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The Application of Hedging in Enterprise Risk Management: The Case Study of Southwest Airlines

Yuyan Zhao *, Jianwei Lu

School of Economics, Anhui University of Finance and Economics, Bengbu, Anhui 233030, China
*** Corresponding author:** Yuyan Zhao (Email: 2867507981@qq.com)

Abstract: In today's project of globalization and increasing market uncertainty, enterprise risk management has become one of the key factors for the survival and development of enterprises. As an important risk management tool, hedging is widely used in corporate practice. This article takes Southwest Airlines as an example to explore the application of hedging in enterprise risk management. Through a case study of Southwest Airlines, we aim to uncover how hedging can help companies reduce risk, stabilize operations, and improve profitability. At the same time, this paper also hopes to provide useful inspiration and reference for enterprise risk management.

Keywords: Hedging; Risk Management; Option.

1. Introduction

With the continuous development of the global economy and the intensification of market competition, enterprises are facing more and more uncertainties and risks. In this context, the risk management carried out by hedging raw materials related to the company's operation and the realisation of sound operation of the enterprise are of great significance. With the continuous improvement of the mechanism of China's futures market and the increasing variety of the market, the hedging enthusiasm of many companies is increasing. Contrary to the rising heat of hedging, the effect of hedging behaviour still needs to be strengthened, and the events of substantial losses of corporate hedging occur frequently, how effective is corporate hedging behaviour? How to optimise the hedging programme to better serve the enterprise? This is every enterprise and even every investor need to actively think about the problem. In order to effectively improve the ability of enterprises to resist the risks faced in the implementation of hedging, it is necessary to correctly understand the types of risk and the reasons for the formation of the reasonable use of hedging this financial derivatives to resolve the financial risks and recover corporate losses.

2. Literature Review

The study of hedging theory can basically be divided into two types: classical hedging theory and modern hedging theory.

Hedging theory was firstly proposed by Keynes (1930) and Hicks (1946), which is called classical hedging theory or naive hedging theory. They believe that, as long as the hedger in the futures, spot two markets at the same time to carry out 'balanced relative' transactions, you can effectively transfer the price risk faced in the market, that hedging is the hedger through the futures market to transfer the price risk to the speculator in order to obtain the risk subsidy. But the traditional hedging theory has harsh assumptions. Hoffman (1932), however, believes that hedging is a transfer of risk, and he first put forward the viewpoint of Shifting of risk. Johnson (1960) and Stein (1961) break through the traditional theory of the constraints of the creative introduction of the Marko Vitz asset portfolio theory to explain hedging behaviour. Later, Rutledge (1961) and others further developed this theory: whether or not to participate in hedging, risk always exists in the investor's decision-making, and the futures market only facilitates risk management rather than risk transfer.

Jiang Meiyun (2001) in the 'Study on the Risks and Countermeasures of Corporate Futures Market Hedging' summarises the risks faced by hedging exchanges into four major categories, namely, technical risk, basis risk, policy management risk and market depth risk, and proposes corresponding risk management strategies for each category of analyses in the paper. Li Yizhi (2001) and others pointed out in the 'Report on the Application of Value-at-Risk Method in Risk Assessment in Futures Market' that: enterprises in hedging transactions not only have to face the price risk, transaction risk, credit risk and liquidity risk that they face in traditional spot trade, but also have to face the unique risk of choosing futures varieties, selecting futures contracts and measuring the amount of value to be guaranteed in the hedging transactions.

3. The Theory of Hedging

3.1. Meaning of Hedging

Hedging can also be referred to as 'Haiqin' or 'hedge trading' and so on, refers to the futures market as a place to transfer price risk, the use of futures cooperation for the future purchase and sale of commodities in the spot market as a temporary substitute for its buy now ready to sell the commodity later or the price of the future need to buy the commodity to insure trading activities.

3.2. Fundamentals of Hedging

The principle of hedging is to take advantage of the price relationship between the futures market and the spot market to achieve the trading behaviour of locking in future cash flows or fair value by establishing opposite positions between the two markets. Specifically, when the price in the spot market rises, the price in the futures market also rises and can be hedged in this way. The basic principle of hedging lies in

the fact that the futures price and the spot price of a particular commodity or financial instrument are subject to the same economic factors and thus they move in roughly the same trend. Moreover, spot prices and futures prices are convergent in trend, i.e., when a futures contract is approaching its expiry date, spot prices and futures prices will gradually converge. If at the same time in the spot market and the futures market to establish the same number of positions in the opposite direction, the expiry of the spot price, regardless of whether the price rise or fall, the two positions of the profit and loss is exactly offset, so that the hedger to avoid taking the risk of loss.

There are three main methods of hedging:

(1) Selling to hedge: Selling to hedge refers to the way hedgers sell futures contracts in the futures market in order to avoid the risk of future price declines. When the future market price falls, the hedger can get the cash earned from the earned futures contract to make up for the loss in the spot market.

(2) buying hedging: buying hedging refers to the hedger in order to avoid the risk of future price increases in the futures market, the way to buy futures contracts. When the future market price rises, the hedger can get the cash earned from the earned futures contract to make up for the loss in the spot market.

(3) cross hedging: cross hedging refers to the way hedgers use different markets or different varieties of futures contracts for hedging. This approach can avoid the liquidity risk of a single market or trading restrictions, but also to obtain a wider range of hedging effects.

In short, the principle of hedging is to make use of the price relationship between the futures market and the spot market to achieve the purpose of risk avoidance by establishing opposite positions between the two markets.

4. Hedging of Southwest Airlines fuel in the US

Founded in 1966, Southwest Airlines is the second oldest airline in the United States, and has carved out a niche for itself as a 'low-cost' carrier in the industry. After the September 11th terrorist attacks in 2001, the US airline industry suffered a huge blow, with Delta Air Lines and Northwest Airlines filing for bankruptcy in 2005 as a result of overcapacity and high fuel prices that caused US airlines to lose $10 billion. In contrast, Southwest Airlines remained profitable during these turbulent years and continued to do so for 33 years. The airline has been in the black since the early 1980s. In addition to winning a large market share with its blue ocean strategy, Southwest has been the most profitable airline for the longest period of time since 1973 due to the implementation of a long-term error-free hedging strategy for its aviation fuel. The large fluctuations in international oil prices have caused fuel costs to account for more than 30% of the airline industry's total costs, making it the second largest cost item after labour costs. However, Southwest's fuel cost ratio is well below the airline industry average; even in 2007, when global oil prices peaked, Southwest's fuel cost ratio was only 25% of cost. Successful hedging has played a critical role in Southwest's 'profitability myth,' as many international oil price changes have been perfectly resolved.

4.1. U.S. Southwest Airlines Fuel Hedging Strategy

4.1.1. Stages of Hedging

Southwest Airlines' fuel hedging strategy has gone through three different stages of development. (1) Preliminary stage: As early as 1991, during the Gulf War, Southwest Airlines started to hedge aviation fuel. However, due to the lack of experience, there were very few hedging positions at that time. The strategy at this stage was mainly to buy crude oil call options to hedge jet fuel. (2) Growth stage: After 2004, as fuel prices continued to rise, the proportion of jet fuel expenses to the company's total expenses increased year by year. Against this background, Southwest Airlines adhered to a systematic, long-term, large-percentage fuel hedging strategy. In 2006 and 2007, the relationship between the company's expected fuel usage hedging ratio and the average oil price was effectively managed. (3) Adjustment phase: The financial crisis in 2008 had a major impact on the global airline industry, and Southwest 3 Airlines adjusted its fuel hedging strategy in a timely manner. The strategy in this phase may focus more on risk control and cash flow stability.

Overall, Southwest's hedging strategy has evolved in response to changing market conditions and company needs. The company's flexibility and foresight in risk management can be seen from the initial small amount of call options purchased, to systematic, long-term hedging of a large percentage, to the adjustment of the strategy after the financial crisis.

4.1.2. Hedging Strategies Implemented

(1) Long-term contract strategy

Southwest Airlines not only hedges its current jet fuel needs, but also hedges a certain percentage of its future jet fuel. The long-term contract strategy is primarily achieved by entering into long-term fuel supply contracts with suppliers. These contracts are for longer periods of time, usually 5-10 years and sometimes longer. By entering into long-term contracts, Southwest is able to lock in fuel prices in advance and avoid the risks associated with fluctuating fuel prices. In a long-term contract, Southwest and the supplier agree on a fixed price, which is usually lower than the market price. This means that when the market price of fuel rises, Southwest is able to obtain fuel at a lower price than the market, reducing costs. And when market fuel prices fall, although Southwest needs to purchase fuel at a higher-than-market price, the impact of this higher purchase price is offset by the stability of the long-term contract due to the longer term of the long-term contract. In addition, the long-term contract strategy helps Southwest stabilise its business plan. By entering into long-term contracts, Southwest can plan ahead for fuel costs and ensure the company's long-term stability, laying a solid foundation for the 'profitability myth' of the company.

However, there are some risks associated with the long-term contract strategy. Firstly, long-term contracts are long term, so if market conditions change, Southwest may not be able to adjust the contract in time, resulting in high costs or insufficient supply. Second, long-term contracts usually require the payment of a certain amount of liquidated damages or cancellation fees, and if the market price of oil remains low for an extended period of time, Southwest may face the risk of excessive costs.

(2) Adoption of Combination Derivative Instruments

U.S. Southwest Airlines uses a combination of derivatives strategy in hedging, aiming to achieve effective risk

management and cost stability through the combination of a variety of derivatives. Combination of options and futures: U.S. Southwest Airlines uses both options and futures as derivative instruments in hedging. Options provide airlines with the right to buy or sell fuel at a specific price in the future. By buying call options, Southwest can quickly determine future fuel costs and avoid the risk of rising oil prices. Futures contracts, on the other hand, provide airlines with a fixed-price supply of fuel, helping to stabilise costs.

Dynamic Adjustment: Southwest Airlines dynamically adjusts the proportion of its derivative portfolio based on changes in market conditions and its own needs. When the market price of oil rises, Southwest can increase its holdings of options contracts to better lock in costs. And when oil prices fall, it may reduce the amount of option contracts held to reduce costs. This dynamic adjustment ensures the effectiveness of the hedging strategy.

Diversification of Risk: By combining multiple derivative instruments, Southwest Airlines can diversify risk and reduce the impact of fluctuations in a single derivative instrument on the overall hedging effectiveness. For example, when oil prices fall, the value of a futures contract will decrease accordingly, while an option contract may maintain its value or decrease by a smaller amount, a combination that reduces overall risk exposure.

Risk Management: Combining derivative strategies has also helped Southwest Airlines better manage risk. By using a combination of options and futures, the airline has the flexibility to respond to risk in different market environments. For example, when the market price of oil is volatile, Southwest can reduce its risk exposure by adjusting the ratio of options to futures.

Southwest Airlines in the United States uses a combination of derivatives strategy for hedging strategy to reduce risk and stabilise costs through the combination of multiple instruments, which provides a strong impetus to the company's sustained profitability.

4.2. U.S. Southwest Airlines Fuel Hedge Gains and Losses

Table 1. Annual Revenue and Net Income of All U.S. Airlines and Southwest Airlines, 1990-2010

Number	Vintages	Industry operating income ($ billion)	Industry net profit ($ billion)	Southwest Airlines operating revenues ($ billion)	Southwest Airlines net profit ($ billion)
1	1900	760	-39	12	0.5
2	1991	755	-19	13	0.3
3	1992	790	-48	17	1.0
4	1993	855	2	21	1.7
5	1994	890	-3	24	1.8
6	1995	949	23	29	1.8
7	1996	1024	27	34	2.1
8	1997	1099	51	38	3.2
9	1998	1135	49	42	4.3
10	1999	1193	53	47	4.7
11	2000	1309	27	56	6.0
12	2001	1156	-83	56	5.1
13	2002	1074	-114	55	2.4
14	2003	1180	-17	59	4.4
15	2004	1348	-91	65	3.1
16	2005	1518	-273	76	5.5
17	2006	1658	180	91	5.0
18	2007	1748	77	99	6.4
19	2008	1862	-237	110	1.8
20	2009	1552	-25	104	1.0
21	2010	1749	37	121	4.6

Source: Statistics and collation of US aviation industry annual reports 1990-2010.

For the benefits brought by hedging, using its financial data analysis and collation, it was found that the long-term hedging and rolling position adjustment strategy used by Southwest Airlines in the United States can provide it with stable operating profits, and even bring good economic benefits.

Table 2. Hedging gains/losses and profits of Southwest Airlines, 2002-2008

Vintages	Hedging profit ($ billion)	Profit before tax ($ billion)	Profit after hedging gains ($ billion)
2002	0.45	3.39	3.48
2003	1.71	6.04	4.33
2004	4.55	3.39	-1.16
2005	8.92	7.79	-1.13
2006	6.34	7.90	1.56
2007	6.86	10.58	3.72
2008	11.06	2.78	-8.28
Total	39.89	42.41	2.52

Source: Southwest Airlines 2002-2008 Annual Report Statistics and Compilation

Through the statistics of hedging gains and pre-tax profits of Southwest Airlines during 2002-2008, and the simple calculation of pre-tax profits after deducting hedging gains, we can have a more intuitive feeling of the benefits of jet fuel hedging to Southwest Airlines. In these seven years, Southwest Airlines has three years of negative profit after deducting the hedging gain, while the total gain of jet fuel hedging accounted for as much as 94.06% of the total pre-tax profit. In other words, if Southwest Airlines had not hedged its jet fuel, it would have been difficult for it to bear the pressure of rising costs if it relied only on its main business income to directly face the risk of rising oil prices since 2000, and in 2008, under the financial crisis, it would have faced the same operational dangers as most of the companies in the industry, which would have affected the healthy development of the company.

5. Hedging Realization and Risk Management

5.1. How Companies can Successfully Use Hedging

5.1.1. Focus on Risk Control

Hedging as a risk management tool, the main purpose is to reduce or eliminate the price risk at the same time to ensure the normal operation and long-term development of the enterprise. First of all, enterprises should fully understand and assess various possible risks, including market risk, interest rate risk, exchange rate risk and so on, which all have a significant impact on the operation of the enterprise. Through the establishment of a perfect risk assessment system, enterprises can more accurately identify and measure these risks, so as to provide a basis for subsequent risk control. Secondly, enterprises should establish a perfect risk monitoring mechanism. Hedging is a continuous process, enterprises need to monitor real-time market changes and the implementation of hedging, timely adjustment of strategy and to deal with possible risks. At the same time, enterprises also need to regularly assess the effect of hedging, in order to timely identify problems and make corrections.

In short, enterprises want to successfully use hedging, must focus on risk control. Only through scientific risk assessment, reasonable strategy development, effective monitoring mechanism and continuous learning and improvement, enterprises can really realise the expected effect of hedging and ensure the sound development of enterprises.

5.1.2. Limited Hedging

If an enterprise wants to use hedging successfully, it must first define its risk management objectives. This involves an in-depth understanding and analysis of the enterprise's own business situation, market environment, competitive situation and other aspects. On this basis, an enterprise may choose to hedge some or all of its products in order to reduce the risks associated with price fluctuations. However, in the process of hedging, enterprises need to pay special attention to avoid hedging more than the quantity of their own products or purchases. Excessive hedging may bring additional risks, such as liquidity risk and basis risk. Once the market situation is reversed, enterprises may face huge losses, which may even affect normal production and operation. In addition, enterprises need to pay attention to the cost-benefit analysis of hedging. Although hedging can reduce risk, it also requires a certain cost, such as transaction costs, margins, etc. Enterprises need to weigh between risk control and cost-effectiveness and choose the hedging strategy that best suits them. In order to ensure the successful implementation of hedging, enterprises also need to establish a sound risk management mechanism. This includes the establishment of a special risk management department, the development of risk management processes, the establishment of risk operation process, strengthen internal control and other measures, enterprises can effectively reduce the risk of hedging, to ensure that the reasonableness and effectiveness of hedging.

In short, enterprises need to combine with their own actual situation to develop reasonable strategies and operational programmes when hedging. Especially to avoid excessive hedging risks, focus on cost-benefit analysis, and establish a perfect risk management mechanism. Only in this way, enterprises can really achieve the expected effect of hedging, to ensure the sound development of the operation.

5.1.3. Consulting Professional Organisations

Consultation with a professional organisation is essential if a company is to use hedging successfully. Hedging is a complex and professional risk indicator system and so on. By clarifying the responsibilities of each department and standardising management activities, it involves market analysis, strategy formulation, trade execution and other aspects. Due to the limited resources and capabilities of the enterprise itself, the success rate and effect of hedging can be greatly improved by consulting and cooperating with professional institutions. Professional institutions usually

have rich experience and professional knowledge, and can provide enterprises with a full range of hedging consulting services. They can gain a deep understanding of the business needs and market environment of the enterprise, and tailor-made hedging programmes according to the actual situation of the enterprise. These programmes are usually more targeted and operational, and can better meet the risk management needs of enterprises. Working with a professional organisation also provides access to more comprehensive risk management advice and solutions. In addition to hedging, companies can get support and guidance on market analysis, risk assessment and strategy optimisation from professional institutions. These suggestions and solutions can help enterprises understand market risks more comprehensively and develop more scientific risk management strategies. It should be noted that enterprises should conduct sufficient investigation and assessment when choosing the professional institutions to cooperate with. Enterprises need to understand the qualifications, performance, reputation and other information of the organisation to ensure the reliability and effectiveness of the cooperation. At the same time, enterprises should also clarify their own needs and expectations, and establish a good cooperative relationship with professional institutions to jointly promote the successful implementation of hedging.

In conclusion, if enterprises want to use hedging successfully, it is wise to consult professional institutions. Through the cooperation with professional institutions, enterprises can obtain more comprehensive and professional services and support to improve the success rate and effect of hedging. But at the same time, enterprises also need to carry out sufficient investigation and evaluation, choose the right cooperation organisation and establish a good cooperation relationship.

5.2. Enterprise Hedging Risk Prevention Countermeasures

5.2.1. Strengthen Internal Control

Establish a sound internal control system, including decision-making, execution and monitoring of hedging business, to ensure the standard operation of hedging business. At the same time, strengthen internal audit and risk control, conduct regular inspection and audit of hedging business, and discover and correct problems in a timely manner.

5.2.2. Reasonable Selection of Hedging Tools

Enterprises should choose suitable hedging tools according to their own risk management needs. For example, for the prevention of raw material cost risk, it can choose futures contracts for hedging; for the prevention of foreign exchange risk, it can choose to borrow another currency and then convert it into base currency for hedging.

5.2.3. Establish Risk Management System

Enterprises should have a perfect risk management system, including risk identification, assessment and control. Through the monitoring of market conditions and credit assessment of counterparties, potential risks can be identified and responded to in a timely manner. The Internal Audit Department is the main force to monitor the hedging risk management. The Internal Audit Department should carry out regular audits for the risk management procedures to ensure that all elements of risk management are always operated in an effective way.

5.2.4. Improve the Quality of Personnel

Hedging business involves complex financial derivatives and risk management techniques, enterprises should strengthen the training and introduction of talents, improve the professional quality and risk awareness of relevant personnel. At the same time, staff training and experience exchange should be strengthened to improve the risk management level of the whole enterprise. Risk management should be incorporated into performance appraisal and linked with employees' remuneration, and incentives should be given to departments and individuals who give full play to their subjective initiative, accurately predict the market and bring benefits to the enterprise; and departments and individuals who do not operate in accordance with the hedging process and system and cause losses to the company should be criticised and punished.

5.2.5. Regular Assessment of Hedging Effect

Enterprises should regularly assess the effect of hedging, including the profit and loss of hedging, the rate of hedging and other aspects. According to the assessment results, timely adjust the hedging strategy to improve the efficiency and effectiveness of hedging.

5.2.6. Actively Carrying Out Publicity Activities on the Basics of Hedging

Under the conditions of market economy, commodity prices fluctuate violently, futures prices interact more and more with spot prices, and there is a growing demand for enterprises to hedge commodity price risks. Therefore, it is necessary to continuously increase the publicity activities of enterprise hedging, especially to increase the publicity efforts to the decision-making level of enterprises, and deepen their understanding of the importance of the futures market and hedging. It is necessary to publicise the basics of the futures market and the current situation of hedging, as well as to guide enterprises to see the vision of future development; it is necessary to enable enterprises to understand the basic functions of the spot market, as well as to give them an insight into the risks that exist in the futures market.

6. Conclusion

Hedging is a double-edged sword, the reasonable and flexible use of commodity futures and its financial derivatives will help enterprises to avoid risks, and even obtain additional benefits. In view of the great harm caused by the risk to the enterprise, the enterprise should make good use of this new derivative financial tool to control its own operation and management risk, but also recognise the new risks that may be brought by the hedging operation, and take scientific and reasonable countermeasures to avoid the spread of risk and its loss, so as to strengthen the enterprise risk management effect, maintain the safety of the enterprise's assets, and escort the sustainable development of the enterprise.

References

[1] ZHAO Xinxi, ZHAO Wusheng, XU Lujun. Research on the impact of hedging on enterprise value and business risk[J]. Modern Business, 2023, (17):133-136.

[2] L.L. Johnson. The Theory of Hedging and Speculation in Commodity Futures[J]. Review of EconomicStudies, 1960,27 (3): 139–151.

[3] Stein, J. L.The simultaneous determination of spot and futures prices [J]. American EconomicReview,1961,51(5):1012-1025.

[4] H. Markowitz.1952 Portfolio selection-- efficient diversification of investments[M]. Yale University Press, 1959.

[5] Jiang Meiyun. Research on the Risks and Countermeasures of Enterprise Futures Market Hedging[J]. Enterprise Economy, 2001, (11):138-139.

[6] LI Yi-Zhi, ZOU Ping, XIAO Zhi-Ying et al. Application of value-at-risk method in risk assessment of futures market[J]. Journal of Central South University: Social Science Edition, 2001, 7(4):325-327.

[7] Zhang, Hongru. Hedging[M]. Earthquake Publishing House, 2011.

[8] Li Zhecheng. Research on fuel hedging strategy of airlines[D]. Southeast University, 2024.

[9] Zhang Rong. Research on enterprise hedging risk management [D]. Xiamen University,2014.

[10] Wang Li-Nan. Research on the application of commodity futures market hedging in enterprise risk management [D]. University of International Business and Economics,2016.

[11] LI Xiaojin, SU Mingxiao, WANG Qiaoli, et al. Research on commodity price risk management based on risk utility function--Taking jet fuel hedging as an example[J]. Price Theory and Practice,2023(11):191-196.

[12] JIA Weiying, CHENBaofeng. An empirical study of risk management motivation of listed companies in China based on the use of derivative financial instruments[J]. China Circulation Economy,2009,23(08):77-80.

[13] Chen Chuei-Rong, Wu Chong-Feng. A theoretical study on the motivation of corporate hedging in the financial derivative market [J]. International Financial Studies,2001(08):66-71.