

Analyzing the Impact of Financial Sharing Models on the Efficiency of Resource-Consuming Firms in a Low-Carbon Economy Using Monte Carlo Methods

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ABSTRACT

In response to the greening and decarbonization of economic development and in search of a path to improve the corporate efficiency of resource-consuming enterprises, the study explores the impact of the financial sharing model on the efficiency of resource-consuming enterprises. The research hypothesis is formulated after the preliminary analysis of related theories such as financial sharing and accounting information. After completing the selection of research samples and data collection, the research variables are defined, the regression analysis model of the impact of financial sharing model on enterprise efficiency is constructed, and empirical analysis is conducted. The research hypotheses proposed in the previous section are verified through regression analysis. Monte Carlo method is used to simulate the financial sharing model and resource-consuming enterprise efficiency, and the net present value of resource-consuming enterprises is simulated during the construction period and the operation period of the financial sharing model, respectively, so as to understand their enterprise efficiency. The results of the empirical study show that financial sharing can realize the improvement of enterprise efficiency. Enterprise efficiency can increase with the improvement of accounting information transparency and accounting information consistency. During the construction and operation periods of the financial sharing model, the mean enterprise NPV after five years of operation is \$608.4 and \$2,327.4 million, respectively, and the probability of positive NPV is 68% and 94%, respectively.

Keywords: regression analysis; Monte Carlo method; financial sharing; enterprise efficiency

1. Introduction

Monte Carlo method is a numerical simulation method that takes probabilistic phenomena as the object of study. It is a computational method of assuming unknown characteristics by obtaining statistical values according to the sampling method. It is especially suitable for some problems that

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are difficult or even impossible to solve by analytical methods, and thus has an important position in analyzing the impact of financial sharing model on the efficiency of resource-consuming enterprises [1-4].

In today's competitive business environment, enterprises are constantly looking for ways to improve operational efficiency in order to enhance their competitiveness. As an innovative financial management model, financial shared service is gradually favored by many enterprises [5-8]. Through the standardization, centralization and informatization of financial processes, it has brought many significant changes and impacts for enterprises. The core of financial shared services is scattered in various business units of high repetitiveness, high degree of standardization of the financial process centralized, unified processing [9-12]. The first thing this change brings is the reduction of costs. In the past, each business unit needs to be equipped with specialized financial personnel to deal with basic financial work such as expense reimbursement, accounts receivable, accounts payable and so on [13-16]. This not only leads to the duplication of human resources, but also increases the cost of training and management costs. Under the financial shared service model, the streamlining and optimal allocation of personnel can be achieved by centralizing these operations, which greatly reduces the manpower cost [17-20]. At the same time, financial shared services improve the accuracy and timeliness of financial processing. Due to the adoption of standardized processes and operating practices, errors and deviations caused by human factors are reduced [21-22]. Moreover, the centralized processing allows financial information to be summarized and transmitted more quickly, and management can obtain accurate financial data in a timely manner, providing strong support for decision-making. Financial shared services also accelerate the speed of financial processes and help to improve the internal control and risk management of enterprises [23-25].

The article proposes relevant research hypotheses through the theoretical study of financial sharing, accounting information transparency and accounting information consistency. After selecting samples and collecting data, the explained variables, explanatory variables, mediating variables and control variables are defined respectively. Subsequently, the regression model of the impact of financial sharing model on enterprise efficiency is constructed. After completing the foundation test and path test of the impact of financial sharing model on enterprise efficiency, the two are simulated by Monte Carlo method. Taking resource-consuming enterprises as the object of research, the NPV situation of resource-consuming enterprises is deeply explored in the construction period and operation period of the financial sharing model, so as to explore the enterprise efficiency in the construction period and operation period of the financial sharing model.

2. Theoretical analysis and research hypothesis

2.1. Theoretical foundations

2.1.1. Financial sharing. In the 1980s, the concept of shared services began to emerge in the United States. Shared services are the integration of scattered and highly repetitive businesses in an enterprise into a shared center for processing, so that each business unit will devote more energy to more value-creating businesses. The scope of shared services includes finance, human resources, production, information technology and other aspects. Financial shared service is to centralize basic financial operations, including journal entries, accounts receivable and payable settlements, and expense categories, to be processed in the financial shared center, which will develop unified process standards. As uniform standards are adopted for repetitive work, the processing speed can be effectively increased with the help of technical information systems, which truly realizes information sharing, reduces the workload of employees, strengthens the supervision and management of subsidiaries by the group headquarters, and helps to form a sustained competitive advantage. Such a financial model can make the enterprise's process more standardized and efficiency is improved.

Financial sharing mode is a new type of management [26-27], mainly relying on information technology to realize, to save costs and improve efficiency as the goal, the specific characteristics are as follows:

1) Centralization of financial accounting. The basic business financial accounting of the entire group is centralized by the FSSC, unlike the traditional financial model, the financial sharing model greatly reduces the demand for financial personnel, and the business between different locations can also be handled through the platform, in addition, if the FSSC is selected in the area of the lower average wage level, all to a large extent, can reduce the cost, not only is the resources have been rationally allocated, the efficiency of the accounting is also improved. Improvement.

2) Standardization of business processes. Through the standardization of business processes, there is almost no difference in the data between companies and departments, so that the group headquarters can make higher quality decisions based on the financial information in the system, and the financial data between different companies are also comparable, in addition, because of the system to deal with the data, a series of problems such as human error and counterfeiting can be avoided to the greatest extent possible, and it is only necessary to provide uniform training for financial personnel for a certain period of time. Only a certain period of uniform training of financial personnel, you can optimize the business process in real time, thus enhancing the efficiency of business processing.

3) Data informatization. The financial sharing model is generated in the Internet era under the general environment of information technology, so the financial sharing model of information systems should be completed with the help of information technology to achieve data sharing between internal and external enterprises.

2.1.2. Transparency of accounting information. In 1996, the U.S. Securities and Exchange Commission (SEC) was the first to introduce the concept of transparency, which was clearly defined as the need for enterprises to actively and proactively publicize their accounting information on the premise of ensuring its accuracy. The aim is to provide the public with a quick and accurate insight into the financial situation of an organization. This high degree of transparency not only provides investors with a wealth of information to help them comprehensively analyze and assess the potential risks of the enterprise, but also effectively enhances the public's trust in the enterprise, which in turn promotes the sound development of the capital market.

From a narrow perspective, "transparency" focuses on the full disclosure of accounting information, i.e., ensuring that all relevant information is available to the public. From a broader perspective, transparency centers on improving the overall quality of accounting data by relying on accurate and trustworthy accounting data and ensuring that the eight key elements of information quality are fully integrated into the preparation process. Transparency of accounting information is an evaluation index used to measure whether an enterprise can provide timely and accurate accounting information to all sectors of society, and requires that the accounting information published by an enterprise be truthful, accurate and complete. Accounting information is a direct reflection of an enterprise's real earnings capacity, and its transparency directly determines the quality of information that investors can obtain. The higher the transparency of accounting information, its accounting information is often more real, detailed and valuable, which provides investors with a comprehensive and in-depth judgment basis, with this high-quality information, investors can more accurately assess the business situation and profitability potential of the enterprise, so as to make more informed investment decisions and effectively reduce investment risk.

Transparency not only requires enterprises to strictly follow accounting standards and norms to ensure the authenticity and accuracy of accounting information. Secondly, transparency emphasizes the need for enterprises to maintain a high degree of information disclosure frequency and timeliness,

which effectively reduces information asymmetry in the market and promotes the significant improvement of market efficiency. Further, accounting information with high transparency should be highly comprehensible and comparable, so that internal and external information users can easily understand and compare the financial position and operating results of different enterprises. Such excellent transparency not only significantly enhances the effectiveness of corporate governance, but also provides investors with solid and reliable decision-making support and a clear direction for their investment choices.

2.1.3. Consistency of accounting information. Accounting information consistency means that the caliber of information inside and outside the company is comparable in both the spatial and temporal dimensions, and is an important characteristic of the level of quality of accounting information. The financial sharing policy needs to compare the consistency of information between different companies in the group as well as to focus on the harmonization of accounting information in different departments within the company. The consistency of accounting information reflects whether the information on economic activities of the same company at different times and between group companies at the same time is comparable, whether the business processing process of the enterprise group is consistent, and whether the accounting information is of the same caliber, which directly reflects the effectiveness of internal control and the stability of enterprise development, and thus affects the efficiency of operation and management.

2.2. Research hypotheses

The introduction of the financial sharing model has optimized the flow of funds and information in enterprises through centralization and standardization, significantly improving their efficiency. This model brings more efficient capital flow and lower operating costs to enterprises by reducing redundant financial processes and improving the transparency and predictability of capital usage. By centralizing financial processing, the financial sharing model helps to improve the standardization and rationality of capital use and reduce the risks and costs associated with decentralized management. Under the financial sharing model, enterprises can better carry out centralized forecasting and control of capital flow and information flow, monitor and analyze the liquidity status of enterprises in a timely manner, provide accurate data support for decision-making, and effectively reduce the liquidity risk of enterprises. In addition, the implementation of the financial sharing model also promotes cooperation and synergy within the enterprise, improves the efficiency of collaboration between departments through the optimal allocation of financial resources, and enhances the stability between the internal and external partners of the enterprise, which is also an important factor in improving efficiency. Based on this, the following hypotheses are proposed:

H1: There is a significant positive association between financial sharing and the improvement of enterprise efficiency.

The financial sharing model optimizes the capital flow and information flow of the enterprise through centralization and standardization, which significantly improves the efficiency of the enterprise. In this process, the transparency and consistency of accounting information are the key factors to ensure the effective operation of the financial sharing model. From the perspective of accounting information transparency, when an enterprise implements the financial sharing model, by improving the transparency of financial information, it can enhance the understanding and trust of internal and external stakeholders in the enterprise's financial condition and business performance. At the same time, highly transparent accounting information helps to strengthen regulatory compliance and reduce the risks and costs associated with information asymmetry, thereby improving overall efficiency. From the perspective of accounting information consistency, the consistency of accounting information under the financial sharing model is the basis for ensuring the comparability and reliability of financial data. Through the standardization of accounting policies, processes and

systems, it is possible to achieve consistency of financial information at different times and between different departments, thus helping enterprises to carry out effective centralized forecasting and control of capital and information flows. Under the financial sharing model, the transparency and consistency of accounting information are not only separate factors, but also have a mutually reinforcing relationship between them. On the one hand, highly transparent accounting information needs to be based on consistency, and its transparency can be guaranteed only when the financial data are consistent in all periods and departments. On the other hand, the realization of consistency also needs to be underpinned by transparent disclosure of information so that possible inconsistencies can be detected and corrected in a timely manner. This interaction further contributes to the role of the financial sharing model in enhancing efficiency. Based on this, the following hypotheses are proposed:

H2: Accounting information transparency and consistency play a partial mediating role between financial sharing and firm efficiency.

3. Research design and empirical results

3.1. Study design

3.1.1. Sample selection and data sources. Based on the consideration of the lag of the effect of financial sharing in the existing research, this paper decides to explore the effect of its implementation three years later, and selects the A-share listed companies in Shanghai and Shenzhen from 2008 to 2023 as the initial sample. In order to accurately screen the data of enterprises that have built and implemented financial sharing from 2008 to 2020, this paper mainly uses the following three methods: (1) This paper crawls the annual report through Python and combines the information of the company's website and the "Research Report on China's Shared Service Field" over the years, and searches for "financial sharing", "sharing center", "shared service", "financial shared service" and "financial shared service center" as keywords, and preliminarily screens the enterprises that have built and implemented financial sharing. (2) Collect the information on the official website and official account of the sample enterprises over the years, confirm whether the enterprise has set up a financial shared service center, and manually sort out whether the "process reengineering" is carried out, and eliminate the samples of enterprises that have not carried out process reengineering. (3) Inquire about the annual report of the enterprise that has set up a financial sharing service center, eliminate the introduction of the financial sharing service of the enterprise in the annual report of the enterprise, and confirm that there are no negative words such as "none", "not" and "no" in front of the keywords of the financial sharing service, and finally determine the year in which the enterprise truly implements financial sharing, and confirm it one by one and verify it again to ensure that the sample is valid. The above selection is based on the following reasons: First, the starting point of the sample is postponed by three years because ZTE first introduced and implemented financial sharing in China in 2005, and China's financial sharing started here, but according to most case studies, the comprehensive architecture of financial sharing requires a three-year construction period. Second, as mentioned above, true financial sharing needs to meet the needs of informatization, process reengineering, and financial shared service centers. However, a large number of cases show that informatization, as a necessary condition for financial shared service centers, has been covered in it, so this paper chooses a more reasonable two-factor measurement method. In order to maintain the integrity and rationality of the economic data and ensure that the results are perfect and unbiased, the initial sample processing is continued: (1) delete the enterprise samples with missing relevant data and abnormal financial data. (2) Eliminate ST and *ST enterprises. (3) Tail shrinking of continuous variables at the 1% level.

3.1.2. Definition of variables. The variables in this paper are defined as shown in Table 1.

Table 1. Variable definition

Variable type	Variable name	Variable symbol
Explained variable	Enterprise efficiency	EE
Interpretation variable	Financial sharing mode	FSM
Mediation variable	Transparency of accounting information	TRANS
	Accounting information consistency	DIB
Control variable	Company size	Size
	Asset liability ratio	Lev
	Growth	Growth
	Fixed asset ratio	Fata
	Board size	Board
	Independent director proportion	Indep
	The largest shareholder shareholding ratio	Top1

3.1.3. **Modeling.** Through the previous analysis, the utility of financial sharing needs a three-year lag to be realized, so this paper constructs model (1) to test the explanatory variable time by pushing back the explanatory variable time in the model by three periods:

$$EE_{i,t} = \alpha_0 + \alpha_1 FSM_{i,t-3} + \alpha_2 Controls_{i,t} + \sum Year + \sum Industry + \varepsilon_{i,t} \quad (1)$$

where *FSM* is a dummy variable for whether the firm has implemented financial sharing, *Year* represents a year dummy variable, and *Industry* represents an industry dummy variable. If the coefficient α_1 is positive, it indicates that the implementation of *FSM* by the enterprise group improves enterprise efficiency, i.e., *FSM* is conducive to the adjustment and governance of enterprise working capital management, and vice versa, it indicates that *FSM* does not realize the governance of enterprise working capital management. *EE* indicates the efficiency of the enterprise, this indicator measures the time of one capital turnover, the smaller its value indicates higher efficiency, the larger the value indicates lower efficiency, presenting the reverse effect is worth paying attention to.

In order to continue to explore the mediating role played by the information quality element of accounting information transparency between financial sharing and corporate efficiency, model (2) is constructed for testing:

$$TRANS_{i,t} = \beta_0 + \beta_1 FSM_{i,t-3} + \beta_2 Controls_{i,t} + \sum Year + \sum Industry + \varepsilon_{i,t} \quad (2)$$

$$EE_{i,t} = \gamma_0 + \gamma_1 FSM_{i,t-3} + \gamma_2 TRANS_{i,t} + \gamma_3 Controls_{i,t} + \sum Year + \sum Industry + \varepsilon_{i,t} \quad (3)$$

where *TRANS* represents transparency of accounting information, as measured by the average of the sample percentile ranks of the variables based on the indicators selected from the three perspectives described earlier.

The mediation effect test is carried out in three steps:

The first step, regression test the main hypothesis model (1), observe whether the coefficient α_1 is significant; if it is significant, go to the second step; if it is not significant, stop the test.

In the second step, the regression test of the mediation hypothesis model of transparency of accounting information (2) is conducted to investigate the effect of financial sharing model (*FSM*) on the transparency of accounting information (*TRANS*), i.e., whether the coefficient β_1 is significant or not.

The third step is to regressively test the mediation hypothesis model (3) of accounting information transparency to investigate the effects of financial sharing (*FSM*) and accounting information

transparency (*TRANS*) on corporate efficiency (*EE*). Specific analysis is as follows: if the coefficients β_1 , γ_2 , γ_1 are significant, it confirms that the variable plays a partial mediation effect; if the coefficients β_1 , γ_2 are significant, and γ_1 is not significant, it confirms that the variable plays a full mediation effect. If the coefficients of β_1 and γ_2 are not significant, the Sobel test is conducted, and if the test results are significant, it also indicates that the transparency of accounting information can play a mediating role.

In order to continue to explore the mediating role of accounting information consistency as an element of information quality between financial sharing and corporate efficiency, model (4) is constructed for testing:

$$DIB_{i,t} = \theta_0 + \theta_1 FSM_{i,t-3} + \theta_2 Controls_{i,t} + \sum Year + \sum Industry + \varepsilon_{i,t} \quad (4)$$

$$EE_{i,t} = \mu_0 + \mu_1 FSM_{i,t-3} + \mu_2 DIB_{i,t} + \mu_3 Controls_{i,t} + \sum Year + \sum Industry + \varepsilon_{i,t} \quad (5)$$

The specific steps of the mediation effect test for accounting information consistency are consistent with the above, and will not be analyzed in detail.

As the initial sample of the model in this paper is 2008-2023, in order to ensure the completeness of the lagged data, the sample time is again accurate, and the *FSM* data time is positioned in 2008-2020. Other data time selection corresponds to $t+3$.

3.2. Empirical results

3.2.1. Descriptive statistics. The descriptive statistics of the model variables are shown in Table 2. As shown in Table 2, the minimum value of financial sharing (*FSM*) is 0, the maximum value is 1, the mean value is 0.072 and the standard deviation is 0.062, which indicates that 7.2% of the firms have established financial sharing. Enterprise Efficiency (*EE*) has a minimum value of 0.000 and a maximum value of 0.267 with a mean, median and standard deviation of 0.035, 0.015 and 0.023 respectively.

Table 2. Descriptive statistics

Variable	N	Mean	SD	Min	P50	Max
EE	20537	0.035	0.023	0.000	0.015	0.267
FSM	20537	0.072	0.062	0.000	0.000	1.000
TRANS	20537	0.056	0.041	0.000	0.016	0.263
DIB	20537	0.049	0.038	0.000	0.017	0.284
Size	20537	24.165	2.365	18.745	24.065	27.623
Lev	20537	0.468	0.185	0.058	0.426	0.874
Growth	20537	0.426	1.175	-0.762	0.147	8.032
Fata	20537	1.826	1.384	0.153	1.162	9.953
Board	20537	0.342	0.196	-0.512	0.031	1.856
Indep	20537	0.625	0.265	-0.352	0.037	1.074
Top1	20537	0.478	0.312	-0.268	0.124	0.879

3.2.2. Analysis of regression results:

1) Basic test. In order to test hypothesis H1 and explore the impact of financial sharing on enterprise efficiency, this paper adopts model (1) for regression, using financial sharing (FSM) as an explanatory variable and enterprise efficiency (EE) as an explanatory variable, introducing two variables of Over_efficiency (Over_effi) and Under_efficiency (Low_effi), and adding the control variables into the model, and at the same time, the industry and year of the dummy variables were controlled and the regression results obtained are shown in Table 3.

As can be seen from the regression results in Table 3, the results in Column (1) show that the regression coefficient of corporate efficiency is significantly negatively correlated at the 10% level, indicating that financial sharing can improve corporate efficiency, and this conclusion confirms that hypothesis H1 is valid. In column (2) the coefficient of financial sharing is significantly negative at the 10% level, indicating that financial sharing helps to reduce the excessive efficiency of firms. The result in column (3) shows that the coefficient of financial sharing is negatively significant at the 10% level, indicating that financial sharing can mitigate firms' inefficiency.

Table 3. Regression analysis of FSM and EE

	(1)	(2)	(3)
	EE	Over_effi	Low_effi
FSM	-0.003** (-2.44)	-0.004* (-1.82)	-0.001* (-1.73)
Size	-0.001*** (-9.02)	-0.001*** (-5.83)	-0.001*** (-7.98)
Lev	0.004*** (4.62)	0.012*** (3.96)	-0.002 (-0.78)
Growth	0.000 (1.23)	0.001*** (3.34)	-0.001* (-1.97)
Fata	0.001*** (5.03)	0.001* (1.74)	0.001*** (6.25)
Board	-0.001*** (-9.96)	-0.001*** (-7.52)	-0.001*** (-6.12)
Indep	-0.001 (-0.12)	0.001 (1.58)	-0.003*** (-3.95)
Top1	-0.018*** (-3.88)	-0.001 (-0.11)	-0.034*** (-7.19)
_cons	0.068*** (12.56)	0.084*** (7.71)	0.067*** (11.29)
N	20537	8725	11812
r2	0.056	0.082	0.089
F	17.542	8.674	12.345

2) Path test. The regression results of financial sharing, accounting information transparency and firm efficiency are shown in Table 4. The regression coefficient of TRANS is 3.15, which is significant at 1% level, which shows that the improvement of accounting information transparency has a significant inhibitory effect on the inefficiency of firms. In columns (2) and (3), by setting up financial sharing, the firm increases the transparency of the firm's accounting information, which in turn increases the firm's efficiency. Thus, the transmission mechanism hypothesis H2 of accounting information transparency is tested.

Table 4. Regression result of FSM, TRANS and EE

	(1)	(2)	(3)
	EE	Over_effi	Low_effi
FSM	-0.003**	-0.005*	-0.003**
	(-2.44)	(-2.33)	(-2.45)
TRANS			0.014***
			(3.15)
Size	-0.001***	-0.002**	-0.001***
	(-9.02)	(-2.34)	(-9.01)
Lev	0.004***	0.028***	0.004***
	(4.62)	(8.97)	(4.52)
Growth	0.000	0.005***	0.000
	(1.23)	(10.58)	(1.31)
Fata	0.001***	0.008***	0.001***
	(5.03)	(20.78)	(4.83)
Board	-0.001***	-0.001	-0.001***
	(-9.96)	(-0.15)	(-9.95)
Indep	-0.001	-0.003**	-0.001
	(-0.12)	(-5.08)	(-0.13)
Top1	-0.018***	-0.131***	-0.018***
	(-3.88)	(-21.68)	(-3.42)
_cons	0.071***	0.078***	0.065***
	(12.95)	(8.39)	(12.45)
N	20537	20537	20537
r2	0.068	0.094	0.069
F	15.634	231.526	16.084

The regression results of financial sharing, accounting information consistency and firm efficiency are shown in Table 5. The regression coefficient of accounting information consistency is -0.005, which is significant at 1% level. It indicates that the increase in accounting information consistency has a significant effect on improving firm efficiency. The empirical study found that the establishment of financial sharing reduces the company's assets and liabilities, thus reducing the company's efficiency problems. This confirms the H2 hypothesis of the transmission mechanism of accounting information consistency.

Table 5. Regression result of FSM, DIB and EE

	(1)	(2)	(3)
	EE	Over_effi	Low_effi
FSM	-0.003** (-2.44)	0.062*** (6.58)	-0.003** (-1.97)
DIB			-0.005*** (-12.08)
Size	-0.001*** (-9.02)	-0.028*** (-9.25)	-0.001*** (-9.81)
Lev	0.004*** (4.62)	0.497*** (14.16)	0.008*** (6.85)
Growth	0.000 (1.23)	-0.046*** (-14.23)	0.000 (0.58)
Fata	0.001*** (5.03)	-0.003* (-1.85)	0.001*** (4.98)
Board	-0.001*** (-9.96)	0.002*** (6.74)	-0.001*** (-9.47)
Indep	-0.001 (-0.12)	-0.001 (-0.14)	-0.001 (-0.13)
Top1	-0.018*** (-3.88)	1.203*** (24.56)	-0.011*** (-1.59)
_cons	0.071*** (12.95)	0.896*** (13.86)	0.075*** (13.89)
N	20537	20537	20537
r2	0.068	0.372	0.076
F	15.795	126.087	17.859

4. Monte Carlo simulation

4.1. Theoretical foundations of the Monte Carlo method

The Monte Carlo method is actually a stochastic simulation technique [28-29], whose development is inextricably linked to the generation of computerized random numbers as well as the overall advancement of computer technology.

The core of the Monte Carlo method is actually solving for the mean of a function composed of random variables. The main core theoretical foundations are the Large Number Theorem and the Central Limit Theorem. The Large Number Theorem reflects the fact that as the sample size tends to infinity, the sample mean will converge infinitely to the expected value of the random variable. The Central Limit Theorem tells us that no matter what the distribution of each random variable is, the distribution of random variables obtained by summing multiple independent random variables approximately follows a normal distribution. Based on these two theorems, we can represent the basic logic of the Monte Carlo method of valuation in this way.

First, let the statistic be Y , and the random variables associated with the statistic are X_1, X_2, X_3, X_n . The relationship between Y and X_i can be expressed by the following functional relationship:

$$Y = f(X_1, X_2, X_3, X_n) \quad (6)$$

We know the probability distribution corresponding to X_1, X_2, X_3, X_n , the Monte Carlo method is through the random number generator, X_1, X_2, X_3, X_n respectively, and then get X_1, X_2, X_3, X_n corresponding to the sample value of X_1, X_2, X_3, X_n and then calculated Y corresponding to the sample

value of Y . Such a sampling is carried out to independently repeat the simulation a number of times, and finally get a batch of statistics. The sample values $y_1, y_2, y_3, \dots, y_n$ corresponding to the quantity Y are obtained. y_n , and when the number of simulations is large enough, these values obey the normal distribution in an infinite approximation, and thus we can approximate the expectation and variance of the corresponding statistic Y .

Due to the above properties of the Monte Carlo method coupled with the rapid development of computer technology, compared with other methods, the Monte Carlo method can not only directly simulate the stochastic process, for the direct solution of statistical problems, which is precisely one of the reasons for the use of Monte Carlo method in this paper. At the same time, Monte Carlo method is different from the simplified approximation of traditional mathematical models in the treatment of complex problems, Monte Carlo method can directly simulate the actual complex system by determining the random variables and statistics, so as to directly solve the problem. In addition, based on the central limit theorem, the Monte Carlo method also presents a great advantage in dealing with high-dimensional problems. Compared with the traditional method in which the error of high-dimensional approximation will increase exponentially with the increase of the number of dimensions, the Monte Carlo method does not affect the error of the solution when dealing with high-dimensional problems.

4.2. Basic steps of the Monte Carlo method

Based on the basic logic of the Monte Carlo method described in the previous section, in general, we can summarize the application steps of the Monte Carlo method into the following five steps:

- 1) Construct the corresponding mathematical model for the problem under study and select the corresponding random variables as input variables.
- 2) Analyze and determine the probability distribution of each random variable.
- 3) Define the statistics as model output variables based on the defined mathematical model.
- 4) Set the number of computer simulations and perform simulated random sampling and statistic fitting estimation.
- 5) Monte Carlo method results are reported as output and analyzed and interpreted.

4.3. Monte Carlo simulation results

In this section, we will use a resource-consuming enterprise as a vehicle for scenario simulation, based on deterministic modeling, to simulate the impact of the financial sharing model on the efficiency of the resource-consuming enterprise during the construction period of the financial sharing model and the operation period of the financial sharing model, respectively.

Although the resource-consuming enterprise has planned for the financial sharing model at the initial stage, however, the risk during the actual construction period will make the actual enterprise NPV deviate from the planning. However, specific data on financial sharing model risks are often difficult to obtain, which makes it extremely difficult to quantify and analyze the risks. Based on the probability distribution of risk factors in the management module, the eigenvalues of the risk distribution of the financial sharing model are obtained by combining the data collected from the Internet and the survey of relevant regulations.

4.3.1. Financial sharing model build-out period. Take resource-consuming enterprise A as an example to indirectly quantify enterprise efficiency by enterprise profitability. By Monte Carlo simulation of the construction phase of the financial sharing model, the enterprise NPV of enterprise A after 5 years of operation in the financial sharing model. The NPV after 5 years of operation of the financial sharing model in the construction phase is shown in Figure 1.

Monte Carlo simulation of the model is performed based on the probability distribution of the influencing factors in the construction period of the financial sharing model. According to Figure 1

shows the NPV situation after 5 years of operation, the mean value is 608.4 million yuan, and there is only 68% probability that the NPV is positive. Therefore, if the impact of the financial sharing model during the construction period is considered, the stable operation period for the efficiency of the enterprise is at least 5 years to make the decision to implement the financial sharing model.

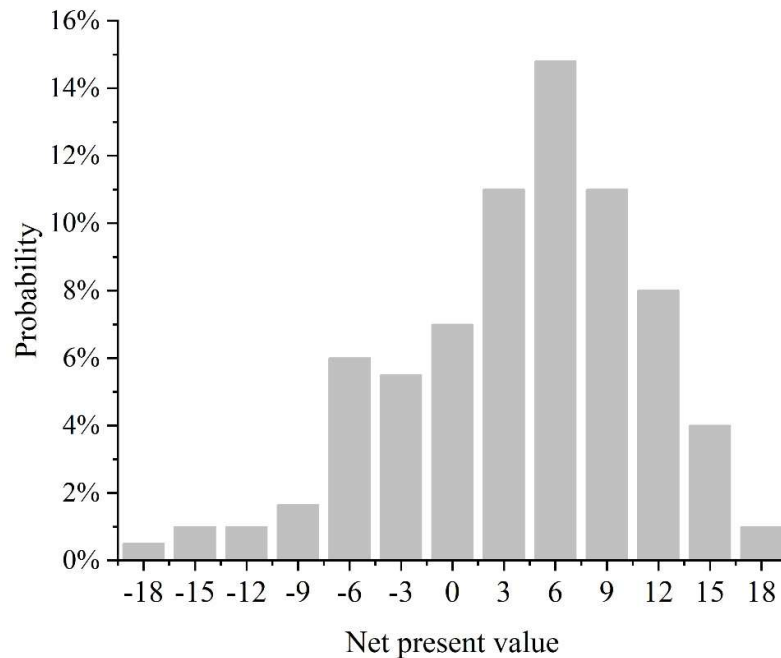


Fig. 1. The net present value of 5 years after operating in the FSM in construction stage

4.3.2. Financial sharing model operating period. The NPV after 5 years of operation under the operating period financial sharing model is shown in Figure 2. The NPV scenario after 5 years of operation is obtained after taking into account the financial sharing model during the operation period, with an average value of 2,327.4 million yuan and a 94% probability of a positive NPV.

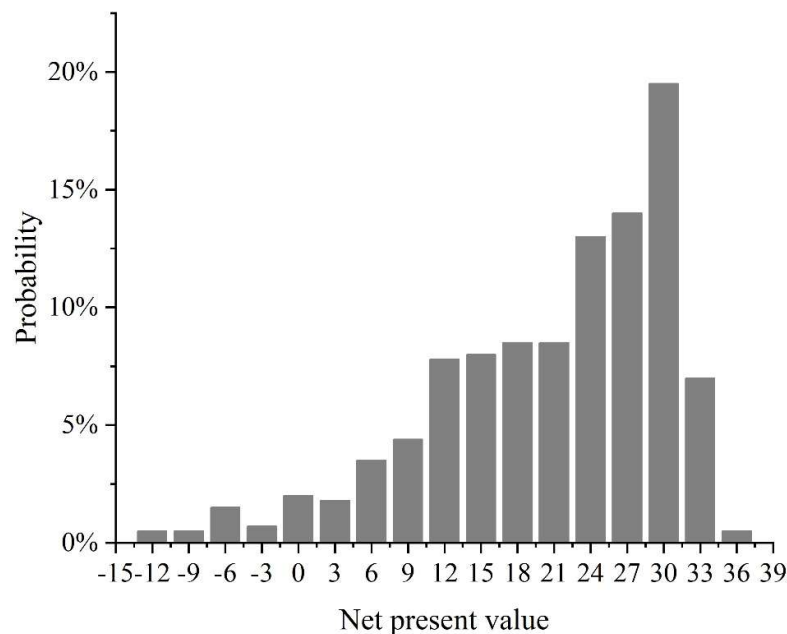


Fig. 2. The net present value of 5 years after operating in the FSM in operation stage

After analyzing by Monte Carlo method, the resource-consuming enterprise efficiency during the construction of the financial sharing model is lower than the enterprise efficiency during the operation of the financial sharing model in terms of different stages of the financial sharing model. After the establishment of the financial sharing model, the efficiency of enterprises was significantly improved.

5. Conclusion

This paper takes the lead in researching the financial sharing model and corporate accounting information and proposes relevant research hypotheses. After defining the research variables, the research model is constructed through regression analysis. Empirical research is conducted on the impact of financial sharing model on the efficiency of resource-consuming enterprises. Based on the results of the empirical research, the net present value of enterprises in the construction and operation periods of financial sharing is analyzed through Monte Carlo method.

The minimum value of financial sharing (FSM) and enterprise efficiency (EE) are both 0, the maximum value is 1, 0.267, the mean value is 0.072, 0.035, and the standard deviation is 0.062, 0.023, respectively. The results of the empirical study show that financial sharing can improve enterprise efficiency. The improvement of transparency and consistency of accounting information of the company can promote the improvement of corporate efficiency.

During the construction period of the financial sharing model, the average net present value after 5 years of operation is 608.4 million yuan, and there is only a 68% probability that the net present value is positive. During the operation period of the financial sharing model, the NPV situation after 5 years of operation has a mean value of 2,327.4 million yuan, with a 94% probability of a positive NPV.

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