

Hedging Enterprise Risk and Value Maximization in Volatile Markets

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Abstract: In the volatile market, any enterprise or industry will encounter all kinds of risks. As a risk machine, financial institutions obtain returns by providing financial services and undertaking all kinds of risks. Compared with other industries, they bear more operational risks. The volatility of the financial market, the aggravation of risks and their serious influence on the company's operation lead to the necessity of risk management. On the basis of analyzing the historical data of CSI 300 Index, this paper calculates the optimal hedging ratio of CSI 300 futures, which is of great significance for financial companies to guard against the risks of securities they hold. This research will further effectively avoid the systematic risks in China's financial market and expand investment ideas and strategies. It also provides reference value maximization for further exploring and optimizing the index environment and investment strategy of China's index investment.

1. Introduction

Risk management is one of the main functions of futures market, and commodity futures market is an indispensable part of market economy [1]. At present, the risk management of financial market is mainly based on futures market and options market for hedging. The company is only the legal subject of a contractual relationship, which includes company managers, shareholders, suppliers, customers, employees and other stakeholders, and all stakeholders are rational people. The ultimate goal of the company is to maximize the company's value. The fact that a large number of companies use financial derivatives to engage in hedging activities shows that potential hedging activities can increase the company's value maximization [2-3]. However, financial theory tells us that it is unnecessary for companies to engage in hedging activities. If shareholders can engage in hedging themselves, then companies will not get corresponding returns from shareholders if they hedge again. Therefore, it is unnecessary for companies to engage in hedging activities.

In the process of continuous development and perfection of the financial company, each enterprise group will also put forward higher requirements for the centralized management services of the financial company, and the demand for investment banking services will increase, and it will be more urgent for the financial company to improve its own investment business ability [4]. If an enterprise can raise funds through both liabilities and equity in incremental financing, it may keep the overall capital structure unchanged when the capital increases or adjusts; However, if the total amount of capital can only be adjusted through separate financing channels, the capital structure may tilt to a certain channel, thus causing the fluctuation of capital structure [5]. The author hopes to give practical and practical guidance and suggestions through the study of specific cases, which can play an important role in attracting jade, and can arouse the concern and thinking of Chinese enterprises with high dependence on foreign countries about enterprise risk hedging and value maximization in volatile markets.

2. The Relationship among Management Risk, Capital Structure Fluctuation and Enterprise Value Maximization

Capital structure fluctuation is influenced by two conditions. One is incremental capital. If the total capital of an enterprise does not change for a period of time, the possibility of capital structure change is relatively small. Once the total amount of capital is adjusted, the proportion of capital increase or decrease by liabilities and equity is different, which may lead to capital structure fluctuation [6].

Second, the choice of financing channels, if enterprises can raise funds through both liabilities and equity at the same time, it is possible to keep the overall capital structure unchanged when capital is increased or adjusted.

The business risk of enterprises leads to the increase of capital structure fluctuation through the joint action of two aspects:

On the one hand, once long-term business risks occur, normal business activities will be affected, resulting in fluctuations in cash flow of business activities. In order to maintain the normal operation, enterprises need to obtain incremental cash flow through external financing.

On the other hand, if there is business risk, the business performance of enterprises will inevitably fluctuate greatly, and the possibility of loss will increase. In this case, it is difficult for enterprises to obtain capital by issuing equity securities. Therefore, enterprises can only raise funds through debt.

Capital fluctuation will reduce the maximization of enterprise value. The fluctuation of capital structure in enterprises leads to the instability of corporate equity and debt governance, the failure of governance structure and the decline of corporate efficiency. Second, it leads to the uncertainty of enterprise financing plan, and increases the temporary financing demand, thus increasing the transaction cost; Third, it is the capital structure that is easy to cause high debt ratio, thus increasing financial risks.

In practice, it is not uncommon for the increase of business risk to lead to the fluctuation of capital structure, thus reducing the maximization of enterprise value.

3. Hedging Company Hedging under Information Disclosure

With the further expansion of corporate risk financial environment. Hedging-based derivative activities of companies in financial derivative instruments have greatly increased, and the application of derivative products has become increasingly extensive. However, because of the huge risks of derivative financial instruments, the complex products of financial derivative transactions and high leverage and other characteristics, the issuers and end-users have been constantly caused accidents and disasters.

Behind a series of financial derivatives crises, the regulatory authorities have found the inadequacy of information disclosure of various financial derivatives traders. According to the current information disclosure method of derivative transactions, the information disclosure of derivative transactions is an information disclosure method with accounting information as the main body [7-8]. Because only through the disclosed information of derivative transactions, the regulatory authorities, company management and investors can effectively know the risk situation of derivative transactions, accurately assess the risks and make correct judgments.

3.1 Basic Model

Firstly, assume the information structure of the model: there is information asymmetry between the company and the external investors, the company provides hedge information to the external investors through financial reports, and the external investors maximize the risk and value of the company according to the information obtained. Consider a two-stage model: $t = 0, 1, 2$.

The company holds assets available for sale at $t = 2$. The company liquidates at $t = 2$, and the assets generate cash flow until $t = 2$. The assets held by the company are risky because of the uncertainty of the price and quantity of assets. The fluctuation of the company's asset price can be avoided by financial derivative contracts, while the uncertainty of the company's asset quantity cannot be avoided by financial derivative contracts.

In $t = 2$, the unit price of assets is expressed as:

$$\tilde{S}_2 = a_0 + \tilde{a}_1 + \tilde{a}_2 \quad (1)$$

Among them, $a_0 = \mu$, $\tilde{a}_i \sim N(0, \sigma^2)$, $i \in \{1, 2\}$, $\text{cov}(a_1, a_2) = 0$.

Uncertain asset quantity is expressed as:

$$\tilde{x} = x_0 + \tilde{x}_1 \quad (2)$$

Among them, $\tilde{x}_1 \sim N(\tilde{x}_1, \sigma^2)$.

At $t = 0$, managers and the market can observe the asset quantity x_0 . Thus, at $t = 0$, managers have no private information; at $t = 1$, managers of the company observe the realized value of the asset quantity \tilde{x}_1 , but the market cannot observe it; at $t = 2$, managers and the market can directly observe the final asset quantity \tilde{x}_1 .

For simplicity, we also assume that there is no correlation between price and quantity, that is:

$$\text{cov}(a_i, x_1) = 0, i \in \{1, 2\} \quad (3)$$

Due to the separation of ownership and actual control rights in modern enterprises and the information asymmetry between shareholders and managers in the daily operation and management of enterprises, managers' behavior is likely to run counter to shareholders' behavior, which leads to the principal-agent problem. Performance in enterprise risk management, managers may take risk management strategies that are not conducive to the interests of shareholders [9]. The decisions made by managers have a strong correlation with the way they get paid.

3.2 Incomplete Disclosure of Information

The company can disclose the information of hedging activities for a specific risk by the change of expected future cash flow. In our model, if there is no specific financial contract to avoid the risk of the assets x sold, the company can only disclose information by means of cash flow hedging.

If hedging option y_0 is regarded as cash flow hedging, then the effective part of the profit and loss of derivative contract is reported as other comprehensive income part at first, and then re-recorded into the income when the expected transaction affects the income. The invalid part of profit and loss is reported directly in the income, and the comprehensive income is:

$$\text{ComprehenssiveIncome}_{1,CF} = -y_0 \left(a_1 + \frac{1}{2} \rho_f \sigma^2 \right) \quad (4)$$

Therefore, in this case, the information obtained through the financial report is the same as the income report under the non-hedging accounting information disclosure mode.

In the model, the company faces price risk and quantity risk, but it can only avoid price risk in the forward contract market. Under the definition of limited fair value maximization, the company must calculate the profit and loss of hedged assets. Because the price change of each forward contract is:

$a_1 + \frac{1}{2} \rho_f \sigma^2$, the price change of company assets per unit is a_1 , and the reported income is:

$$\text{Earning}_{1,LEF} = -y_0 \frac{1}{2} \rho_f \sigma^2 \quad (5)$$

All the market participants know the change a_1 of asset price, and we can see that the information provided by the income report is equivalent to the hedging choice in the case of non-hedging accounting.

Through the analysis of the above model, we believe that there is information asymmetry between the company and the external investors. The company provides hedging information to the external investors through financial reports, and the external investors evaluate the risk and value maximization of the company according to the information obtained.

Under the way of non-hedging accounting information disclosure, managers' hedging choices are different from those under public information, which leads to the inability of external investors to effectively evaluate information related to the company. Under the comprehensive fair value maximization hedging accounting information disclosure mode, managers' hedging choices are the same as those under public information, and external investors can effectively evaluate information related to the company with the help of financial reports.

4. Empirical Analysis

This study is divided into three parts. One part considers the effect of hedging with stock index futures and the influence of hedging on portfolio when the stock market is on the rise (that is, the bull market). Part one considers the degree to which the hedging of stock index futures reduces the risk when the stock market is in a declining period (that is, in a bear market); The last part considers the hedging effect of stock index futures on investment portfolio when the stock market is in the stage of equilibrium shock (i.e. equilibrium market).

In order to study the hedging effect of stock index futures, we must select the stock spot and CSI 300 Index simulation futures related data in China, in which the spot data comes from the website data of Shanghai Stock Exchange, and the stock index futures data comes from the historical data of simulation trading varieties launched by China Financial Futures Corporation.

4.1 Establishment of Model

According to the selected sample of SSE 50 stock portfolio, for portfolio return OLS model:

$$r_{group,t} = \alpha_{group} + \beta_{group,hs300} r_{hs300,t} + \varepsilon_{group,t} \quad (6)$$

Among them, $r_{group,t}$ is the return rate of the portfolio in t period; α_{group} is the intercept term of portfolio regression equation; $\beta_{group,hs300}$ is the optimal hedging ratio of portfolio and CSI 300 Index futures:

$$\beta_{group,hs300} = \frac{Cov(r_{group}, r_{hs300})}{Var(r_{hs300})} \quad (7)$$

It reflects the sensitivity of portfolio to macroeconomic factors represented by CSI 300. Q_t is the random error term of portfolio regression equation, or the unique risk of portfolio itself.

After estimating the optimal hedging ratio by OLS method, we calculated the performance of hedging. Through empirical research, we found that during bull market and bear market, the hedging effect of HS300 stock index futures was very remarkable. The calculation results are shown in Figure 1, in which the variance of the yield before hedging and the variance of the yield after hedging are respectively enlarged by 1000 times, so as to be more intuitive in the figure.

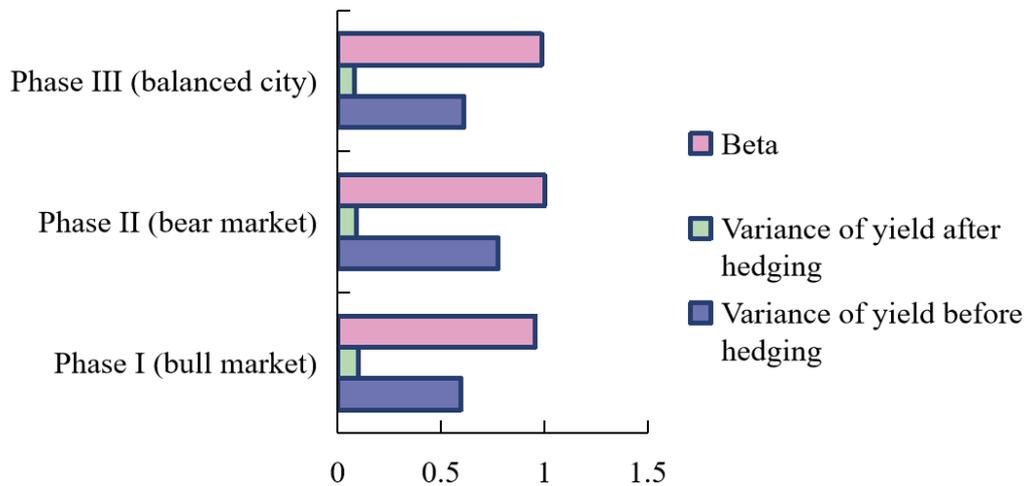


Fig.1 Comparative Analysis of Hedging Effect between Bull Market and Bear Market

4.2 Hedging Effect Measurement

Adopt the hedging effectiveness measurement standard defined by Ederington, that is, the hedging effectiveness index indicates the risk avoidance degree of hedged transactions relative to non-hedged transactions, which is expressed by H_e :

$$H_e = 1 - \frac{Var(H)}{Var(U)} = 1 - \frac{1}{(1+h)^2} \left[1 - 2h\rho \frac{\sigma_f}{\sigma_s} - \frac{h^2 \sigma_f^2}{\sigma_s^2} \right] \quad (8)$$

Among them, $Var(U)$ represents the variance of the rate of return achieved without hedging, $Var(H)$ represents the variance of the rate of return achieved with hedging, h is the optimal hedging ratio, $\frac{h^2 \sigma_f^2}{\sigma_s^2}$ is the proportion of stock spot system risk to total risk, σ_f^2 in molecule is the variance of stock index futures return, $h^2 \sigma_f^2$ measures the systematic risk part of stock spot return risk, ρ is the correlation coefficient between stock spot return and stock index futures return, and σ_s^2 is the total risk of stock spot, which includes systematic risk and company-specific risk.

It can be seen from the expansion of index H_e of hedging effect that the greater the proportion of systematic risk of stock spot to total risk, the better the hedging effect. Similarly, the greater the correlation coefficient between stock spot yield and stock index futures yield, the better the hedging effect.

In this section, we take the above 50 securities as an example to measure the hedging effect between them and CSI 300 Index futures. Select the historical data of futures simulation trading varieties as the benchmark data, which comes from the simulation trading data of China Financial Futures Trading Network and is calculated according to the calculation formula in the previous section. The calculation results are shown in Figure 2.

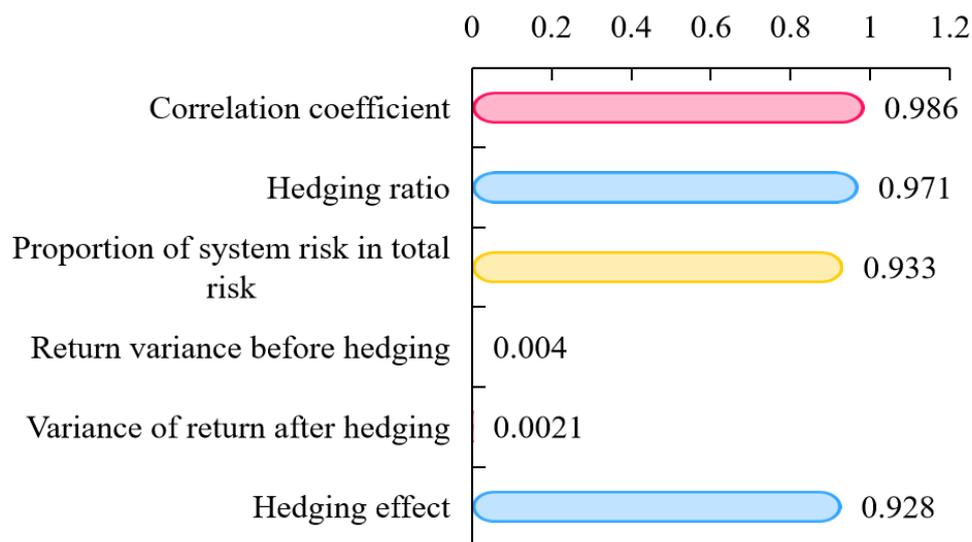


Fig.2 Hedging Effectiveness Measure

From the calculation results, under the sample, the variance of the return rate of SSE 50 after hedging decreases, and it can also be seen that the volatility of the return rate after hedging obviously decreases. Through the above-mentioned robustness analysis, it fully shows that the volatility of the return rate of the sample after hedging decreases.

4.3 Policy Advice

With the development of China's financial market, more and more financial assets held by China's financial companies are exposed to risks, and financial companies are stable institutional investors. Therefore, how to hedge the risk of stock investment and bring stable income to financial companies has become an important topic for the development of financial companies. Therefore, this paper has the following suggestions:

Financial companies should actively participate in the financial market and use the tools of the financial market to manage their financial assets. China's stock market took a huge roller coaster ride, which caused many funds and asset management companies to suffer huge losses. With the development of financial companies, the financial assets they hold are more exposed to risks, and the

requirements for risk management of financial companies are getting higher and higher. As a financial company pursuing stable operation, it needs to use financial instruments such as stock index futures to manage risks, so as to better participate in the financial market.

Financial companies should fully diversify their investments to diversify the individual risks of stocks. Diversified investment can eliminate the non-systematic risk of stocks, while hedging can eliminate the systematic risk of stocks, thus smoothing the fluctuation of financial assets. In the daily financing decision of enterprises, attention should be paid to maintaining the balance of capital structure. First, keep all financing channels unblocked, and do not rely on a specific channel for financing; Second, on the basis of ensuring shareholders' dividend demand, increase the proportion of retained earnings, so as to maintain certain financial flexibility; Third, improve the efficiency of capital use and reduce the external financing demand, thus reducing the probability of capital structure fluctuation; Fourth, when adjusting the capital structure, we should pay attention to the changes of business risks, and it is not appropriate to arbitrarily increase the debt ratio when the business risks increase.

In this paper, these factors are simply classified into macro factors and micro factors, which are too simple and do not conform to the actual situation. In reality, there are many factors that affect stock returns. When single-factor model is used for fitting, important factors may be missed, which makes the residual value of the model appear autocorrelation, and finally leads to the failure of model parameter estimation. In the future research, we should find out as many influencing factors as possible and establish a multi-factor model to make the model estimation more accurate.

5. Summary

With the expansion and intensification of the market risk environment of the company, hedging, as an important way of risk management for the risk exposure faced by the company, has gradually become an important aspect of the company's business decision-making. It should be said that hedging theory is a highly technical theory, which develops with the development of financial derivative instruments. The greater the proportion of systemic risk to total risk, the better the hedging effect. Finally, the influence of the ratio of system risk to total risk on hedging effect is analyzed. Stock returns are influenced by macroeconomic factors and microeconomic factors. Other factors affecting the hedging effect. The greater the correlation coefficient between stock return and stock index return, the higher the ratio of system risk to total risk, and the better the hedging effect.

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