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Multiple Regression Analysis of the Relationship between Corporate Economic Efficiency and Financial Structure

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Abstract Financial structure directly affects an enterprise's capital liquidity, financial soundness and its competitiveness in the market. And the rapid development of digital economy provides new development opportunities for enterprises to enhance productivity, optimize resource allocation, and promote sustainable growth through digital transformation. This paper explores the relationship between the development level of digital economy and the financial structure of enterprises through the method of multiple regression analysis. The sample of the study is 9,000 Chinese companies listed on the GEM between 2012 and 2014, and the data are obtained from Cathay Pacific and China Economic and Financial Database. The results of the study show that there is a significant positive correlation between the level of digital economy and corporate financial structure, and the regression analysis shows that the unstandardized regression coefficient of digital economy development is 0.111 and is significant at the 0.01 significance level. In addition, the return on total assets (ROA) also shows a positive correlation with financial structure, with a regression coefficient of 1.845 and a significance level of 0.000. R&D innovation investment has a weak positive correlation with financial structure, with a regression coefficient of 0.070 and a significance level of 0.058. The study shows that the development of the digital economy, by promoting the technological innovation of the enterprise and the efficiency of resource allocation, significantly improves the the level of financial structure.

Index Terms Digital economy, financial structure, multiple regression, economic efficiency, return on total assets, R&D innovation investment

I. Introduction

In the context of global economic integration and increasingly fierce market competition, enterprises are facing unprecedented challenges and opportunities. In this environment, the economic efficiency of the enterprise is particularly important, not only related to the current operation status of the enterprise, but also directly affects the future development direction and competitiveness of the enterprise [1]. Therefore, in-depth understanding of the characteristics of enterprise economic efficiency and its impact on enterprise financial structure is of great significance for improving the quality of enterprise operation and maintaining the long-term sound development of enterprises.

Modern enterprise financial structure is a set of internal control and management system formed under globalization, informationization and complex market environment to ensure long-term sound operation of the enterprise and maximization of shareholder value [2]. Its core objective is to ensure the effective allocation of enterprise resources, while maximizing shareholders' interests under the premise of complying with relevant laws and regulations [3], [4]. A sound financial structure is particularly critical to improving enterprise efficiency, which on the one hand can promote enterprise financing by improving the transparency of enterprise information, and on the other hand can also promote the rational allocation of enterprise resources through reasonable structural design [5]-[7]. A sound financial governance mechanism can ensure that decisions are based on the real needs of the enterprise and market conditions rather than on certain subjective factors, which is more conducive to increasing the economic benefits of the enterprise, thus improving the performance of the enterprise [8]-[10]. Therefore, by exploring the interactive relationship between enterprise financial structure and economic efficiency, it is conducive to reducing enterprise management risks and improving its operational efficiency, ensuring that financial governance is consistent with the strategic objectives of the enterprise, making the enterprise's resource allocation more flexible, and facilitating the enterprise to realize its long-term strategic objectives [11]-[14].

Based on panel data, this paper constructs a multiple linear regression model to explore the impact of corporate economic efficiency, especially the level of digital economy development, on financial structure. The study selects data from 9,000 GEM companies, controls for factors such as company growth, human capital, and R&D investment,

and combines ROA, profitability and other financial indicators to comprehensively analyze the key drivers of financial structure changes, and uses the mediation effect model to reveal the mechanism of the digital economy's impact on the financial structure through the paths of innovation investment and human capital, so as to enhance the explanatory power and practical value of the research results.

II. Research on the relationship between economic efficiency and financial structure of enterprises based on multiple regression

II. A. Construction of multiple regression model

Where Y_i is the dependent variable; b_0 is the intercept; x_{ik} is the independent variable; b_k is the vector of regression coefficients; and e_i is the residuals, which is the random error after removing the effect of the k independent variables on Y to discriminate discrete outliers. An outlier is a discrete outlier when the residuals e_i of a set of data (x_i, y_i) are much larger than the residuals of the other data in the constructed regression model. It is possible that the variables in some samples deviate significantly from the rest of the data for specific reasons, such as sudden changes in experimental conditions or human error in recording. The diagnosis and treatment of outliers can improve the reliability of the results, reduce the analytical errors and improve the accuracy.

In this study, MATLAB was used to calculate the MLR model [15]. The MLR in this study minimizes the sum of squared errors between the measured and predicted variables, and the regression coefficients were determined using the least squares technique [16] to minimize the sum of squared errors (RSS), which is defined as follows:

$$RSS = \sum_{i=1}^{n} (y - b_0 - b_1 \cdot x_{i1} - b_2 \cdot x_{i2} - b_3 \cdot x_{i3} - \cdots - b_k \cdot x_{ik}) \tag{1}$$

After constructing the model, model validation is required. Model validation is probably the most important step in the model construction sequence the validation process can include checking the goodness-of-fit of the regression, investigating whether the regression residuals are random, and testing whether the predictive performance of the model decreases substantially when applied to data not used in the model estimation.

Goodness-of-fit is the degree to which the regression line fits the observations. The coefficient of fit R^2 is a statistic used to measure the goodness of fit, i.e., the proportion (or percentage) of the y variance explained by the regression model in the y total variance, ranging from 0 to 1. The closer the value of R^2 is to 1, the better the regression straight line fits the observations; conversely, the smaller the value of R^2 is, the poorer the fit is.

The formula for calculating the fit coefficient R^2 is as follows:

$$R^2 = 1 - (SS_{res} / SS_{tot}) \tag{2}$$

where SS_{res} denotes the residual sum of squares, which is the sum of the squares of the differences between the true and predicted values, i.e., the error between the predicted and true values. SS_{tot} denotes the total sum of squares, reflecting the total error between the n observations of the dependent variable and its mean, indicating the degree of dispersion of the values, with larger indicating more dispersion. SS_{res} / SS_{tot} indicates that SS_{res} excludes the effect of dispersion.

where the expressions for SS_{res} and SS_{tot} are as follows:

$$SS_{res} = \sum_i (y_i - f_i)^2 SS_{tot} = \sum_i (y_i - \overline{y})^2 \overline{y} = (\sum_{i=1}^{n} y_i) / n \tag{3}$$

where f_i denotes the true value and y_i denotes the predicted value.

In addition, the significance of the multiple regression [17] equation is tested (F-test) by constructing the statistic F. If the p value of the F-test is less than 0.05, it means, the overall regression is significant.

$$F = (SS_{reg} / k) / (SS_{res} / (n - k - 1)) \tag{4}$$

$$SS_{reg} = \sum_i (f_i - \overline{y})^2 \tag{5}$$

where SS_{res} denotes the residual sum of squares and SS_{reg} denotes the regression sum of squares. The larger the F the more significant the existence of linear relationship. In addition, the smaller the residual variance S^2, the

more accurately the regression equation is predicted; the residual variance S^2 is equivalent to the error mean squared error MSE, defined as:

$$MSE = SSres / (n-k) \tag{6}$$

In this study, checking the goodness of fit of the regression was used to initially determine the accuracy of the model, then outliers were removed and when the goodness of fit was more than 90%, the regression equations were determined and the microalgae data that were not used in the construction of the model were used for validation comparisons.

Regression modeling is one of the multivariate statistical methods and is the best tool to study and model linear relationships between correlated and independent parameters.MLR is a statistical method that attempts to model the correlation between involved and response variables based on linear equations in the observed data. Using MATLAB 2016a software, the equation of the MLR model for this study is:

$$Y_i = b_0 + b_1 \cdot x_{i1} + b_2 \cdot x_{i2} + \ldots + b_k \cdot x_{ik} + e_i \tag{7}$$

II. B. Research design on the relationship between economic efficiency and financial structure of enterprises

II. B. 1) Sample Selection and Data Sources

This paper selects companies listed on the GEM from 2012 to 2014, collects data through the Cathay Pacific database (CSMAR Center) and the China Economic and Financial Database (CCER), and applies EXCEL software and Statall.0 software to cumbersomely screen and organize the data with the following treatments:

(1) Remove the samples with too poor performance such as ST, *ST, PT, etc., because the poor operating performance will lead to abnormal financial indicators, and thus will have an impact on the results of the empirical analysis.

(2) Remove samples with missing values in financial data.

Through screening and organizing, the final number of valid samples obtained is 9000.

II. B. 2) Definition of variables

(1) Dependent Variables

Through extensive study of the established literature, it can be found that the two most common indicators used by existing studies in setting measures of a company's financial structure (*FST*) are the indicator of advanced industrial structure (*Industry_gh*) and the level of servitization of industrial structure (*Industry_ser*). Advanced industrial structure usually implies a shift from a low value-added, labor-intensive industry to a high value-added, technology-intensive and knowledge-intensive one, representing a company's entry into a position more conducive to market competition. Advanced industries tend to have the potential for higher profitability. Under the trend of digitalization, the advanced industrial structure is the general direction of the industry development, the company follows this trend, the financial structure will also be adjusted to adapt to the new form of industrial development. The service-oriented industrial structure refers to the transformation of the industry from production-oriented to service-oriented, which requires the company to have a more flexible financial structure to support the development of customers. Therefore, this paper selects the index of advanced industrial structure and the level of servitization of industrial structure as the dependent variables to measure the financial structure.

(2) Independent Variables

There is a close relationship between the digital economy and the economic efficiency of enterprises. Digital technology can realize the automation and intelligence of the production process, and enterprises can optimize the production process by using big data analysis. Through the data collection and analysis of the production process, enterprises can control the input of raw materials more accurately, improve the quality control efficiency of the production link, reduce the production cost, and then improve the economic efficiency. At the same time, the digital economy can enable enterprises to build a more transparent and efficient supply chain, real-time monitoring of raw material inventory and transportation process. It improves the response speed of the supply chain, which in turn improves the economic efficiency of the enterprise. Therefore, this paper selects the level of digital economic development (*lnDigital_city*), as the core explanatory variable.

(3). Control Variables

The sample of GEM listed companies selected in this paper. Combined with the study of other influencing factors, company growth, return on total assets, human capital structure, R&D and innovation investment are selected as control variables, and the year and industry as dummy variables.

a) Company growth (*GROW*): expressed by the company's profit growth rate.

b) Return on total assets (*ROA*): expressed as net profit divided by average total assets.

c) Human capital structure (*lnHR*), selected from the number of students enrolled in higher education per 10,000 people in each region. Human capital development promotes total factor productivity and technological progress, thus promoting the optimization and upgrading of industrial structure.

d) R&D and innovation investment (*lnRD*), selected from the scientific career expenses of each region, R&D investment can significantly promote industrial structure upgrading through technological innovation.

e) Year (*YEAR*): the sample interval selected in this paper is located in 2012-2014, only three dummy variables YEAR12, YEAR13 and YEAR14 are set. For example, when the sample data belongs to 2012, YEAR12 takes the value of 1, while YEAR13 and YEAR14 take the value of 0.

f) Industry (*IND*): when the listed company belongs to a certain industry, it takes the value of 1, otherwise 0.

II. B. 3) Modeling

This paper uses a panel data model. The panel data model takes into account the effects of both time series and cross sectional series and also finds some effects that are not captured by time series alone and cross sectional series alone. Furthermore panel data has the advantage of overcoming heteroskedasticity, autocorrelation and serial correlation compared to time series and cross sectional series, and it also significantly reduces problems due to defaults, making the estimation better. The study period is 2012-2014.

III. Empirical analysis of the impact of corporate economic performance on financial structure

This paper presents manual statistics on the corporate economic performance of listed companies for the three-year period 2012-2014.

III. A. Descriptive analysis

Table 1 shows the results of descriptive analysis of financial structure and related variables. For the explanatory variable financial structure (*FST*), its mean value is 58.74%, the maximum value is as high as 89.78%, and the minimum is only 3.85%, with a standard deviation of 0.1954, which indicates that the financial structure of the sample companies is relatively good. For the explanatory variable enterprise economic efficiency (*lnDigital_city*), its standard deviation is 0.3145, indicating that there is not much difference between enterprise economic efficiency. However, if the coefficient of variation (standard deviation/mean) of corporate economic efficiency is calculated, the coefficient of variation is extremely large, indicating that the situation of financial governance structure varies greatly among the sample companies. As for the control variables, the mean value of firm growth (*GROW*) is 0.2845 and the standard deviation is 1.4512, which indicates that the firms as a whole are in the growth period of steady growth. However, it can also be seen that the minimum value of the company's growth (*GROW*) is -10.5421, which may be due to the fact that the company's revenue from main business in the base period has grown extraordinarily, and the revenue from main business in the reporting period has failed to exceed the level of the base period. The mean value of Return on Total Assets (*ROA*) is 9.87% and the maximum is 28.45% with a standard deviation of 0.0456, which indicates that the sample companies are more stable in terms of profitability and possess strong competitiveness and development ability. The minimum value of return on total assets (*ROA*) is -21.35%, which may be due to the fact that some sample companies are operating with debt. The mean value of human capital structure (*lnHR*) is 25.41% and the maximum value is 89.45%, which indicates that the company has a better human capital structure. The mean value of investment in R&D and innovation (*lnRD*) is 0.4845, which indicates that about fifty percent of the firms are innovative and productive firms.

Table 1: Descriptive analysis of related variables

Variable name	Minimum value	Maximum value	Mean value	Standard deviation
FST	0.0385	0.8978	0.5874	0.1954
lnDigital_city	-0.8122	0.8789	0.5412	0.3145
GROW	-10.5421	23.4512	0.2845	1.4512
ROA	-0.2135	0.2845	0.0987	0.0456
lnHR	0.0025	0.8945	0.2541	0.1987
lnRD	0.0044	0.8845	0.4845	0.4851

III. B. Correlation analysis

Table 2 shows the results of the correlation analysis between the financial structure and the relevant variables using the Pearson correlation analysis method, which is mainly obtained by using the Pearson correlation analysis software SPSS22.

The level of digital economy development shows a significant positive correlation with financial structure at the 0.01 level of significance with a correlation coefficient of 0.226. Return on total assets (*ROA*) is positively correlated with financial structure at 0.01 level of significance with a correlation coefficient of 0.511, indicating that the better the profitability, the better the financial structure of the company. Investment in R&D and innovation (*lnRD*) is positively correlated with financial structure at 0.05 level of significance. Company growth (*GROW*) and human capital structure (*lnHR*) are not correlated with financial structure.

Table 2: Pearson related analysis results

Variable name	*FST*	*lnDigital_city*	*GROW*	*ROA*	*lnRD*	*lnHR*
FST	1					
lnDigital_city	0.226***	1				
GROW	0.018	0.09**	1			
ROA	0.511***	0.133***	0.082**	1		
lnRD	0.018	0.105**	0.084**	-0.07**	1	
lnHR	0.085**	0.365***	0.045**	-0.12**	0.19***	1

III. C. Regression analysis and results

Correlation is based on the premise of the assumption that other variables remain unchanged to study the correlation between two two variables, but this is impractical. Therefore, in this paper, under the consideration of multiple control variables, the multiple linear regression model is used to regress the selected variables to further examine whether there is a relationship between the explanatory variables and the explained variables as well as the directionality of their relationship, and the regression results are shown in Table 3.

The adjusted R-squared can test the fit of the linear model, and the larger the value of the adjusted R-squared, the better the fit of the model. The adjusted R-squared is 0.288, which means that the explanatory variables can be explained by the explanatory variables to the extent of 28.8%, and the model fit between the explanatory variables and the explanatory variables is in general.

The F-test, also known as the variance chi-square test, is a hypothesis test that tests whether the linear relationship between the explained variable and the explanatory variable is significant, utilizing the ANOVA method. The result is significant if Sig.<P, otherwise it is not significant.F=38.456, significance Sig.=0.000<0.01, passed the F significance test, indicating that the regression coefficients of all the explanatory variables are not zero at the same time, so there is a linear relationship between the explanatory variables and all the explanatory variables, and the linear regression model can be used.

The level of digital economy development is positively related to the explanatory variable financial structure, with an unstandardized coefficient of 0.111, which is significant at the significance level of 0.01, which means that the higher the level of digital economy development, the better the financial structure. Among the control variables, the return on total assets (*ROA*) and financial structure are significantly positively correlated, the higher the company's ROA is, the better the company's profitability is, which is conducive to the company's long-term development in the future, and therefore the company's financial structure is more perfect. The non-standardized coefficient of R&D and innovation investment (*lnRD*) and financial structure is 0.070, which is weakly positively correlated at the significance level of 0.1. There is no significant relationship between firm growth (*GROW*), human capital structure (*lnHR*) and financial structure.

Table 3: Regression analysis

	Nonnormalized coefficient	Standard coefficient		t	Significance
	B	Standard error	Beta		
FST	0.645	0.019		36.451	0.000
lnDigital_city	0.111	0.025	0.165	3.959	0.000
GROW	0.006	0.0069	0.051	1.266	0.209
ROA	1.845	0.145	0.502	12.451	0.000
lnRD	0.070	0.045	0.078	1.905	0.058
lnHR	0.009	0.019	0.019	0.415	0.678
YEAR	control				
IND	control				
R	0.549		*F*	38.456	
Adj R-squared	0.288		*sig*	0.000	

IV. Further research on the effects of the economic efficiency of enterprises

IV. A. Impact of structural sophistication and servitization on the financial structure of enterprises

Table 4 shows the estimation results of the impact of industrial structure advanced and service-oriented on the financial structure of firms. From the results, it can be found that the results of Hausmann's test and likelihood ratio test are both significant at the 1% level, which means that the regression can be performed by clustering robust standard errors under time and firm fixed effects. Among them, columns (1)~(3) show the estimation results of the industrial structure advanced on the financial structure of the enterprise in the financial structure representative indexes, and it can be found that the coefficients of the influence of the industrial structure advanced on the enterprise's various financial performance indexes are all significantly positive at the 1% confidence level, which suggests that the industrial structure advanced can significantly promote the enhancement of the financial structure of the enterprise, which is conducive to the promotion of the high-quality development of the enterprise.

Among them, columns (4)~(6) show the estimation results of industrial structure servitization on the financial structure of enterprises among the representative indicators of financial structure, and it is found that the impact coefficients of industrial structure servitization on various financial performance indicators of enterprises are also significantly positive at 1% confidence level, indicating that the development of industrial structure servitization can also significantly contribute to the enhancement of the financial structure of enterprises, which is conducive to the promotion of the sustained improvement of the financial structure of enterprises. Improvement. This may be due to two reasons: on the one hand, the development of advanced industrial structure and servitization is conducive to promoting the flow of factors, improving the efficiency of resource allocation, enhancing the core competitiveness of enterprises, and promoting the enhancement of enterprise performance; on the other hand, the development of industrial integration can help to promote the development of high quality, and the development of advanced industrial structure and servitization is the foundation of the development of industrial integration. The development of advanced industrial structure and servitization further drives the integrated development of the service industry and the manufacturing industry, which can effectively bring into play the technological effect, the knowledge effect, the channel effect, the market demand effect and the synergistic innovation effect, promote the development of the servitization of enterprises, push forward the value-added and value-creation of enterprises, improve the competitiveness of enterprises and bring about the continuous improvement of the financial structure of enterprises.

Table 4: The regression results of high level and service

Variable quantity	(1)	(2)	(3)	(4)	(5)	(6)
	Profit	ROE	ROA	Profit	ROE	ROA
lnIndustry_ser	0.054***	0.035***	0.025***			
	(0.015)	(0.012)	(0.005)			
lnIndustry_gh				0.174***	0.097**	0.062**
				(0.051)	(0.045)	(0.022)
lnAge	0.026	0.014	0.005	0.025	0.014	0.005
	(0.018)	(0.016)	(0.007)	(0.018)	(0.015)	0.008
lnCapital	0.031***	0.003	0.000	0.031***	0.002	0.000
	(0.004)	(0.003)	(0.001)	(0.004)	(0.003)	(0.002)
Growth	0.081***	0.073***	0.035***	0.084***	0.074***	0.038***
	(0.006)	(0.004)	(0.002)	(0.006)	(0.004)	(0.003)
LEV	-0.266***	-0.078***	-0.104***	-0.265***	-0.084***	-0.101***
	(0.021)	(0.015)	(0.007)	(0.021)	(0.015)	(0.008)
HHI	-0.003	0.034	0.005	0.007	0.045	0.009
	(0.062)	(0.068)	(0.031)	(0.064)	(0.065)	0.035
Constant	-0.265***	0.065	0.088**	-0.301***	0.047	0.077*
	(0.082)	(0.075)	(0.041)	(0.083)	(0.071)	0.034
Hausman	279.14***	236.78***	250.71***	274.32***	232.65***	245.13**
LR	181.62***	113.93***	132.14***	174.50***	104.42***	122.61***
Individual fixation	Yes	Yes	Yes	Yes	Yes	Yes
Time fixed	Yes	Yes	Yes	Yes	Yes	Yes
Sample size	9000	9000	9000	9000	9000	9000
R^2	0.193	0.135	0.204	0.192	0.133	0.203
Business number	800	800	800	800	800	800

IV. B. Impact of the level of development of the digital economy on the financial structure of enterprises

Table 5 shows the regression results of digital economy development affecting the financial structure of firms. Since the results of Hausman test and likelihood ratio test are both significant at the 1% level, it indicates that the choice of time and individual double fixed panel model for estimation is reliable. Columns (1) to (3) demonstrate that the coefficients of the impact of digital economic development on all financial performance indicators of enterprises are all significantly positive, indicating that the regional digital economic development can promote the improvement of the financial structure of enterprises, which is conducive to the promotion of high-quality development of enterprises. This may be due to the fact that digital economic development can promote enterprises to more effectively play the technology effect, knowledge effect, channel effect, market demand effect and collaborative innovation effect, fully promote the flow of resource elements, improve the efficiency of resource allocation, reduce the transaction cost, expand the market scale, enhance the core competitiveness of the enterprise, improve the financial structure of the enterprise and realize the sustainable development.

Table 5: The result of the financial structure of digital economic development

Variable quantity	(1)	(2)	(3)
	Profit	ROE	ROA
lnDigital_city	0.015*	0.013*	0.004**
	(0.008)	(0.002)	(0.001)
lnAge	0.025	0.014	0.005
	(0.015)	(0.015)	(0.007)
lnCapital	0.031***	0.001	0.000
	(0.004)	(0.004)	(0.001)
Growth	0.085***	0.072***	0.033***
	(0.005)	(0.001)	(0.001)
LEV	-0.269***	-0.082***	-0.105***
	(0.022)	(0.014)	(0.004)
HHI	0.000	0.035	0.002
	(0.061)	(0.062)	(0.031)
Constant	-0.235***	0.091	0.105**
	(0.087)	(0.074)	(0.042)
Hausman	276.61***	234.54***	246.51***
LR	159.25***	100.22***	118.33***
Individual fixation	Yes	Yes	Yes
Time fixed	Yes	Yes	Yes
Sample size	9000	9000	9000
R^2	0.195	0.202	0.133
Business number	800	800	800

IV. C. Examination of the Dynamic Mechanisms of the Development of the Digital Economy Affecting the Financial Structure of Enterprises

Table 6 shows the test results of the power transmission mechanism of R&D and innovation investment and human capital structure as mediating variables. The estimation results in columns (1) and (3) show that the coefficient of the level of digital economy development is significantly positive at the 1% confidence level, indicating that the digital economy development promotes the optimization of firms' R&D and innovation investment and human capital structure. Columns (2) and (4) report the results of the mediation effect tests for firms' R&D and innovation inputs and human capital structure, respectively, which show that the estimated coefficients of both R&D and innovation inputs and human capital structure on firms' net profits are significantly positive, while the coefficient of the level of digital economy development remains significantly positive at the 1% confidence level.

Table 6: Test of power conduction mechanism

Variable quantity	(1)	(2)	(3)	(4)
	lnRD	lnProfit	lnHR	lnProfit
lnDigital_city	0.185***	0.022***	0.185***	0.018***
	(0.120)	(0.008)	(0.121)	(0.008)
lnRD		0.045***		
		(0.007)		
lnHR				0.556***
				(0.006)
lnAge	0.281***	-0.042*	0.211***	-0.045**
	(0.032)	(0.021)	(0.032)	(0.023)*
lnCapital	0.118***	0.155***	-0.101***	0.165***
	(0.182)	(0.011)	(0.015)	(0.011)
Growth	0.085**	0.552***	-0.04	0.553***
	(0.042)	(0.024)	(0.041)	(0.027)
LEV	2.122***	-2.842***	2.344***	-2.887***
	(0.061)	(0.052)	(0.071)	(0.052)
HHI	-0.034	0.174	-0.272	0.187
	(0.195)	(0.142)	(0.207)	(0.142)
Constant	15.064	-4.432***	6.202***	-4.71***
	(0.275)	(0.232)	(0.292)	(0.205)
Sample size	9000	9000	9000	9000
R^2	0.142	0.281	0.135	0.281

Table 7 shows the estimation results of industrial structure advanced and industrial structure servitization as mediating variables respectively. Among them, columns (1) and (2) report the estimation results of the mediating effect of industrial structure servitization, and it can be seen that the coefficient of the impact of digital economy development on industrial structure servitization is significant at 1% confidence level, and the coefficient of the impact of industrial structure servitization as a mediator variable on firms' net profit is only significantly positive at 10% level.

However, columns (3) and (4) report the estimation results of industrial structure sophistication as a mediating variable, and it can be seen that the coefficients of the level of digital economy development are both significant at more than 5% confidence level, but the coefficients of industrial structure sophistication's impact on firms' net profit are not significant, so industrial structure sophistication is not a valid mediating variable. This may have some relationship with the process of industrial digitization.

Table 7: Test of power conduction mechanism

Variable quantity	(1)	(2)	(3)	(4)
	lnIndustry_ser	lnProfit	lnIndustry_gh	lnProfit
lnDigital_city	0.388***	0.008**	0.155***	0.044**
	(0.002)	(0.011)	(0.001)	(0.019)
lnIndustry_ser		0.055*		
		(0.032)		
lnIndustry_gh				-0.089
				(0.096)
lnAge	0.035***	-0.034	-0.004**	-0.032
	(0.007)	(0.022)	(0.001)	(0.022)
lnCapital	0.025***	0.163***	0.012***	0.164***
	(0.004)	(0.012)	(0.002)	(0.015)
Growth	0.018*	0.160***	0.002	0.555***
	(0.011)	(0.012)	(0.002)	(0.027)
LEV	-0.053***	-2.752***	-0.032***	-2.762***
	(0.015)	(0.051)	(0.004)	(0.052)
HHI	0.005	0.172	-0.042***	0.150
	(0.051)	(0.142)	(0.014)	(0.142)
Constant	0.581***	-3.864***	0.454***	-3.792***
	(0.072)	(0.202)	(0.021)	(0.205)
Sample size	9000	9000	9000	9000
R^2	0.645	0.281	0.745	0.285

V. Conclusion

This study shows that the digital economy has a significant impact on the financial structure of enterprises, especially in improving the efficiency of resource allocation and enhancing the core competitiveness of enterprises. The results of regression analysis show a positive correlation between the level of digital economy development and financial structure, with an unstandardized regression coefficient of 0.111 and significant at the 0.01 level of significance. This indicates that with the development of digital economy, the financial structure of enterprises has been effectively optimized, which is conducive to enhancing the market competitiveness of enterprises. In addition, the return on total assets (ROA) is also significantly positively correlated with financial structure, with a regression coefficient of 1.845, which further supports the important role of profitability in the optimization of financial structure. Although there is a weak positive correlation between R&D and innovation investment and financial structure, with a regression coefficient of 0.070, its impact is relatively small. In summary, the digital economy plays a positive role in the improvement of the financial structure of enterprises by promoting the enhancement of productivity, reducing operating costs and optimizing the allocation of resources.

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