

Equity Management for Senior Management Personnel Digital Transformation and Corporate Financial Performance

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Abstract. Digital transformation is the key to the current growth of the digital economy. Recognizing the importance of this and helping to promote the implementation of this projects in enterprises, promoting the long-term stable growth of enterprises is also of great significance. This article selects relevant information from firms with A-shares from China Stock Market & Accounting Research Database (CSMAR) from 2011 to 2023, and analyzes the data of senior management equity incentives, digital transformation, and corporate financial performance based on the Aggregate Management Performance Score Model (AMPS) model. Research has found that: Digital transformation can promote the level growth of corporate financial performance; management equity incentives can enhance digital transformation's primary impact on economic performance ; the economic performance level of enterprises may have a reverse impact on digital transformation; management equity incentives can also have a driving effect on economic performance to a certain extent, and digital transformation can strengthen the promoting effect of management equity incentives on economic performance. These conclusions provide experience and evidence for enterprises to make decisions related to promoting digital transformation.

Keywords: AMPS model, management equity incentives, digital transformation, economic performance.

1. Introduction

With the promotion and popularization of technologies such as cloud computing, artificial intelligence, and big data, digital technology has gradually become one of the core competitiveness of various enterprises [1]. Regarding the issue of how to advance enterprise digital transformation, some studies have pointed out that the academic experience of executives can promote the digital transformation of enterprises [2]. This study examines the interfering factors of digital transformation from the aspect of the selection of senior management personnel in companies, while this article focuses on the aspect of equity incentives for senior management. This article uses the Aggregate Management Performance Score Model (AMPS) model for research. The main research approach and process are as follows. Ask a question (A): This article starts with digital transformation, studies digital transformation influence on economic performance, and further proposes senior management equity incentives' Moderation effect on digital transformation effect on economic performance. Master the data (M): This article lists the required data and variables, and collects relevant information from firms with A-shares through China Stock Market & Accounting Research Database (CSMAR). Perform analysis (P): Using the entropy weight coefficient method on the collected financial data, the researcher obtain the evaluation results of the economic performance. Subsequently, the researcher conduct data analysis on the data separately, and then carries out further research based on the analysis results. The way of showing (S): Summarize the table of statistical results and conduct visual analysis.

From the digital transformation and economic performance, enterprises' digital transformation can enhance their own capabilities. Enterprises can enhance their innovation capabilities, reduce operational risks, and improve internal control and management levels by introducing digital technology and related systems [3]. Moreover, digital transformation can also help enterprises improve the capabilities of both managers and employees. Digital transformation can influence enterprise human resource planning by integrating technologies from different fields, amplifying employees' technical abilities and managers' management levels [4]. In addition, digitalization can assist enterprises in enhancing performance by improving the efficiency of enterprise resource

utilization. Digitalization can effectively enhance the integration of business and finance within enterprises, initiate supply chain management and integration, reduce costs and increase efficiency, and ultimately improve enterprise performance levels [5].

Assumption 1: Enterprises' digital transformation can enhance economic performance. From the relationship between management equity incentives, digital transformation, and economic performance, management often adopts a short-term perspective when making decisions, neglecting the enterprise's long-term development. However, the initial investment in digital transformation is significant, and management's decisions in digital transformation are influenced by potential returns, leading to a relatively conservative attitude during the process [6]. Equity incentives for senior management is a long-term incentive mechanism that helps alleviate the short-sightedness of senior management, making them more focused on the company's long-term strategic, and more willing to take certain risks to choose projects that are beneficial to the company's long-term interests [7, 8].

Assumption 2: Management equity incentives can enhance the digital transformation's positive impact on economic performance.

This article demonstrates that digital transformation is important to enterprise development through computational analysis and further explores the equity incentives for senior management in enhancing the effectiveness of digital transformation, providing new ideas for enterprises to accelerate their digital transformation.

2. Research Design

2.1. Sample Selection and Data Sources

This research selects information from firms with A-shares from 2011 to 2023 on CSMAR as the sample. To ensure more reasonable and accurate research results, the following operations were performed on the sample data: 1. Excluding all companies that are Special Treatment (ST) and have been delisted during the period. 2. To reduce the impact of outliers, the financial industry is excluded. 3. Eliminate companies with severe data missing. 4. Perform a 1% up-down scaling on continuous variables. After processing, 41,235 samples of the digital transformation index, 52,497 samples of economic performance, and 8,992 samples of the management equity incentives degree for senior management were obtained. After integration, a total of 478 samples were obtained

2.2. Variable Selection

Table 1. Variable selection

variable type	variable name	variable symbol	variable meaning
explained variable	economic performance	EP	The data calculated using the entropy weight coefficient method from four aspects reflects the financial status of the enterprise
explanatory variable	digital transformation	DIG	The enterprise digital transformation index is calculated by weighting six indicators: strategic guidance, digital achievements, organizational empowerment, technology drive, environmental support, and digital application
moderator variable	Equity incentives for senior management	MRS	Stocks' numbers held by management/total stocks' numbers [10]
	company size	Size	The natural logarithm of the total assets of the enterprise at the end of the period
control variable	shareholding nature	Soe	State-owned enterprises: 1; otherwise: 0
	dual roles combined	Dual	If the chairman and the general manager are the same person, assign a value of 1; otherwise, assign a value of 0
	annual industry	Year Industry	Control for year fixed effects Control industry fixed effects

Table 2. Financial performance evaluation indicators

classification	indicator	symbol	indicator type	weight	entropy value	coefficient of variation
profitability	Return on Assets	ROA	positive	0.0108	0.9979	0.0021
	Return on net assets	ROE	positive	0.0016	0.9997	0.0003
operating capability	Total asset turnover ratio	TATO	positive	0.2436	0.9525	0.0475
	Liquidity turnover ratio	CAT	positive	0.1758	0.9657	0.0343
debt repayment capacity	debt-to-asset ratio	DAR	reverse	0.0055	0.9989	0.0011
	cash ratio	Cash	positive	0.5616	0.8905	0.1095
development capability	Net profit growth rate	NPG	positive	0.0010	0.9998	0.0002

The selection of variables is displayed in Table 1. For economic performance, this paper adopts the entropy weight method, drawing on Liang Tongxin's economic performance calculation approach, to assess a company's economic performance from four perspectives: profitability, operational capability, solvency, and growth potential [9]. Then, based on the economic performance evaluation system, the entropy weight coefficient method is used to process the data, resulting in the entropy weight difference coefficient, entropy value, and weight as shown in Table 2. Finally, the comprehensive score of economic performance evaluation is obtained through calculation.

2.3. Model Construction

To investigate the relationship between economic performance and digital transformation, this article constructs the following regression analysis model as shown in Equation (1), and se Controls_{*i,t*} as control variables.

$$EP_{i,t} = \alpha_0 + \alpha_1 Dig_{i,t} + \alpha_k Controls_{i,t} + Year_{i,t} + Industry_{i,t} + \varepsilon_{i,t} \quad (1)$$

$$EP_{i,t} = \beta_0 + \beta_1 Dig_{i,t} + \beta_2 MRS_{i,t} + \beta_3 Dig_{i,t} \times MRS_{i,t} + \beta Year_{i,t} + \beta Industry_{i,t} + \varepsilon_{i,t} \quad (2)$$

Next, the research studied the management equity incentives' moderation effect on the relationship between corporate economic performance and digital transformation, and further constructed a moderating model as shown in equation (2).

3. Descriptive Statistics

According to the descriptive statistical results presented in Table 3, the significant difference between the maximum and average values of the enterprise digital transformation index indicates substantial variations in this among enterprises. The development space for this in most listed companies is still vast. The significant difference between the minimum and maximum values indicates that the majority of enterprises are not highly digitized, and most of their digital transformation are still in their initial or non-initial stages. The difference between the minimum and maximum values of corporate economic performance also indicates that there is a significant gap in economic performance among listed companies, and the competition is relatively fierce. The disparity between the mean and the maximum value can also reveal the uneven distribution of corporate economic performance. A small number of leading companies have pushed the overall value slightly higher, but the vast majority of enterprises are still at a low level. The minimum and median values of management equity incentives for senior management are both 0, with a mean of 0.01, indicating

that the shareholding ratio of senior management in most enterprises is not high, and the degree of management equity incentives is low.

Table 3. Descriptive statistical results

variable	mean	sd	min	p50	max	N
EP	0.05	0.03	0.01	0.04	0.15	477
DIG	38.85	11.71	23.52	36.37	73.54	477
MRS	0.01	0.03	0	0	0.22	477
Size	23.51	1.45	20.26	23.35	27.45	477
Soe	0.65	0.48	0	1	1	477
Dual	0.16	0.37	0	0	1	477

4. Regression Analysis

4.1. Main Effect Regression

After controlling for fixed effects of year and industry, the study investigates the correlation between digital transformation and economic performance. As shown in Table 4 (1) below, the value of the result parameter is positive, at 0.0004, and the significance level reaches 99%. This preliminarily indicates that digital transformation's level of firms with A-share is positively correlated with their economic performance, with a correlation coefficient of 0.0004. The higher digital transformation level of an enterprise, the higher its economic performance level, and the higher its overall operating income level.

4.2. Moderation Effect Regression

This article introduces an interaction term, which multiplies the top management equity incentives variable and the digital transformation maturity variable together, and then conducts regression analysis. The regression results in Table 4 show that the regression coefficient of the interaction term between digital transformation and the management equity incentives level is 0.021095. At a 99% confidence level, the regression coefficient is significantly different from 0, indicating that when the shareholding ratio of senior management is high, the positive correlation between enterprise digital transformation and corporate economic performance is stronger. That is, management equity incentives will strengthen the digital transformation's positive effect on economic performance. From the senior management, the higher the management's shareholding ratio, the more willing they are to undertake short-term capital investment in digital transformation, pursue long-term benefits, and engage in venture capital investment, rather than cost-centered investment. Moreover, senior management typically holds a higher level of authority, enabling them to promote the alignment of decision-making and management powers, thereby achieving consistency between decision-making and implementation.

Table 4. Regression analysis results

variable	(1) EP	(2) EP
DIG	0.0004 (0.0001)	0.0002 (0.0001)
MRS		-0.1506 (0.1401)
DigMRS		0.0095 (0.0029)
controls	Yes	Yes
Industry	control	control
Year	control	control
N	477	477
Adj-R2	0.5868	0.6474

Note: are significant at the 5%, 1%, and 0.1% levels, respectively

4.3. Robustness Test

This article re-measures the digital transformation level by replacing the dependent variable with Return on net assets (ROE) and conducting regression analysis. The regression results are presented in Table 5 and indicate that when using ROE to measure corporate economic performance, the interaction term effect between the digital transformation level and management equity incentives cannot statistically reject the null hypothesis, with a P value of 0.598. This may reflect that ROE has lower validity in measuring corporate economic performance and cannot comprehensively assess economic performance. However, the direction of the coefficient is consistent with the benchmark result, indicating that ROE is still positively correlated with the digital transformation index, but the estimation accuracy is insufficient.

4.4. Endogeneity Test

This article performs a one-period lag processing on the digital transformation index and conducts regression analysis again to eliminate the interference of reverse causality. First, the research conducted an endogeneity test on the explanatory variables without interaction terms, with the outcomes displayed in Table 5's column (2). It indicates that the model cannot reject the null hypothesis, meaning that the level of corporate economic performance may also affect the enterprises' digital transformation. Next, the research added an interaction term to test the endogeneity of the explanatory variable lagged by one time, and Table 5's column (3) displays the outcomes. As may be observed, the value of the enterprise digital transformation index is still positive, but the regression coefficient of the interaction term is negative. It can be seen that the result cannot reject the null hypothesis of non-existent endogeneity, indicating that the digital transformation level may also affect the management equity incentives impact on economic performance.

Table 5. Robustness and endogeneity tests

variable	(1) Replace the dependent variable	(2) The explanatory variable with a one-period lag does not include interaction terms	(3) The explanatory variable lags by one period and includes interaction terms
	ROE	EP	EP
DIG	-0.0009 (0.0009)		
MRS	0.2234 (0.5701)		0.294 (2.12)
Dig*MRS	0.0062 (0.0118)		
L_DIG		-0.0000575 (-0.37)	0.0000717 (0.49)
L_DIG MRS			-0.00677 (-1.61)
controls	Yes	Yes	Yes
Industry	control	control	control
Year	control	control	control
N	477	477	213
Adj-R2	0.2629	0.8666	0.8724

4.5. Expansion Analysis

Influenced by endogeneity, this article re-examines the management equity incentives impact on corporate economic performance and the digital transformation's moderation effect on this relationship, and conducts a regression analysis. The regression analysis and calculation results of management equity incentives and economic performance show that the coefficient of management equity incentives is a positive value of 0.2369, indicating a significant correlation between the two

with a confidence level of 99.9%. The results indicate that there is a positive correlation between the degree of management equity incentives in A-share listed companies and their economic performance. Under certain conditions, the higher the management's shareholding ratio, the better the economic performance of the enterprise.

Next, this article performs a cross-product operation between digital transformation and management equity incentives, followed by regression analysis. The regression coefficient of the interaction term between digital transformation and management equity incentives is 0.0095. At a 99% confidence level, this regression coefficient is significantly different from zero. It indicates that when the digital transformation level is high, management equity incentives' s positive impact on corporate economic performance is more significant, that is, digital transformation will strengthen the management equity incentives enhancement effect on corporate finance.

In addition, this article conducts research by transforming explanatory variables and dependent variables. Research has found that the level of corporate economic performance also affects digital transformation level of enterprises. The improvement of corporate economic performance can also enhance the digital transformation level of enterprises.

5. Conclusion

The research results show that: Digital transformation can effectively enhance the overall economic performance of enterprises. The robustness test results are not significant but still maintain a positive correlation. The endogeneity test results fail to reject the null hypothesis, indicating a potential bidirectional causality problem between the two; management equity incentives can strengthen the digital transformation' s driving effect on corporate economic performance. The regression results are significant, but there are still deviations in robustness tests and endogeneity tests, which may also involve a bidirectional causality issue; Further research on bidirectional causality issues has found that the level of corporate economic performance may have a reverse impact on digital transformation. To some extent, management equity incentives can also drive corporate economic performance. Digital transformation can also enhance the role of management equity incentives in promoting corporate economic performance.

This article refines the evaluation method of enterprise economic performance level and further confirms digital transformation' s positive impact on enterprise economic performance. At the same time, it enhances the moderating effect of management equity incentives on the impact of digital transformation, providing suggestions for enterprises to implement digital transformation. There are some bidirectional causality issues in the robustness test and endogeneity test of this study, which lead to insignificant results. For that, this paper further conducts research by transforming explanatory variables, dependent variables, and moderating variables. The research findings remain significant, providing direction for subsequent studies on the bidirectional causal relationship among the three.

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