the addition of control variables in the regression steps. It is ultimately found that executives' academic background has a significant inhibitory effect on enterprises' financialization level, with a coefficient of -0.0045 significant at the 99% level, confirming Hypothesis 1.

After completing the above tests, an interaction term between digital transformation and executives' academic background was constructed. Control variables were first added for regression, followed by the inclusion of individual fixed effects. As shown in Table 1, the regression coefficient of the interaction term between digital transformation and executives with academic backgrounds was 0.0071 and significant at the 99% level after adding control variables. After further incorporating individual fixed effects, the regression coefficient became 0.0028, significant at the 95% level. The results indicate that digital transformation can significantly enhance the inhibitory effect of executives with academic backgrounds on financialization in manufacturing enterprises, thus validating Hypothesis 2.

Table 1. Regression Results.

variable		BF		
Step		1	2	3
Results		-0.0036**	-0.0175***	-0.0084***
Adjust	BF*CT		0.0071***	0.0028***
Controls	Lev		-0.1118***	-0.0380***
	Size		0.0132***	0.0099***

SAL	0.0002*	0.0002**
TAT	-0.0121***	-0.0083***
ROA	0.0195	-0.0190*
Cash	-0.1290***	-0.1388***
Age	0.0063***	0
CEO	-0.0002	-0.0027
Top1	-0.0369***	-0.0916***

Standard errors in parentheses

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

3.5 Robustness and Endogeneity Tests

3.5.1 Robustness Test.

To validate the hypothesis results, this study conducted a series of robustness tests. First, the measurement of financialization was replaced with the proportion of financial income to total revenue. Financial income includes interest income, investment income, and fair value change income from financial assets, which is calculated as the sum of these financial incomes divided by the enterprise's total revenue. Second, some control variables were replaced: the debt-to-asset ratio was substituted with the ratio of non-current liabilities to total assets, return on total assets (ROA) was replaced with return on equity (ROE), and the shareholding ratio of the largest shareholder (Top1) was replaced with the combined shareholding ratio of the top 10 shareholders (Top10). The regression results remained significant in all cases. Due to space limitations, the results are not presented here.

3.5.2 Endogeneity Test.

This study used a correlation test between residuals and explanatory variables to examine endogeneity in the panel data, specifically testing the academic background of executives and the interaction term between academic background and digital transformation. The results showed $P > F = 1$, far greater than 0.05, indicating no significant correlation between residuals and explanatory variables. This excludes endogeneity issues between the dependent variable and moderating variables. The regression results are not shown in the text due to space constraints.

3.6 Heterogeneity Analysis

According to the regional classification method of the National Bureau of Statistics of the People's Republic of China in 2011, regions are divided into three categories: eastern, central, and western regions, with separate tests conducted for different regions. As shown in Table 2, executives with academic backgrounds significantly reduce the level of financialization in all three regions (eastern, central, and western), but the significance levels in central and western regions are lower compared to the eastern region. After regional regression, the moderating effect of digital transformation is only

significant in the eastern region, where it can enhance the inhibitory effect of academic backgrounds on enterprise financialization. Due to space constraints, the regression results of control variables are not presented in Table 2.

Table 2. Regional Regression Results

region	Eastern	Central	Western
BF	-0.0079***	-0.0079*	-0.0100**
BF*CT	0.0028**	0.0033	0.0033
Standard errors in parentheses			
* p<0.1, ** p<0.05, *** p<0.01			

4 Conclusions and Recommendations

4.1 Conclusions

Through empirical tests, it can be seen that executives with academic backgrounds have an inhibitory effect on the financialization level of manufacturing enterprises, and this inhibitory effect is statistically significant. Additionally, the regression results of the moderating variables show that digital transformation can significantly enhance the inhibitory effect of academic-background executives on the financialization level of manufacturing enterprises.

Possible reasons include that Executives with academic backgrounds have developed research-oriented thinking in their past work environments and pay more attention to activities such as R&D and innovation. Therefore, during enterprise management, they prioritize real economy investments and are more willing to engage in innovative and R&D-related work, thereby suppressing the financialization level of manufacturing enterprises. With the surge of the digital wave, academic-background executives' keen insight into cutting-edge innovative fields prompts them to actively deploy digital investments. At the same time, digital transformation optimizes enterprise operational processes and improves the management efficiency of real investments, further reducing the space for financial asset allocation. Under the dual role of these factors, the enterprise's financialization level is significantly reduced.

Regarding regional heterogeneity, executives with academic backgrounds exhibit an inhibitory effect on the financialization level of manufacturing enterprises in all eastern, central, and western regions, but the moderating effect of digital transformation only significantly enhances this inhibitory effect in eastern regions.

Possible explanations for this heterogeneity are: first, In both China's real economy and the adjusted sample, the number of enterprises in eastern regions is far greater than that in central and western regions; second, Digital transformation first originated in eastern coastal regions due to their developed digital industries and high concentration of relevant digital talent. The eastern region's development level is also far higher than that of central and western regions, giving it advantages in talent and capital aggregation for cultivating digital industries, thus making the moderating effect more significant.

4.2 Recommendations

When selecting senior executives, corporate governance layers can refer to executives' diverse backgrounds to diversify the composition of the executive team and meet the enterprise's different strategic needs. Introducing managerial talent with academic backgrounds can not only broaden the enterprise's investment vision and improve investment efficiency but also effectively mitigate the financialization trend of manufacturing enterprises, promote inter-industry collaborative development, and help build China's full industrial chain ecosystem. This measure is not only conducive to optimizing the industrial structure and promoting economic development but also creates a large number of employment opportunities, provides broad space for talent development, and effectively curbs the brain drain phenomenon.

With the continuous deepening of digitalization in China, digital transformation has become a choice that enterprises cannot afford to ignore. The application of a large number of digital technologies in the transformation process can improve enterprises' production and operation efficiency. However, the application of digital technologies also requires significant capital investment, which may pose challenges for enterprises with financial crises or insufficient cash flow. Therefore, digital transformation presents both opportunities and challenges for traditional manufacturing enterprises.

In the past, central and western regions have primarily undertaken industrial relocation from eastern regions, resulting in insufficient reserves of high-quality talent and capital. However, with the development of digitalization, economic growth and innovation are no longer limited to coastal eastern regions with maritime transportation advantages. The digital economy is currently in a stage of rapid development. Moreover, the Yunnan-Guizhou Plateau has attracted many high-quality enterprises to deploy their cloud data centers in western regions due to its geographical advantages. Additionally, China is heavily investing in central and western regions. Under the guidance of the state, central and western regions can enhance their service capabilities to attract enterprise settlement, improve talent introduction packages to retain high-quality talent, and vigorously develop the digital economy to achieve overtaking in the digital era.

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