

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

Qiuyan Tang¹, Jun Zhang¹, 

¹ School of Management, Xiangsihu College of GuangXi Minzu University, Nanning, Guangxi, 530031, China

ABSTRACT

In this paper, the financial structure is defined as two parts, asset structure and capital structure, with respect to the mechanism of enterprise financial management on the economic performance of enterprises. The multivariate regression model of asset structure and business performance is constructed with the dimensions of asset turnover efficiency and asset structure ratio. In order to represent the operating performance, total return on assets and return on net assets are chosen as the measures of operating performance and as the explanatory variables. It is proposed that there is a linear correlation between capital structure and corporate profitability, and the linear model between capital structure and corporate operating profitability is constructed. Combined with empirical tests to verify the relationship between asset structure or capital structure on business operations. The curve estimation method of the regression model is used to analyze the effects of inventory ratio, money fund ratio and fixed asset ratio in asset structure and capital structure on the total return on assets and return on net assets. The coefficients of fixed asset turnover on performance are 0.033 and 0.025 respectively, i.e., for every increase of 1 in fixed assets, total return on assets and return on net assets increase by 0.033 and 0.025. Similarly, the fixed asset turnover, inventory turnover, and the ratio of long term financial assets are positively correlated with the performance of the enterprise. The correlation coefficients of equity ratio and state-owned ratio of enterprise capital structure are positive, which bring positive impact on enterprise operating profitability.

Keywords: multiple regression; linear correlation; enterprise business performance; financial structure

 Corresponding author.

E-mail address: lechi116@163.com (J. Zhang).

Received 10 April 2024; Revised 25 July 2024; Accepted 15 November 2024; Published Online 16 April 2025.

DOI: [10.61091/jcmcc127b-059](https://doi.org/10.61091/jcmcc127b-059)

© 2025 The Author(s). Published by Combinatorial Press. This is an open access article under the CC BY license (<https://creativecommons.org/licenses/by/4.0/>).

1. Introduction

There is a close relationship between enterprise financial management and economic benefits, enterprise financial management is one of the important parts of enterprise management, whether it is scientific, reasonable, stable or not directly affects the economic benefits of enterprises [1-3]. Enterprise financial management is one of the important components of enterprise management, which has an irreplaceable position and role in the enterprise. Enterprise financial management involves various fields and links of the enterprise, including financial planning, cost control, investment decision-making, financing decisions and other aspects [4-7]. At the same time, the economic efficiency of enterprises is one of the important indicators of enterprise development, which reflects the comprehensive strength and competitiveness of enterprises in the market competition [8-9].

The financial management of the enterprise directly affects the economic efficiency of the enterprise. First of all, the enterprise in the financial planning should be based on the operating characteristics of the enterprise, market demand, financial situation and other factors, to develop appropriate business plans and financial budgets, to ensure that the economic benefits of the enterprise can be maximized to ensure [10-13]. At the same time, enterprises in the cost control should be strictly control and management of the entire production process, reduce unnecessary waste and loss, so as to improve the profitability and economic efficiency of enterprises [14-16]. In addition, enterprises should take into account the long-term development and risk control when making investment and financing decisions, and choose the most suitable investment and financing methods under the premise of guaranteeing the safety of funds, so as to improve the efficiency of capital utilization and economic benefits of enterprises [17-20].

Literature [21] emphasizes that the market economy can have an important impact on the business methods and efficiency of enterprises, and that scientific management has a positive impact on the economic efficiency of enterprises and corporate effectiveness, revealing that good financial management methods are conducive to the enhancement of corporate effectiveness. Literature [22] points out the important role of financial stability of modern enterprises on the long-term development of the country. And the study was carried out using the thematic, comparative, hierarchical and quantitative methods of financial ratios. Literature [23] is aimed at is to deepen the theoretical and methodological basis of financial management of the company in the conditions of the modern economy and to improve the practical recommendations. Methods of financial management of the company and anti-crisis management measures of the company are proposed, emphasizing that the purpose of financial management is to ensure the growth of net income and profits of the company. Literature [24] indicates that the entity financial status of the enterprise is an important indicator of the competitiveness of the enterprise, and the complexity and diversity of the internal and external financial relations of the enterprise determines the necessity of financial management, and points out the significance of the "time-money" formula in financial management. Literature [25] systematically introduces the scientific connotation and value orientation of modern enterprise financial management, and analyzes the effective strategies of financial management, aiming to help enterprises carry out financial management activities. Literature [26], based on the theme of enterprise financial management, analyzes the financial management problems existing in the current enterprise management and examines the application strategies of financial management in enterprise management. Literature [27] outlines the current situation of financial management of small and medium-sized enterprises, such as revealing the existence of lax fund management, weak financial control, poor quality of personnel and other problems, and discusses the causes of these problems and coping strategies. Literature [28] examined the determinants of fiscal decentralization and the relationship between fiscal decentralization and economic efficiency based on the establishment of a mathematical model and deduced the channels through which fiscal decentralization affects economic

efficiency. The results specified that fiscal decentralization is related to the size of the employed population and contributes to economic efficiency by affecting the capital efficiency of private firms and the capital limit of private firms. Literature [29] explored the impact of business support mechanisms on the economic efficiency of firms based on integrating stakeholder analysis, prioritization and theory. Through logistic regression on data from different firms, it was found that business support has a positive impact on economic efficiency.

This paper analyzes the interrelationship between enterprise financial management and economic efficiency. It mentions the principles of enterprise financial management and the characteristics of enterprise financial organization structure. It divides the financial structure into asset structure and capital structure, and discusses the influence of asset structure on enterprise operation and the influence of capital structure on enterprise operation. Utilizing multiple linear regression model to establish the research model between asset structure and enterprise performance, capital structure and enterprise profitability respectively. Select sample data to explain the research variables and verify the research hypotheses. Combine the factors of the relevant variables of asset structure and capital structure to analyze the relationship between the effects of inventory ratio, money fund ratio, and fixed asset ratio on corporate performance.

2. Enterprise economic efficiency and enterprise financial structure

2.1. Relationship between enterprise financial management and economic efficiency

For enterprises, financial management and economic efficiency is a dialectical and unified relationship, the most important thing for enterprise management is to find a balance between the two.

First of all, economic efficiency reflects, to a certain extent, the relationship between inputs and outputs of the enterprise and the effect and impact of the enterprise's financial management. In order to maximize economic efficiency, enterprises will rationally organize financial expenditure, reduce the loss and waste of economic resources, and optimize enterprise resources to the maximum extent.

Secondly, enterprises in financial management should also consider the actual economic benefits of the enterprise, based on the actual development situation and mode of the enterprise. Only reasonable investment and rational operation of the enterprise, strengthen the internal management and control of the enterprise, strengthen the internal supervision and feedback, in order to ensure that the economic benefits of the enterprise has been continuously improved.

Finally, enterprises must improve the professional level of financial management, all departments need to implement efficient management, not only to ensure product quality, but also to reduce operating costs. At the same time, through the introduction of new technologies and new human resources to improve the financial situation and operating conditions of enterprises. Within a certain range, the financial management and economic efficiency of enterprises are co-evolving and interdependent. Only by improving the financial management level of the enterprise can we improve the business performance of the enterprise and then promote the development of the enterprise.

2.2. Enterprise financial management and financial structure

2.2.1. Enterprise financial management. Enterprise financial management refers to the process of planning, organizing, coordinating, controlling and evaluating the financial activities of an enterprise under the conditions of market economy and in accordance with the requirements of national laws, regulations and policies, with the goal of improving economic efficiency and safeguarding asset security.

Enterprise financial management should follow the following basic principles:

1) The principle of the rule of law is the fundamental principle of enterprise financial management, which is the basis for guaranteeing the legal operation and normal operation of enterprises. Enterprises should strictly abide by the national constitution, laws, regulations, rules and regulations,

respect the basic laws of the market economy, in accordance with the scope and authority authorized by the state, independently carry out financial activities in accordance with the law, and accept the supervision and management of the state and society.

2) The principle of efficiency is the core principle of enterprise financial management, and is an important standard for measuring the business results and social value of enterprises. Enterprises should focus on improving economic efficiency, reasonably determine the financial objectives and budgets, effectively configure and utilize financial resources, reduce financial costs, increase financial income, and realize the maximum benefit of financial activities.

3) The principle of safety is an important principle of enterprise financial management, and it is a necessary condition for maintaining assets from loss and infringement. Enterprises should strengthen the identification, assessment, prevention and control of financial risks, establish and improve the risk prevention and emergency response mechanism to ensure the safety and stability of financial activities.

4) The principle of innovation is the driving principle of enterprise financial management, which is the key factor to adapt to market changes and improve competitiveness. Enterprises should constantly innovate financial concepts and methods, use modern information technology and management tools, improve the ability of financial analysis, forecasting, decision-making, control and other aspects, strengthen the grasp of market opportunities and risks and response, and realize the scientific, digital and intelligent financial management.

2.2.2. Financial structure. The enterprise, as a carrier of a series of economic activities, involves both the content of production and operation activities and the content of financial activities. The difference is that production and operation activities are aimed at the use of value, forming the form of assets and asset structure. Assets are potential resources that can bring future economic benefits, and profits are created in the conversion of asset forms. Financial activities, on the other hand, take value as the object and form the capital form and capital structure. In this paper, the financial structure is defined as including both asset structure and capital structure.

Characteristics of financial organizational structure:

1) Holistic. Financial organizational structure is composed of different elements of a unified organism, each part of the constituent elements and the whole of the interdependence, interconnection, mutual constraints, inseparable. Horizontally in accordance with the division of financial functions. Vertically in accordance with the hierarchy of financial functions, a series of organic forms of combination and arrangement, rather than just a simple mechanical superposition of the financial elements.

2) Objective. If the financial organizational structure does not determine the goal, the internal financial personnel will be difficult to customize a series of future accounting, supervision and management programs. For the results of these programs there is no evaluation and comparison of the scale, which for the implementation of these programs also lacks the review of the evidence.

3) Hierarchy. Hierarchy is one of the basic characteristics of the financial organizational structure, is composed of elements of the financial organizational structure of a vertical structure. These elements from high to low, composed of layers of sub-systems, while the financial organizational structure for the entire enterprise organizational structure is a higher level of the system.

4) Specialization. Financial management is the core of enterprise management, so the degree of specialization of the organizational structure of the financial sector, the normal operation of the financial business and enterprise capital operations have a great impact.

5) Decentralization. In the enterprise's financial organizational structure, all levels of financial organizations in the appropriate centralized conditions, have a certain degree of decision-making power.

6) Incentive. Motivation theory that the financial organizational structure of its members of the reasonable needs of the degree of satisfaction directly determines the organization of the degree of

motivation of the members of the play. Therefore, the establishment of financial organizational structure needs to include efficient and complete organizational incentive mechanism.

2.3. Mechanisms of financial structure on business operations

2.3.1. Impact of asset structure on business operations:

1) Impact of risk. Operational risk is generally the risk arising from the impact on the profit level of a business due to poor utilization and turnover of assets when the business is not using debt. Operational risk arises mainly when a business fails to correctly anticipate changes in the market, resulting in the failure to realize the value of its assets or the inability to liquidate its assets.

2) Impact on earnings. According to the impact on earnings, the enterprise's assets can be divided into assets that directly form the enterprise's earnings, assets that have no impact on the enterprise's earnings for a certain period of time, and assets that offset the enterprise's earnings for a certain period of time. Different asset structures of an enterprise will achieve different earnings, and the enterprise should maximize its earnings by adjusting its asset structure. As far as possible, increase the proportion of assets that directly form income and reduce the proportion of the other two types of assets.

3) Impact of liquidity. The liquidity of assets refers to their ability to liquidate, or turnover speed. The greater the liquidity of an asset, the lower the risk and the higher the return, and vice versa. The liquidity of an asset can be determined by analyzing its turnover rate.

4) Influence of elasticity. Elasticity refers to the possibility that the total amount and structure of asset occupation can be adjusted at any time, and the elasticity of assets is affected by the asset structure of the enterprise. If the enterprise's assets are all fixed assets, it is difficult to adjust the asset occupancy and structure at any moment. If the firm's assets are all financial assets, it is much easier to adjust the size and structure of the asset holdings at any point in time.

2.3.2. Impact of capital structure on business operations:

1) Effect of risk. In the case of uncertainty in both the capital margin and the borrowing rate of the enterprise, the enterprise's capital margin may be higher or lower than the borrowing rate, and thus the use of borrowed funds by the enterprise will inevitably lead to an increase or decrease in the capital margin of the enterprise.

2) The effect of cost. In a certain sense, the cost of financing is the basic basis for determining whether the capital structure of the enterprise is reasonable and optimized. Enterprise capital structure analysis is to determine whether the enterprise's financing cost savings. It can be said that an optimal capital structure is first of all the structure with the lowest cost.

3) Influence of utilization function. The function of internal capital financing is the least restrictive, especially the undistributed profits of the enterprise. Profit tax payable and interest, on the other hand, are difficult to utilize for long term assets and long term investments due to the limitation of end use and payment period. Among external funds, sovereign financing is generally not functionally limited. Of debt-based financing for enterprises, most direct debt is subject to varying degrees of functional limitations, while bond purchasers of indirect debt generally do not impose restrictions on the use of the financing by the enterprise, except to the extent that the issuing enterprise itself specifies the use to which the bond financing is to be put.

4) Impact of Resilience. In general, capital structures, once formed, are relatively stable. However, once any capital structure becomes a super-stable structure, it cannot be adjusted, and it is difficult to adapt to the ever-changing needs of operational and financial activities. For this reason, the capital structure of an enterprise must maintain a certain degree of flexibility so that it can be adjusted in due course. If the funds financed by an enterprise can be liquidated, refunded or converted at any time as its operations and financial management change, the greater the likelihood that the enterprise will be able to adjust its capital structure.

3. Analysis of the impact of enterprise asset structure and capital structure on enterprise performance

3.1. Multivariate linear regression analysis models

Multiple regression analysis is used to study the complex relationship between a number of independent variables and a number of dependent variables, i.e., a mathematical model is developed by varying the number of two or more independent variables with respect to a dependent variable. In this case, the regression analysis between one dependent variable and several independent variables is called one-to-many regression analysis. Regression analysis between multiple dependent variables and multiple independent variables is called many-to-many regression analysis. It can also be categorized into linear regression and nonlinear regression [30-31]. The multiple linear regression model is an extension of the univariate linear regression model with similar principles, except that the calculation is more complicated, and its general form is:

$$y = b_0 + b_1x_1 + b_2x_2 + \cdots + b_kx_k + \varepsilon \quad (1)$$

where b_0 is a constant term that represents the estimate of y when the independent variable is zero. ε is a random disturbance term obeying a normal distribution $N(0, \sigma^2)$ and x is an influence factor. There are k influence factors.

When $k > 1$, taking the mathematical expectation on both sides of equation (1) yields:

$$EY = \beta_0 + \beta_1X_1 + \cdots + \beta_kX_k \quad (2)$$

Remember for:

$$\zeta = EY \quad (3)$$

The original equation is rewritten as:

$$\zeta = \beta_0 + \beta_1X_1 + \cdots + \beta_kX_k \quad (4)$$

The above equation is called the regression plane equation, where $\beta_1, \beta_2, \cdots, \beta_k$ is the regression coefficient.

Parameter $\beta_i (i = 0, 1, 2, \cdots, k)$ and the variance of the multiple linear regression model are generally unknown and need to be estimated from the sample observations. If n observations are made and n sets of observations are obtained $(y_j, x_{1j}, x_{2j}, \cdots, x_{kj})$ and $j = 1, 2, \cdots, n$, equation (5) can be obtained:

$$\left. \begin{aligned} y_1 &= \beta_0 + \beta_1x_{11} + \beta_2x_{21} + \cdots + \beta_kx_{k1} + \varepsilon_1 \\ y_2 &= \beta_0 + \beta_1x_{12} + \beta_2x_{22} + \cdots + \beta_kx_{k2} + \varepsilon_2 \\ &\vdots \\ y_n &= \beta_0 + \beta_1x_{1n} + \beta_2x_{2n} + \cdots + \beta_kx_{kn} + \varepsilon_n \end{aligned} \right\} \quad (5)$$

where ε_i obeys the normal distribution $N(0, \sigma^2)$ and is assumed to be independent among $\varepsilon_1, \varepsilon_2, \cdots, \varepsilon_n$.

Eq. (5) can have a matrix form representation:

$$Y = \begin{pmatrix} y_1 \\ y_2 \\ \vdots \\ y_n \end{pmatrix}, \varepsilon = \begin{pmatrix} \varepsilon_1 \\ \varepsilon_2 \\ \vdots \\ \varepsilon_n \end{pmatrix}, \beta = \begin{pmatrix} \beta_1 \\ \beta_2 \\ \vdots \\ \beta_n \end{pmatrix}, X = \begin{pmatrix} 1 & x_{11} & x_{21} & \cdots & x_{n1} \\ 1 & x_{12} & x_{22} & \cdots & x_{n2} \\ \vdots & \vdots & \vdots & & \vdots \\ 1 & x_{1n} & x_{2n} & \cdots & x_{nn} \end{pmatrix} \quad (6)$$

Then equation (6) can be written as:

$$Y = X\beta + \varepsilon \quad (7)$$

The corresponding error model is:

$$V = X\hat{\beta} - Y \quad (8)$$

According to the principle of least squares $V^T V = \min$, the law equation is obtained:

$$X^T X \hat{\beta} = X^T Y \quad (9)$$

The least squares valuation of the regression parameters is:

$$\hat{\beta} = (X^T X)^{-1} X^T Y \quad (10)$$

Among them:

$$X^T X = \begin{bmatrix} n & \sum x_{1j} & \cdots & \sum x_{ki} \\ \sum x_{1i} & \sum x_{1i}^2 & \cdots & \sum x_{1i} x_{ki} \\ \vdots & \vdots & & \vdots \\ \sum x_{ki} & \sum x_{1j} x_{ki} & \cdots & \sum x_{ki}^2 \end{bmatrix}; X^T Y = \begin{bmatrix} \sum y_i \\ \sum x_{1i} y_i \\ \vdots \\ \sum x_{ki} y_i \end{bmatrix} \quad (11)$$

The least squares valuation of the regression parameters is obtained by bringing the regression parameters into equation (1):

$$\hat{y} = \hat{\beta}_0 + \hat{\beta}_1 x_1 + \hat{\beta}_2 x_2 + \cdots + \hat{\beta}_k x_k \quad (12)$$

The above equation is called the empirical regression plane equation, where $\hat{\beta}_1, \hat{\beta}_2, \hat{\beta}_3, \cdots, \hat{\beta}_k$ is the empirical regression coefficient.

3.2. Asset structure optimization improves business performance

3.2.1. Hypothesis development. This paper intends to construct a model to study the relationship between the relevant indicators indicating asset structure and operational performance. The method of multiple regression analysis is used for empirical analysis in order to provide empirical empirical basis for the later proposal of asset structure optimization. The following hypotheses are proposed:

About the relationship between the turnover efficiency of assets and operating performance:

Hypothesis 1: The higher the fixed asset turnover rate, the better the business performance.

Hypothesis 2: The higher the inventory turnover rate, the higher the business performance of the enterprise.

Regarding the relationship between asset structure ratio and operating performance:

Hypothesis 3: The higher the proportion of assets accounted for by long-term financial assets, the higher the business performance of the enterprise.

Hypothesis 4: The higher the proportion of total assets accounted for by money funds, the worse the business performance of the enterprise.

Hypothesis 5: The higher the proportion of total assets accounted for by inventories, the lower the business performance of the enterprise.

Hypothesis 6: The higher the proportion of fixed assets to assets, the higher the business performance.

3.2.2. Sample Selection, Indicator Selection and Data Sources. A total of 40 enterprises in the textile industry listed in Shanghai and Shenzhen are selected as samples for empirical analysis. When subdividing the impact of long-term financial assets on operating performance, 30 of them are chosen as the sample to be analyzed, because 10 of them do not have long-term financial assets.

In order to represent the operating performance, the return on total assets and return on net assets are chosen as the measures of operating performance and as the explanatory variables. The two measures are chosen so that it is easy to illustrate their impact effects and so that they can be tested for mutual stability. The gearing ratio and asset size are chosen as control variables, and the relevant indicators mentioned in the hypotheses are chosen as explanatory variables. The selected indicators are shown in Table 1.

Table 1. Selected index

Variable class	Variable symbol	Variable name	Calculation method
Explained variable	ROA	Total asset returns	Total profit/assets
	ROE	Return on equity	Net profit/owner's equity
Control variable	DAR	Asset ratio	Liabilities/assets
	InA	Asset size	The logarithm of the assets
Explain variable 1	FAT	Fixed asset turnover	Average operating income/fixed assets
	IT	Inventory turnover	Operating cost/inventory average
Explain variable 2	CAR	Liquidity ratio	Total flow assets/assets
	MR	Monetary ratio	Amount of money/assets
	IR	Inventory ratio	Total inventory/assets
	FAR	Proportion of fixed assets	Total fixed assets/assets
Explain variable 3	LFR	Long-term financial assets ratio	Long-term financial assets/assets

3.2.3. Empirical results and analysis. SPSS statistical econometric analysis software was used to do multiple regression analysis with return on assets and net asset turnover as the explanatory variables and groups 1, 2 and 3 as the explanatory variables, respectively.

The results of regression analysis of asset structure affecting operating performance (1) are shown in Table 2. The F-statistic test is significant at 1% significance level for fixed asset turnover and inventory turnover on the explanation of operating performance, and the regression coefficients are both greater than 0.75, the regression fit is good.

The coefficients of fixed asset turnover on performance explanation are 0.033 and 0.025 respectively, indicating that fixed asset turnover has a positive impact on performance, i.e., for every increase of 1 in fixed assets, total return on assets and return on net assets increase by 0.033 and 0.025. Similarly, inventory turnover has a positive impact, and the results validate hypotheses 1 and 2. In the optimization of the asset structure, it can be considered to increase the turnover ratio of each type of asset to promote increased performance. The effect of the ratio of long-term financial assets on performance is also positive and hypothesis 3 is valid.

Table 2. The asset structure affects the performance regression analysis results (1)

Variable	ROA	ROE	ROA	ROE
a	-0.563*** (-2.6124)	-1.112*** (-5.611)	-0.524*** (-2.031)	-1.523*** (-3.455)
DAR	-0.239*** (-3.541)	-0.326*** (-2.967)	-0.366*** (-9.364)	-0.732*** (-6.485)
InA	0.036*** (4.597)	0.072*** (5.632)	0.035*** (5.233)	0.082*** (5.113)
FAT	0.033** (2.089)	0.025** (3.214)	-	-
IT	0.008* (2.007)	0.035** (3.042)	-	-
LFR	-	-	0.196*** (4.526)	0.315*** (3.524)
R^2	0.824	0.796	0.858	0.836
F	13.52***	16.57***	30.42***	19.04***
DW	1.865	1.891	2.654	2.017
<i>n</i>	40	40	30	30

The results of the regression analysis of the impact of asset structure on operating performance (2) are shown in Table 3, the proportion of money funds and the proportion of inventory on the explanation of operating performance, the F-statistic test is significant at the 1% significance level, and the regression coefficients are also greater than 0.75, the regression fit is good. However, the T-statistic test for each explanatory variable is not significant and there is some economic significance. The T-statistic test of the explanatory variables for the proportion of fixed assets is significant at 10% significance. The results test hypotheses 4 and 5 to some extent, but the conclusion is not significant.

The coefficients of the proportion of fixed assets on the explanation of business performance are 0.153 and 0.167 respectively, which are positive, and the effect of increasing the proportion of fixed assets and inward investment is more obvious, which verifies hypothesis 6.

Table 3. The asset structure affects the performance regression analysis results (2)

Variable	ROA	ROE
a	-0.654***(-5.361)	-1.678***(-4.213)
DAR	-0.326***(-7.543)	-0.569***(-5.697)
InA	0.036***(-4.039)	0.084***(-4.523)
CAR	0.249***(-3.096)	0.327*(2.083)
MR	-0.087(-1.701)	-0.056(-1.296)
IR	-0.086(-0.923)	-0.179(-0.811)
FAR	0.153**(-3.698)	0.167*(2.207)
R^2	0.598	0.815
F	12.04***	10.19***
DW	2.635	1.872
n	40	40

3.3. Correlation analysis between capital structure and profitability

3.3.1. Hypothesis development. The capital structure indicators and their definitions selected for this paper are as follows:

$$Z_1 = \text{Equity ratio} = \text{total liabilities} / \text{total owners' equity} \quad (13)$$

$$Z_2 = \text{Ratio of state-owned shares} = \text{State-owned shares} / \text{total share capital} \quad (14)$$

Hypothesis 7: There is a linear relationship between capital structure and corporate profitability. The following linear model is constructed:

$$Y = C + b_1 Z_1 + b_2 Z_2 + \varepsilon \quad (15)$$

Where, Y denotes the net operating margin. b_1 and b_2 represent regression coefficients. Z_1 represents the equity ratio, Z_2 represents the proportion of state-owned shares. C denotes the constant term, and ε denotes the random error term.

3.3.2. Empirical results. The empirical results of the relationship between corporate capital structure and profitability are shown in Table 4. The F-test value is 32.0784, which passes the model significance test-F-test at the given significance level of 5%, indicating that the equation is significant overall. The adjusted R^2 is chemically 0.7875, indicating that the explanatory variables explain the explained variables to a relatively high degree.

The correlation coefficients of equity ratio and state ownership ratio are 0.0021 and -0.0306 with probability of significance of 0.000 and 0.0325 respectively, indicating that they are significantly related to net interest rate. Whereas the proportion of equity is positively related to net interest rate, the proportion of state-owned shares is negatively related to net interest rate. The proportion of state-owned shares is likely to have a negative impact on profitability, indicating that the shares of state-owned enterprises have not exerted their resource and policy effects to bring a positive effect on corporate profitability, and Hypothesis 7 is valid. It can be seen that the capital structure of enterprises has a greater impact on corporate profitability in the process of business.

Table 4. Empirical results of the relationship between capital structure and profitability

Method: Least Squares				
Sample: 2013-2023				
Included observations: 30				
$Y = C(1) + C(2)X_1 + C(3)X_2$				
	Coefficient	Std. Error	T-statistic	Prob.
$C(1)$	-0.00339	0.0045	-0.8951	0.4635
$C(2)$	0.0021	0.0019	8.6446	0.0000
$C(3)$	-0.0306	0.0018	-3.5591	0.0325
R-squared	0.8364	Mean dependent var	-	0.0363
Adjusted R-squared	0.7875	S.D. dependent var	-	0.0185
S.E. of regression	0.0081	Akaike info criterion	-	-8.998
Sum squared resid	0.0007	Schwarz criterion	-	-8.542
Log likelihood	62.5391	Hannan-Quinn criter.	-	-8.0041
F-statistic	32.0784	Durbin-Watson stat	-	3.2107
Prob(F-statistic)	0.000029			

After conducting an empirical study on the relationship between corporate capital structure and profitability, the capital structure and profitability of listed companies are further studied to find out the relationship. The empirical results of capital structure and profitability of some listed companies are shown in Table 5.

The equity ratio of some listed companies is negatively correlated with net profitability, indicating that financial leverage fails to give full play to its role and fails to bring about an increase in profitability. The proportion of state-owned shares of some enterprises is positively correlated with the net interest rate, indicating that the participation in state-owned shares can bring various resources as well as tax and policy benefits to enterprises, which is conducive to the profitability of enterprises.

Table 5. The capital structure and profitability empirical result of some listed enterprises

Corporate name	Correlation coefficient of property ratio	The correlation coefficient of the proportion of the state	R^2	F-testing	P
Chengdu road bridge	0.0356	0	0.4596	4.3251	0.1217
China and Thailand bridge	-0.0521	0	0.0874	0.2396	0.6283
Pubang garden	-0.0896	0	0.4256	3.1248	0.1186
Brand stock	-0.0422	-0.085	0.6391	7.5521	0.082
Iron ecology	-0.0458	0	0.0135	0.0245	0.8574
Four waters	-0.0096	0	0.8694	23.569	0.0213
Sichuan road bridge	0.0069	-0.042	0.4568	5.2319	0.095
Shanghai construction	-0.0005	0.0057	0.1524	1.2456	0.3624
Pudong construction	0.0045	-0.5236	0.315	2.0398	0.2135
Tibet tianlu	-0.089	-0.0325	0.2978	2.6351	0.1578
Chinese chemistry	0.0218	0.01	0.1824	0.4365	0.6954
Iron construction in China	0.0003	-0.0063	0.3215	1.3521	0.3475
Chinese iron	0.0006	-0.0055	0.0421	0.1421	0.8854
China metallurgical	-0.0347	0.0296	0.5207	2.8234	0.2132
Chinese architecture	0.0068	0.0021	0.8965	9.5054	0.0354
China electric construction	0.0005	-0.0569	0.7123	3.1799	0.2365

3.4. Curve estimation analysis of asset structure, capital structure and firm performance

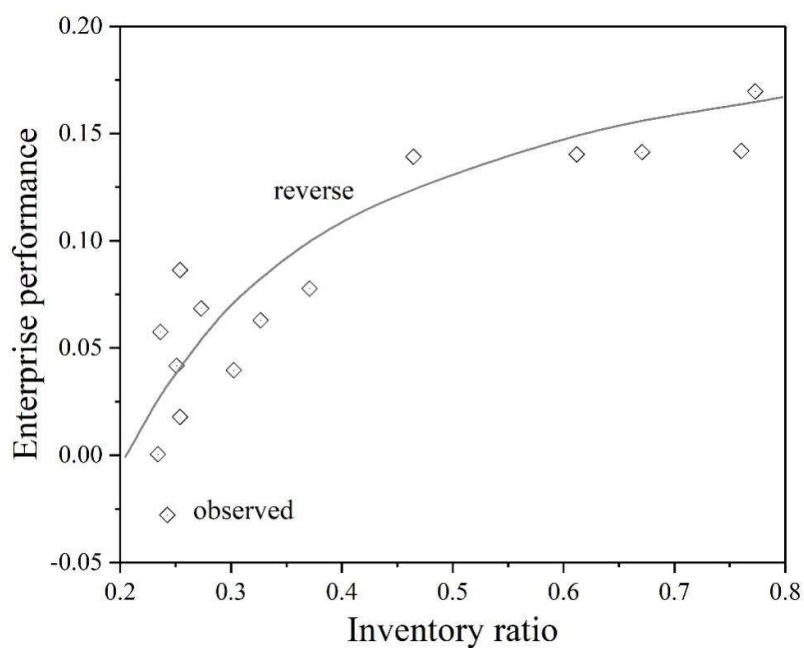
In order to further clarify how individual indicators in asset structure and capital structure affect the total return on assets and return on net assets, the following annual financial indicators of the enterprise from 2013 to 2023 are analyzed by using the curve estimation analysis in regression analysis. This is done by selecting several appropriate regression models in SPSS statistical software and bringing the single independent variable and dependent variable into the calculation separately. Then based on the results of the run the regression model with the best fit (R^2 maximum) and with all significant parameter estimates is selected for analysis.

3.4.1. Curve Estimation Analysis of Inventory Ratio and Firm Performance. The model and parameter estimates of inventory ratio and firm performance are shown in Table 6. It can be seen that the regression models of inventory ratio with total return on production and return on net assets are inverse function models, and the decidable coefficients of the two models are 0.865 and 0.691, respectively, and the models have a high degree of fit. The P-value of the F-test of both models is less than 0.05, indicating that the models are significant as a whole, and the parameter estimates of both models pass the significance level test.

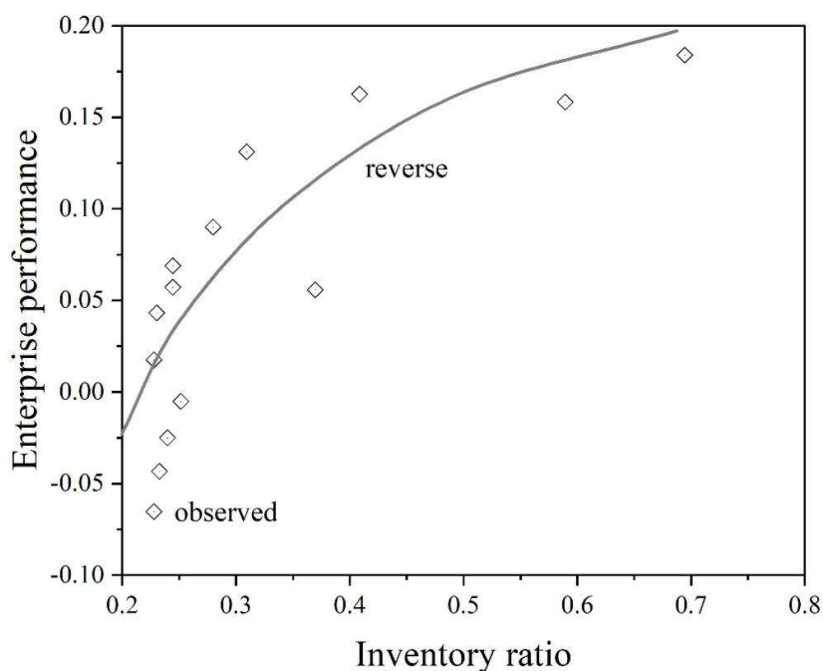
Table 6. Inventory ratio and enterprise performance model and parameter estimation

Model			Unnormalized coefficient	t	Sig.	Adjusted R^2	F-statistic	Prob(F-statistic)
Total asset returns	Reciprocal	1/(inventory ratio)	-50.635	-4.556	0.002	0.865	25.004	0.002
		Constant	25.124	7.896	0.000			
Return on equity	Reciprocal	1/(inventory ratio)	-73.289	-4.632	0.005	0.691	18.321	0.006
		Constant	33.568	5.011	0.003			

The graph of the model function of inventory ratio and enterprise performance is shown in Figure 1, and the effect of inventory ratio on enterprise performance is generally positive, which is consistent with the results of the multiple regression model that the coefficient of inventory ratio is positive. However, the graphs of both models show a fast and then slow growth trend, which indicates that the growth of the inventory ratio causes a significant growth in corporate performance when the inventory ratio is at a low level stage.



(a) Total asset returns



(b) Return on equity

Fig. 1. Inventory ratio and enterprise performance model function diagram

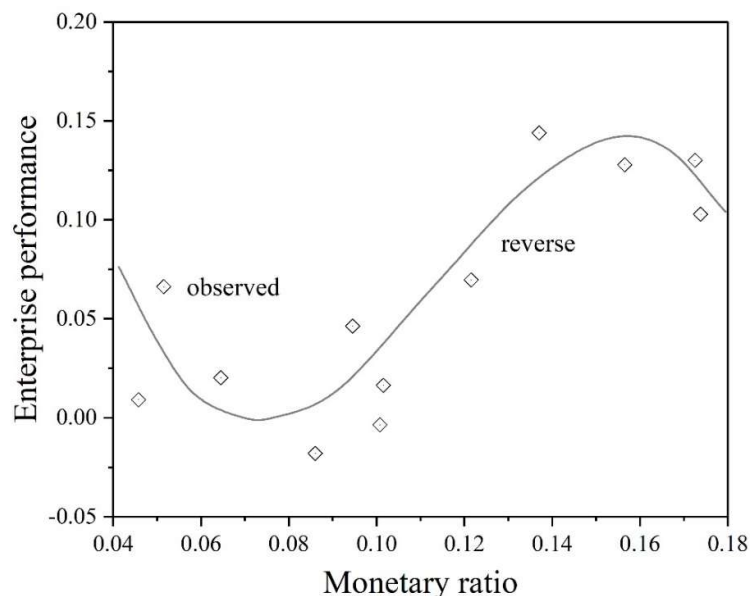
3.4.2. **Curve Estimation Analysis of Monetary Fund Ratio and Firm Performance.** The summary and parameter estimates of the model of money capital ratio and firm performance are shown in Table 7. The regression models of money capital ratio with total return on production and return on net assets are all cubic curve models, and the decidable coefficients of the two models are 0.852 and 0.714, respectively, with a high degree of model fit. The p-value of the F-test of both models is less than 0.05, indicating that the models are significant as a whole, and the parameter estimates of both models pass the significance level test.

Table 7. The money ratio and the enterprise performance model summary

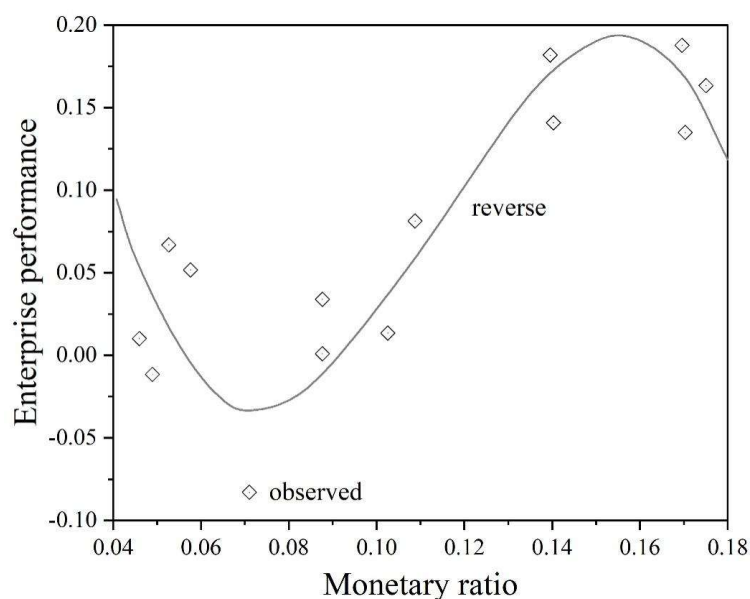
Model			Unnormalized coefficient	t	Sig.	Adjusted	F-statistic	Prob(F-statistic)
Total asset returns	Three times	Monetary ratio	-30.652	-3.211	0.035	0.852	9.642	0.032
		Monetary ratio ²	3.218	2.569	0.046			
		Monetary ratio ³	-0.09	-2.321	0.075			
		Constant	82.664	3.468	0.021			
Return on equity	Three times	Monetary ratio	-45.326	-3.004	0.032	0.714	8.659	0.019
		Monetary ratio ²	4.203	2.751	0.045			
		Monetary ratio ³	-0.5	-2.326	0.064			
		Constant	132.694	3.964	0.023			

The function graphs of money fund ratio and enterprise performance model are shown in Fig. 2, which shows that both curve graphs present a decreasing, then increasing and then decreasing trend, indicating that the effect of the money ratio on the total return on assets and return on net assets is basically the same, and this trend is different from the conclusion of the positive correlation of the

money fund ratio on the total return on assets and return on net assets in the previous multivariate linear regression analysis. The two function graphs take 8% and 16% of the money capital ratio as the cut-off point, with the curve showing a downward trend before 8%, an upward trend from 8% to 16%, and a downward trend after 16%. Depending on the context of the firm's industry, the fact that the graph produces a trough near 8% of money funds is likely to be related to the development situation of the industry in recent years.



(a) Total asset returns



(b) Return on equity

Fig. 2. Monetary capital ratio and enterprise performance model function diagram

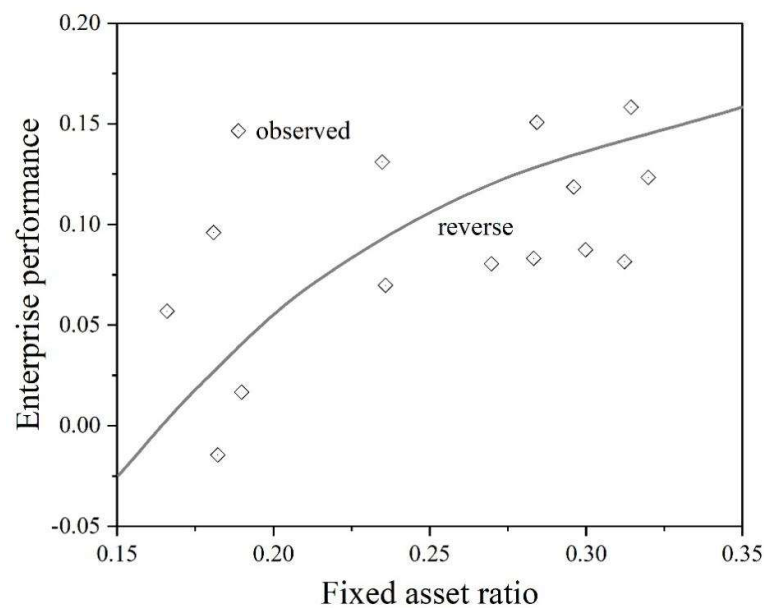
3.4.3. Curve Estimation Analysis of Fixed Asset Ratio and Firm Performance. The summary and parameter estimates of the model of fixed asset ratio and firm performance are shown in Table 8. The regression models of fixed asset ratio with total return on production and return on net assets are inverse function models, and the decidable coefficients of the two models are 0.213 and 0.415,

respectively, and the fit of the models is average. The P-value of the F-test of the two models is less than or equal to 0.05, indicating that the models are significant as a whole, and the parameter estimates of the two models pass the significance level test.

Table 8. Fixed asset ratio and enterprise performance model summary

Model			Unnormalized coefficient	t	Sig.	Adjusted R^2	F-statistic	Prob(F-statistic)
Total asset returns	Reciprocal	1/(Fixed asset ratio)	-480.692	-3.254	0.054	0.213	6.809	0.031
		constant	43.55	3.589	0.031			
Return on equity	Reciprocal	1/(Fixed asset ratio)	-636.512	-2.967	0.07	0.415	6.225	0.045
		constant	46.96	3.045	0.04			

The graph of fixed asset ratio and enterprise performance model function is shown in Figure 3. It can be seen that both curve graphs show an increasing trend, which is basically consistent with the results of multiple linear regression analysis. However, the slope of the curve gradually decreases, indicating that as the fixed asset ratio increases, the growth rate of total return on assets and return on net assets gradually decreases.



(a) Total asset returns

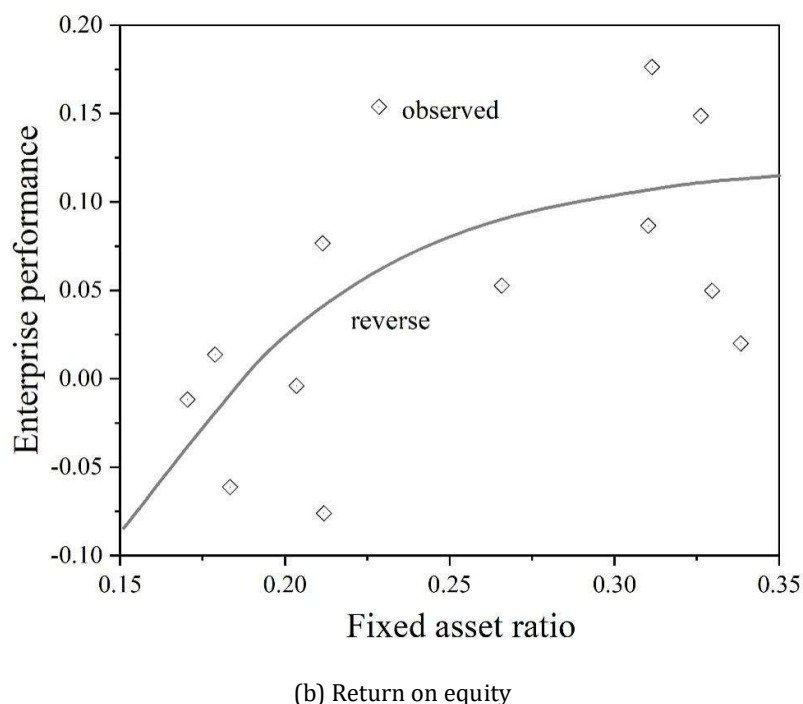


Fig. 3. Fixed asset ratio and enterprise performance model function diagram

4. Conclusion

This paper divides the financial structure of enterprises into asset structure and capital structure, extracts sample data, and constructs the multiple linear regression models of asset structure and enterprise performance, capital structure and enterprise profitability respectively. The inventory ratio, money fund ratio and fixed asset ratio are analyzed for curve estimation of the regression model.

1) With return on assets and net asset turnover ratio as the explanatory variables respectively, the effects of fixed asset turnover ratio, inventory turnover ratio and long-term financial asset ratio on the economic performance of enterprises are all positive. That is, the higher the fixed asset turnover ratio, inventory turnover ratio and long-term financial asset ratio, the better the business performance of the enterprise. There is a linear correlation between capital structure and enterprise profitability, and enterprise capital structure positively affects enterprise operating profitability.

2) The regression models of inventory ratio, money capital ratio and fixed asset ratio with enterprise performance variables are significant overall. The impact of inventory ratio on total return on production and return on net assets is generally positive, and the model curve graphs all show a fast and then slow growth trend. Meanwhile, as the fixed asset ratio increases, the growth rate of total return on assets and return on net assets gradually decreases.

References

- [1] Ren, S. (2022). Optimization of Enterprise Financial Management and Decision-Making Systems Based on Big Data. *Journal of Mathematics*, 2022(1), 1708506.
- [2] Li, Y. (2024, April). Enterprise Economic Benefit Evaluation Model Based on Fuzzy Entropy. In *International Conference on Computational Finance and Business Analytics* (pp. 25-36). Cham: Springer Nature Switzerland.
- [3] Musah, A., Gakpetor, E. D., & Poma, P. (2018). Financial management practices, firm growth and

- profitability of small and medium scale enterprises (SMEs). *Information management and business review*, 10(3), 25-37.
- [4] Mazur, N., Khrystenko, L., Pásztorová, J., Zos-Kior, M., Hnatenko, I., Puzyrova, P., & Rubezhanska, V. (2021). Improvement of Controlling in the Financial Management of Enterprises. *TEM journal*, 10(4).
 - [5] Chen, X., & Metawa, N. (2020). Enterprise financial management information system based on cloud computing in big data environment. *Journal of Intelligent & Fuzzy Systems*, 39(4), 5223-5232.
 - [6] Yubo, C. (2021). Innovation of enterprise financial management based on machine learning and artificial intelligence technology. *Journal of Intelligent & Fuzzy Systems*, 40(4), 6767-6778.
 - [7] Pandey, K. (2017). *Financial management*. Lulu. com.
 - [8] Wang, L. (2022). Application of numerical deconstruction in enterprise economic management. *Mathematical Problems in Engineering*, 2022(1), 2846062.
 - [9] Yang, Y. (2024). The role of Internet marketing in improving enterprise economic benefits under the background of big data and Internet of Things. *Journal of Computational Methods in Science and Engineering*, 14727978241296747.
 - [10] Goncharova, E., Shakhovskaya, L., Starovoytov, M., & Starovoytova, Y. (2019, June). The financial planning and its tasks in modern models of enterprise management. In *Volgograd State University International Scientific Conference "Competitive, Sustainable and Safe Development of the Regional Economy" (CSSDRE 2019)* (pp. 264-269). Atlantis Press.
 - [11] Sitinjak, C., Johanna, A., Avinash, B., & Bevoor, B. (2023). Financial Management: A System of Relations for Optimizing Enterprise Finances—a Review. *Journal Markcount Finance*, 1(3), 160-170.
 - [12] Polova, O. (2020). Enterprise financial policy. *Norwegian Journal of development of the International Science*, (42-3), 28-34.
 - [13] Sosnovska, O., & Zhytar, M. (2018). Financial architecture as the base of the financial safety of the enterprise. *Baltic journal of economic studies*, 4(4), 334-340.
 - [14] Berry-Stölzle, T. R., & Xu, J. (2018). Enterprise risk management and the cost of capital. *Journal of Risk and Insurance*, 85(1), 159-201.
 - [15] Radionova, N., Skrypyuk, M., & Voronkova, T. (2019). Dual nature of industrial enterprise cost management system. *Baltic Journal of Economic Studies*, 5(2), 184-190.
 - [16] Shodiyev, K., Melikov, Z., & Nazarov, B. (2021). WAYS TO SOLVE ECONOMIC PROBLEMS IN ANALYSIS OF ENTERPRISES. *Oriental renaissance: Innovative, educational, natural and social sciences*, 1(8), 568-579.
 - [17] Huang, H., Chau, K. Y., Iqbal, W., & Fatima, A. (2022). Assessing the role of financing in sustainable business environment. *Environmental Science and Pollution Research*, 1-18.
 - [18] Khidirov, N. G. (2021). Mechanisms and methods of financing enterprise investment projects. *Journal of Economics, Finance and Management Studies*, 4(05), 475-482.
 - [19] Drobetz, W., Janzen, M., & Meier, I. (2019). Investment and financing decisions of private and public firms. *Journal of Business Finance & Accounting*, 46(1-2), 225-262.
 - [20] Kotliar, A., Basova, Y., Ivanov, V., Murzabulatova, O., Vasytsova, S., Litvynenko, M., & Zinchenko, O. (2020). Ensuring the economic efficiency of enterprises by multi-criteria selection of the optimal manufacturing process. *Management and Production Engineering Review*.
 - [21] Chen, Y., Wang, C., Zhao, Z., Sun, Z., Jin, H., Zhou, M., ... & Wang, J. (2022). Economic Analysis of Enterprise Management and Enterprise Benefit. *Financial Engineering and Risk Management*, 5(7), 85-90.
 - [22] Cernavskis, K. (2014). Financial stability of enterprise as the main precondition for sustainable

development of economy. Regional formation and development studies, 8(3), 36-46.

- [23] Aleskerova, Y., & Fedoryshyna, L. (2024). Financial management activities of enterprises in the modern economic conditions. *Baltic Journal of Economic Studies*, 10(3), 58-68.
- [24] Khominich, I. P., Rybyantseva, M. S., Borodacheva, L. V., Dik, E. V., & Afanasev, E. V. (2016). Financial management as a system of relations of the enterprise for highly efficient management of its finances. *International Journal of Economics and Financial Issues*, 6(8), 96-101.
- [25] Tan, Z. (2021). Value orientation and strategy analysis of financial management of modern enterprises. In *Modern Economics & Management Forum* (Vol. 2, No. 6, pp. 10-32629).
- [26] Li, X. (2023). Research on the Application of Financial Management in Enterprise Management. *Accounting and Corporate Management*, 5(3), 51-57.
- [27] Liu, S. (2023). Main Problems and Countermeasures in Enterprise Financial Management. *Accounting and Corporate Management*, 5(5), 57-65.
- [28] He, M. L., Jiang, Q., & Hong, Z. (2019). Mathematical analysis of financial decentralization and economic efficiency in both state-owned and private enterprises. *Concurrency and Computation: Practice and Experience*, 31(10), e4750.
- [29] Hubarenko, O., Khilukha, O., Gut, L., Nikitina, Y., & Ivanenko, O. (2024). Corporate Support as a Strategic Factor for Increasing the Economic Efficiency of Enterprises. *Economic Affairs*, 69(1), 647-666.
- [30] Ijlal Raissouni, Lamiaa Achmakh, Asmaa Boullayali & Hassan Bouziane. (2024). Forecast models for start and peak dates of Poaceae pollen season in Tétouan (NW Morocco) using multiple regression analysis. *International Journal of Biometeorology*(11), 2215-2225.
- [31] Andrea Saglietto, Francesco Tripoli, Jaco Zwanenburg, Geert Jan Biessels, Gaetano Maria De Ferrari, Matteo Anselmino... & Stefania Scarsoglio. (2024). Role of the vessel morphology on the lenticulostriate arteries hemodynamics during atrial fibrillation: A CFD-based multivariate regression analysis. *Computer Methods and Programs in Biomedicine* 108303-108303.