The Impact of Internal Management Capability of Manufacturing Enterprises on Enterprise Transformation and Upgrading - Based on the Perspective of Government Subsidies

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Abstract. With the progress and development of the times, as well as the arrival of a new round of industrial change and technological revolution, enterprise transformation and upgrading have become requirements for the survival of enterprises. As an internal factor, the internal management capability of manufacturing enterprises plays an essential role in the transformation and development of enterprises.

Keywords: internal management capacity; enterprise transformation and upgrading.

1   Introduction

The manufacturing industry plays a pillar role in the development of developing countries, and therefore, China's manufacturing industry plays a role in economic development that other industries cannot replace.

Based on the theory of enterprise business management, this paper explores the impact of the internal management capability of manufacturing enterprises on enterprise transformation and upgrading with 2,616 listed manufacturing companies and 19,000 samples in China's Shanghai and Shenzhen A-shares from 2011 to 2022.

2   Literature review and hypothesis

Enterprise management capability can promote enterprise transformation and upgrading. The management capability of enterprises is a focus of academic attention, which is related to whether enterprises can reduce the risks they face(Xiong et al., 2022) [1].Enterprise management capability positively correlates with enterprise total factor productivity (Zhang et al., 2022)[2]. Wang and Zhu (2023) [3]similarly argued that the

management ability of CEOs and other executives can effectively improve the efficiency of enterprise management and can promote enterprise financialization.

Government subsidies are associated with the ability to influence the transformation and upgrading of enterprises to a certain extent. Bernini et al. (2017) [4]pointed out a complex and non-unique relationship between government subsidies and firms' total factor productivity. Wen et al. (2023) [5]had a similar view, arguing that the relevant policy support significantly impacts the total factor productivity of marine enterprises.

Improving enterprise management ability can promote enterprise profitability and positively affect enterprise transformation and upgrading. Feng (2000) believes that enterprise management should be people-oriented and improve adaptability, which helps enterprises adapt to social and economic development and is conducive to improving enterprise management and development[6]. Moreover, enterprise profitability can provide financial support for enterprise transformation and upgrading.

Based on this, this paper proposes the following three hypotheses:

H1: Improving the internal management capabilities of manufacturing enterprises can promote their transformation and upgrading.

H2: Government subsidies can consolidate the role of internal management capacity improvement of manufacturing enterprises in promoting enterprise transformation and upgrading.

H3: The internal management capability of manufacturing enterprises enhances their profitability, facilitating their transformation and upgrading.

To summarize, this paper constructs the model of the influence of the internal management ability of manufacturing enterprises on enterprise transformation and upgrading with enterprise profitability as the mediating variable and government subsidy as the moderating variable, as shown in Fig. 1: Internal governance Enterprise transformation and upgrading government grant profitability.
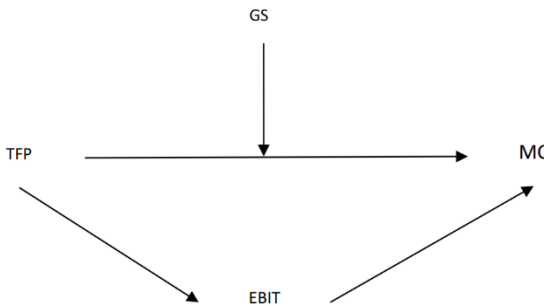

Fig. 1. Diagram of the theoretical model of the study

3   Research design

In this paper, total factor productivity is selected as a proxy variable for the transformation and upgrading of manufacturing enterprises; MA_Score is selected as a proxy variable for the internal capabilities of enterprises; to eliminate the bias caused by

enterprise size, government subsidies to total assets ratio is selected as a proxy variable for government subsidies; EBIT is selected as a proxy variable for profitability, and equity checks and balances, asset turnover ratio, cash holding, enterprise size, etc. as control variables. The variable definition is shown in Table 1:

Table 1. Interpretation of indicators

	variant	variable symbol	Variable Definition
dependent variable	Total factor productivity	TFP	Combined productivity of production units (mainly firms) as factors in the system, calculated using the OP model
explanatory variable	Management capacity	MC	MA_Score
moderator variable	Ratio of government grants to total assets	GS	Government grants/total assets
intermediary variable	EBIT	EBIT	Profit without interest or income tax deduction
control variable	Shareholding checks and balances	EBD	Proportion of shares held by the second to fifth largest shareholder / proportion of shares held by the first largest shareholder
	Asset turnover ratio	AT	Ratio of total turnover to total assets
	cash holdings	CH	cash holdings
	Enterprise size	Size	Logarithm of total assets at the end of the period

4   Diagnostic tests

4.1   Multicollinearity test

The results of the multicollinearity test in this article are shown in Table 2:

Table 2. Results of VIF test

Variables	VIF	1/VIF
MC	1.2300	0.8146
GS	1.0100	0.9877
EBIT	1.3600	0.7329
EBD	1.0100	0.9885
AT	1.2500	0.7999
CH	1.5900	0.6300
Size	1.3900	0.7208
Mean VIF	1.2600	

From the results in Table 2, it can be seen that the VIF values are all greater than 1 and less than 10, and 1/VIF is all less than 1 and greater than 0. Therefore, there is no multicollinearity between the variables.

4.2   Hausmann test

The Husman test is often used to test whether a fixed effects model or a random effects model should be used for parameter estimation. The results of the Husman test in this paper are shown in Table 3:

Table 3. Hausmann test

	(b)	(B)	(b-B)	sqrt(diag(v_b-v_B))
	fe	re	Difference	S.E.
MC	-0.1710	-0.1343	-0.0368	0.0070
EBD	-0.2032	-0.1012	-0.1020	0.0146
AT	0.2988	0.2308	0.0681	0.0091
CH	-0.0608	-0.0789	0.0181	0.0102
Size	0.8307	0.6540	0.1767	0.0103

Hausman test results Prob > chi2 = 0.0000 , P=0.0000, therefore, a fixed effects model should be selected.

4.3   F-test

The F-test of this paper is Prob>F=0.0000, which further justifies the choice of a fixed effects model.

4.4   Tests for mediating effects

In order to verify hypothesis 2, this paper refers to Wen et al. (2004)[7] mediation effect analysis. It tests the three-step method to construct the following mediation effect model as follows:

$$TFP_{it} = \_cons_{it} + \beta_1 \times MC_{it} + \beta_j \times CVs + \sum Year + \sum Firm + \varepsilon_{it} \tag{1}$$

$$EBIT_{it} = \_cons_{it} + \beta_2 \times MC_{it} + \beta_j \times CVs + \sum Year + \sum Firm + \varepsilon_{it} \tag{2}$$

$$TFP_{it} = \_cons_{it} + \beta_3 \times EBIT_{it} + \beta_4 \times MC_{it} + \beta_j \times CVs + \sum Year + \sum Firm + \varepsilon_{it} \tag{3}$$

To test hypothesis 3, the following moderating effects model was constructed:

$$TFP_{it} = \_cons_{it} + \delta_1 \times MC_{it} + \delta_2 \times GS_{it} + \delta_j \times CVs + \sum Year + \sum Firm + \varepsilon_{it} \tag{4}$$

The correlation test results of this article are shown in Table 4:

Table 4. Correlation analysis

	TFP	MC	GS	EBIT	EBD	AT	CH	Size
TFP	1.000							
MC	0.2980***	1.0000						
GS	-0.1200***	-0.0440***	1.0000					
EBIT	0.2750***	0.0410***	-0.0360***	1.0000				
EBD	-0.0690***	-0.0420***	0.0150**	-0.0240***	1.0000			
AT	0.5630***	0.4170***	-0.0130*	0.0690***	-0.0830***	1.0000		
CH	0.3640***	0.0070	-0.0390***	0.5040***	-0.0030	0.0510***	1.0000	
Size	0.7520***	-0.0270***	-0.0970***	0.3390***	-0.0660***	0.1370***	0.4900**	1.0000

***, **, * represent 1%, 5%, and 10% significance levels, respectively, and t-values are in parentheses.

From the correlation analysis in Table 4, it can be seen that the dependent variable management competence is significantly correlated with all other variables at the 1% level; the independent variable management competence is not correlated with cash flow and is significantly correlated with all other variables at the 1% level.

4.5　Tests for mediating effects

This article refers to the paper by Liu J. al. (2023) and conducts a mediation effect test[8]. The results of the mediation effect test in this article are shown in Table 5:

Table 5. Results of the mediation effect test

variant	TFP	EBIT	TFP
MC	0.1733***	0.0657***	0.1730***
	(13.53)	(5.33)	(13.55)
EBIT			0.0049*
			(1.16)
EBD	0.0291*	-0.0475*	0.0293*
	(1.94)	(-1.75)	(1.95)
AT	0.4080***	0.0282	0.4078***
	(9.39)	(1.59)	(9.39)
CH	0.0284***	0.1832***	0.0275***
	(3.50)	(2.89)	(3.37)
Size	0.6802***	0.1103***	0.6796***
	(31.49)	(4.67)	(31.41)
Constant	-0.1284***	0.0460**	-0.1286***
	(-5.33)	(1.69)	(-5.34)
Hausman test value(Prob>chi2)	0.0000	0.0000	0.0000
Prob>F	0.0000	0.0000	0.0000
Observations	19000	19000	19000
Number of id	2616	2616	2616
R-squared	0.3517	0.2429	0.8075
Company FE	YES	YES	YES
Year FE	YES	YES	YES

***, **, * represent 1%, 5%, and 10% significance levels, respectively, and t-values are in parentheses.

In the first column of the primary effect regression, the coefficient of the impact of internal management capabilities of manufacturing firms on the transformation and upgrading of enterprises is 0.1733, which is significantly positively correlated at the 1% level. The second column of the impact coefficient of the internal management capacity of enterprises on profitability is 0.0657, which is significantly positively correlated at a 1% level. The coefficient of influence of the internal management capacity of manufacturing companies on the transformation and upgrading of enterprises in the third column is 0.1733, which is significantly positively correlated at the 1% level, and the coefficient of influence of profitability on the transformation and upgrading of enterprises is 0.0049 significantly positively correlated at the 10% level.

4.6   Moderating effects test

The results of the moderation effect test in this article are shown in Table 6:

Table 6. Tests for the moderating effect of government grants

variant	TFP	TFP
MC	0.1729***	0.1729***
	(13.49)	(13.55)
GS		-0.0086*
		(-1.8800)
M1	-0.0083*	0.0092**
	(-1.66)	(2.22)
EBD	0.0291*	0.0288*
	(1.94)	(1.92)
AT	0.4083***	0.4086***
	(9.38)	(9.39)
CH	0.0284***	0.0282***
	(3.4900)	(3.4500)
Size	0.6790***	0.6798***
	(31.34)	(31.56)
Constant	-0.1290***	-0.1270***
	(-5.35)	(-5.30)
Hausman test value(Prob>chi2)	0.0000	0.0000
Prob>F	0.0000	0.0000
Observations	19000	19000
Number of id	2616	2616
R-squared	0.8082	0.8081
Company FE	YES	YES
Year FE	YES	YES

***, **, * represent 1%, 5%, and 10% significance levels, respectively, and t-values are in parentheses.

4.7   Robustness Tests

The robustness test results of this article are shown in Table 7:

Table 7. Robustness test results

variant	TFP-LE
MC	0.0677 ***
	(7.51)
EBD	-0.0062
	(-0.64)
AT	0.2923***
	(9.36)
CH	0.0246 ***
	(4.11)
Size	0.7855 ***
	(37.05)
Constant	0.0843***
	(4.02)
Hausman test value(Prob>chi2)	0.0000
Prob>F	0.0000
Observations	19000
Number of id	2616
R-squared	0.8919
Company FE	YES
Year FE	YES

***, **, * represent 1%, 5%, and 10% significance levels, respectively, and t-values are in parentheses.

In this paper, total factor productivity under the LP model is used to replace total factor productivity under the OP model, and the correlation coefficient between the digital economy index and the transformation and upgrading of manufacturing enterprises is still significantly positive at the 1% level, with a coefficient of 0.0677. The above robustness test results conform to the baseline regression model results, which indicates that improving the internal management capacity of manufacturing enterprises can promote their transformation and upgrading. Therefore, the benchmark regression model of this paper passes the robustness test.

5   Conclusions and recommendations

5.1   Conclusion

This study proves that improving the internal management ability of manufacturing enterprises can significantly and effectively promote enterprise transformation and upgrading, and government subsidies can reinforce the above relationship. Promoting

enterprise transformation and upgrading by improving enterprise profitability through internal management capability is possible.

5.2   Policy recommendations

Manufacturing enterprises can improve internal management capacity through the cultivation of organizational culture and personnel training to promote the transformation and upgrading of enterprises, but also by using supportive policies to promote the above relationship. At the same time, enterprises can focus on renewing enterprise products and increasing marketing efforts.

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