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Case Analysis of the Hedging Failure of Metallgesellschaft

Chuhao Huang

School of Finance, Shandong University of Finance and Economics, Jinan, China
huangchuhao999@163.com

Abstract. In 1993, Metallgesellschaft Refining and Marketing (MGRM), the U.S. subsidiary of Metallgesellschaft AG (MG)—a century-old industrial group—incurred huge losses due to the failure of its hedging strategy. This not only caused a massive liquidity gap for MGRM itself but also pushed the parent company MG to the brink of bankruptcy, making it a landmark negative case in corporate derivative risk management in global financial history. At that time, as a diversified European industrial giant, MG had profound influence in the commodity trading market, and its crisis once triggered concerns about systemic risks. This paper conducts an in-depth analysis of the hedging failure case of Metallgesellschaft (MG) in 1993. Focusing on the core of MG's hedging failure incident, this paper centers on the operational details and risk transmission path of MGRM, and deeply explores the root causes of the failure. Through a comprehensive analysis of factors such as the rolling hedging strategy, basis risk, financial risk, and market changes, the fundamental reasons for MG's hedging failure are revealed. The study finds that the essence of MG's failure lies in the "mismatch between static risk assumptions and dynamic market changes". This paper aims to provide a reference for enterprises in hedging practice and help avoid similar risk incidents. Its lessons have important reference value for enterprises to optimize the use of derivatives and improve risk management systems.

Keywords: Hedging, Metallgesellschaft, Basis Risk, Financial Risk

1. Introduction

Hedging is a risk management strategy adopted by enterprises to avoid the risk of price fluctuations. According to the definition by Zhang Guosheng et al., hedging refers to the operation where traders use the price linkage between the futures market and the spot market to transfer the risk of spot price fluctuations by establishing opposite-direction and equivalent positions [1]. However, in practical operations, due to market changes, technical factors, and internal corporate management, hedging cannot always achieve the expected results. In 1993, Metallgesellschaft suffered significant losses in hedging transactions, becoming a classic failure case in corporate risk management. As a well-known diversified industrial group in Europe in the 1990s, Metallgesellschaft's business covered metal smelting, energy trading, and other fields. To expand the U.S. oil market, its subsidiary MGRM innovatively designed a combined strategy of "long-term supply contracts + rolling futures hedging". However, due to misjudgments of market structure, customer terms, and liquidity risks, it eventually incurred losses exceeding 2.3 billion U.S. dollars, almost triggering systemic financial

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risks [2]. This paper will analyze the deep-seated reasons for the failure of MGRM, a subsidiary of MG, in the hedging transactions of petroleum products, and summarize the risk management experiences that enterprises can learn from when conducting hedging business based on the case, so as to provide practical references for enterprises to avoid similar hedging risk incidents.

2. Case background

2.1. Company profile

Metallgesellschaft (MG) was a century-old industrial group with a business scope covering metal smelting, mining, machinery manufacturing, engineering design, and contracting. It was one of the largest industrial companies in Germany. Known for its stable operations, MG had always been an investment target for financial institutions and family investors. With a strong industrial background, MG was a major producer and consumer of metals, energy, and other products, and was quite active in the global commodity trading market. MG was one of the few "Ring Dealing Members (RDM)" qualified to trade on the famous circular sofa of the London Metal Exchange (LME); fewer than 10 companies or institutions worldwide could obtain this qualification. The LME had always maintained the old British-style trading system—only admitting a small number of companies as exchange members, and all transactions must be conducted through these dozen members. Therefore, many internationally renowned investment banks and industrial groups could not become its members, but MG was one of them, which fully demonstrated MG's influence and its extensive participation in global commodity trading. Why did such a company with both strength and background eventually hover on the edge of bankruptcy? All this originated from a U.S. subsidiary of MG—MG Refining and Marketing (MGRM).

2.2. Risk embedding

In the early 1990s, to quickly occupy the U.S. petroleum product terminal market, MGRM signed long-term supply contracts for 160 million barrels of petroleum products (mainly gasoline and diesel) with customers, with a contract term of 5 to 10 years. The core terms included three aspects [3]: (1) The supply price agreed in the contract was 3-5 U.S. dollars per barrel higher than the spot price at the time of signing, and MGRM attempted to lock in long-term profits through this "fixed premium". (2) Regarding customer options, if the future spot price was higher than the contract price, customers had the right to request cash settlement and terminate the contract, and MGRM was required to pay a price difference compensation of "(spot price - contract price) × 50%". (3) Customers could adjust the monthly delivery volume according to their own needs, and even cancel the contract completely with advance notice without bearing additional liquidated damages.

From the perspective of the concept of "risk exposure", this contract design had dual hidden dangers: On the one hand, if oil prices fell, customers might turn to the low-price spot market, making MGRM's "fixed premium" advantage ineffective. On the other hand, if oil prices rose, customers could cash out through the "option clause", putting MGRM under the pressure of both "futures hedging losses" and "price difference compensation payments". However, this purchase and sales relationship exposed MGRM to huge price fluctuation risks, so MGRM decided to adopt a hedging strategy to avoid risks.

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2.3. Hedging strategy and implementation

At that time, the longest contract term in the international crude oil futures market was only 32 months, which could not cover the 5-10-year term of MGRM's supply contracts. Therefore, MGRM chose the rolling hedging strategy, which involved continuously rolling over short-term futures contracts for hedging. In specific operations, MGRM bought standard oil futures contracts on the NYMEX and simultaneously entered into swap contracts in the over-the-counter (OTC) market to transfer the price risks arising from the contracts signed with users [4]. Meanwhile, MGRM believed that the oil market would remain in a "backwardation" state for a long time, meaning that the price of near-term futures contracts was lower than that of long-term futures contracts. In this state, MGRM could obtain basis gains by "closing old contracts at a low price and opening new contracts at a high price" during the rolling process to cover transaction fees and position-holding costs [1].

In short, MGRM's hedging strategy highly relied on two premises: first, the oil market maintained a "backwardation" structure; second, customers would not exercise the option clauses on a large scale. However, the market changes in 1993 completely broke these two assumptions, laying the groundwork for the subsequent crisis.

2.4. Crisis outbreak

In the first half of 1993, the international oil market experienced two key changes due to the global imbalance between crude oil supply and demand, which directly impacted MGRM's hedging strategy [5]:

• The market structure shifted from "backwardation" to "contango". Starting from the third quarter of 1993, the price of near-term crude oil futures was higher than that of long-term contracts, which meant MGRM had to bear losses from "closing positions at a high price and opening new positions at a low price" in each rolling process. Only in the fourth quarter of 1993 did the rolling cost exceed 300 million U.S. dollars. From the perspective of the "basis risk" theory proposed by Lu Taiping et al. [6], the basis (spot price - futures price) is the core variable affecting the hedging effect. When the market shifted from "backwardation" to "contango", the basis turned from positive to negative, and MGRM's hedging strategy changed from a "source of income" to a "root of losses", which was the direct trigger for the crisis.

• Moreover, in the futures market, at the end of 1993, the Organization of the Petroleum Exporting Countries (OPEC) failed to reach an agreement on production reduction, leading to a sharp drop in crude oil prices. The international crude oil spot price fell from 19 U.S. dollars per barrel at the beginning of 1993 to 15 U.S. dollars per barrel at the end of the year, resulting in huge floating losses on MGRM's long positions of 55 million barrels of futures.

The risks caused by the sudden market changes were quickly transmitted through the path of "price risk → margin risk → cash flow risk → credit risk", with the specific process as follows [2]:

Since MGRM's crude oil futures positions on the NYMEX accounted for more than 20% of the total market positions, the exchange identified it as a "large-scale risk position" and increased the margin requirement from the initial 5% to 10%, requiring a maximum daily margin call of 200 million U.S. dollars. MGRM's cash flow was quickly exhausted; although oil prices fell, some customers chose to terminate long-term contracts and switch to spot purchases due to the expectation of further decline in oil prices; during the period of short-term oil price rebound, another group of customers exercised the "price difference compensation right" and demanded MGRM pay cash of "(spot price - contract price) × 50%", putting MGRM under the dual cash flow pressure of "futures losses" and "contract compensation"; MGRM's short-term debt scale surged with the

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expansion of losses. Commercial banks, worried about its solvency, refused to renew loans and even demanded early repayment. By December 1993, MGRM's liquidity gap had exceeded 1.5 billion U.S. dollars, and the parent company MG was forced to seek a 1.9 billion U.S. dollar loan from major shareholders such as Deutsche Bank to avoid direct bankruptcy.

It is worth noting that the German accounting standards at that time required "immediate recognition of floating losses on derivatives" but did not allow the inclusion of potential gains from long-term supply contracts in current profits—if the contracts were normally fulfilled, MGRM could obtain more than 1 billion U.S. dollars in profits through the 3-5 U.S. dollars per barrel premium [7]. This rule led to a "false liquidity crisis" in MG's financial statements, misleading the management and creditors in their judgment of risks and accelerating the deterioration of the crisis.

3. Analysis of failure causes

3.1. Underestimation of basis risk

Lu Taiping et al. [6] pointed out that one of the four operational principles of hedging is the "same or similar month principle", which means that the term of futures contracts should match the spot exposure to reduce basis risk. However, MGRM only assumed that the basis was positive (i.e., backwardation) and did not simulate the extreme scenario where the basis was negative. When the market structure reversed, basis risk broke out in an all-round way.

3.2. Neglect of financial risks in the early stage

MGRM's management was overconfident in the empirical judgment that the "oil market would be in backwardation for a long time" and failed to fully disclose the potential risks of the hedging strategy to MG's headquarters. The MG supervisory board did not learn about MGRM's huge losses until October 1993, missing the opportunity for early intervention [4]. From the perspective of the COSO risk management framework, this was a case of "failure in internal information communication", violating the basic requirement that "risk information should be transmitted to the decision-making level in a timely manner" [8]; furthermore, there was a wrong position liquidation in the later stage. In December 1993, without sufficient market prediction, the MG supervisory board decided to "liquidate all MGRM's futures positions and terminate the remaining long-term supply contracts". This decision turned the floating losses of futures positions into an actual loss of 1.3 billion U.S. dollars, and the termination of contracts required MGRM to pay 1 billion U.S. dollars in liquidated damages to customers. Finally, the opportunity for subsequent market rebound was missed—oil prices rose to 19.4 U.S. dollars per barrel in early 1994, and the market returned to backwardation. If MGRM had chosen to roll over the contracts, it could have gradually made up for the losses [5].

3.3. Market change risk

MGRM's futures positions accounted for more than 20% of the NYMEX market, making it a "market-influencing" position. When the market fell, its liquidation behavior further depressed futures prices, forming a vicious cycle of "losses → liquidation → price decline → greater losses" [9]. This "liquidity black hole" phenomenon is common in the commodity futures market, especially when a single entity holds a relatively high proportion of positions, the risk transmission speed will increase significantly.

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3.4. Technical factors

In addition to the above risks, technical factors also contributed to the failure of MGRM's hedging. The Group of Thirty (G30), after conducting in-depth research on the global financial derivative transaction situation and issues, put forward recommendations pointing out that the design of hedging must undergo so-called worst-case stress tests derived from statistical data prediction and analysis before it can be used in practical operations. However, in the Metallgesellschaft case, the model used to design the hedging had not undergone relevant strict tests, and there were many problems in key technical parameters such as hedge ratio, term matching, and basis risk prevention. In addition, potential liquidity risks, credit risks, and other issues were not well resolved, which would seriously affect the formulation and implementation of the hedging strategy. These factors collectively affected the formulation and implementation effect of MGRM's hedging strategy.

4. Case insights

4.1. Attach importance to basis risk

Basis risk is one of the inherent risks in hedging. If the futures market price changes unfavorably, it may have a continuous impact on short-term capital liquidity. This requires making corresponding plans and response strategies in advance, and determining a reasonable overall scale of hedging based on the enterprise's own actual financial situation. In rolling hedging, basis risk is particularly significant. Therefore, when formulating hedging strategies, enterprises should fully consider the impact of basis risk and take corresponding risk management measures. For example, they can reduce basis risk by establishing a basis risk early warning mechanism and optimizing hedging strategies.

4.2. Pay attention to market changes

Market change risk is an unavoidable risk in hedging. Therefore, enterprises should closely monitor market dynamics during the hedging process and adjust hedging strategies in a timely manner. At the same time, enterprises should strengthen market research and analysis capabilities to improve sensitivity and predictability of market changes. Hedging activities must be based on sufficient market analysis, follow the four basic principles, keep abreast of market trends through fundamental and technical analysis, improve the accuracy of predictions, and not be tempted by small profits to easily change the quantity and direction of futures hedging positions.

4.3. Improve hedging strategies

The formulation and implementation effect of hedging strategies directly affect the risk management effect of enterprises. Therefore, when formulating hedging strategies, enterprises should fully consider factors such as market conditions, enterprise risk tolerance, and hedging costs. At the same time, enterprises should continuously optimize hedging strategies to improve risk management effects. The determination of hedging positions and the management of margins should focus on different aspects for different enterprises to avoid the stylization of plans.

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4.4. Strengthen internal control

Internal control is an important part of enterprise risk management. In the hedging process, enterprises should strengthen internal control to ensure that the formulation and implementation of hedging strategies conform to the enterprise's risk management goals and requirements. At the same time, enterprises should establish a sound supervision mechanism to supervise and evaluate hedging activities, and promptly identify and correct problems. Futures practitioners should strive to improve their professional quality and level to provide professional services for investors. In addition, establish an independent risk monitoring mechanism: set up a risk management department independent of the business department to monitor the scale of derivative positions, margin pressure, and cash flow gaps in real time, and regularly disclose risk status to the board of directors to avoid decision-making delays caused by "information asymmetry" [10].

4.5. Strengthen supervision of the derivatives market

Exchanges need to establish a "large position early warning mechanism" to dynamically monitor positions that account for a relatively high proportion of market positions so as to prevent the liquidation behavior of a single entity from triggering market panic; at the same time, moderately relax margin requirements under extreme market conditions to provide liquidity buffers for enterprises [11].

5. Conclusion

The case of Metallgesellschaft's hedging failure shows that hedging is not a risk-free operation, and its success depends on the scientific nature of strategy design, the dynamics of risk control, and the adaptability to the market environment. In essence, MGRM's failure originated from the cognitive deviation of the core logic of hedging. Its "rolling hedging" strategy overly relied on two static assumptions: "the oil market will maintain backwardation for a long time" and "customers will not exercise contract options on a large scale". It neither followed the "same or similar hedging month" principle proposed by scholars such as Lu Taiping to avoid basis risk nor fully evaluated the "two-way risk exposure" in customer contracts. When the global crude oil supply-demand imbalance in 1993 caused the market structure to shift from "backwardation" to "contango", MGRM's rolling operation turned from a "source of basis gains" into a "loss black hole". This neglect of market dynamics exposed the enterprise's superficial thinking of simplifying hedging to "position quantity matching", ignoring the core of hedging as a risk management tool—the prediction and response to "uncertainty".

In the current market environment where global geopolitical conflicts occur frequently, energy transformation accelerates, and the volatility and frequency of commodity prices increase significantly, the insights from the MG case are more practical. Enterprises need to treat hedging with an attitude of "revering the market", and through "dynamic strategy design + full-process risk control", transform derivatives from a "source of risk" into a real "risk avoidance tool". For learners, the MG case also provides a classic sample of "connecting theory with practice", which helps to deepen the understanding of core concepts in courses such as risk management and financial derivatives and lay a foundation for engaging in related work in the future.

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