Metallgesellschaft AG and Its Hedging Program

> *Derivatives are financial weapons of mass destruction, carrying dangers that, while now latent, are potentially lethal.*
>
> —Berkshire Hathaway Inc. Chairman of the Board Warren Buffet, "Letter to the Shareholders of Berkshire Hathaway Inc.," February 21, 2003

INTRODUCTION

In December 1993, Metallgesellschaft AG (MG), once Germany's 14th largest conglomerate with 258 subsidiaries subdivided into 5 branches (trade, finance, engineering and contracting, chemicals, and building technology) went nearly bankrupt after suffering US$1.5 billion of losses from its energy derivative trading activities.[1] MG's U.S. subsidiary, MG Refining and Marketing Inc. (MGRM), was responsible for these derivative trades that generated the losses.[2] What was surprising though was the fact that the losses, and the subsequent near bankruptcy, were the result of MGRM's risk management program that was supposed to hedge the risks from its customers' trades.

When an entity puts on a trade—which could be as simple as buying or selling a stock or as complicated as entering into a derivative trade—it is exposed to various risks that could result in gains or losses when the market moves. A hedge is supposed to offset these risks. MGRM certainly had significant risks from the trades it put on with its customers, but it also had an active hedging program that should have offset these risks. How did MGRM generate such huge losses? What went wrong?

[1] "Big German Concern's Loss," *The New York Times*, July 9, 1994; Encyclopedia.com, "Metallgesellschaft AG: International Directory of Company Histories," 1997; Sharon Reier, "Metallgesellschaft endures despite war, debt and rumor: Easy to beat up, hard to kill," *The New York Times*, March 23, 2002.
[2] Ibid.

Chester Lee (Wharton MBA, Class of 2011) prepared this case under the supervision of Assistant Professor Anastasia V. Kartasheva, The Wharton School, as the basis for class discussion rather than to illustrate either effective or ineffective handling of an administrative situation.

COMPANY INFORMATION

MG was founded in Frankfurt, Germany, in 1881. Its early business involved metal trading at the time when Western Europe was going through the Second Industrial Revolution. Because Germany's domestic production was not able to keep up with demand, MG quickly turned to overseas markets to secure its metal supply. MG first started its U.S. operation when it founded the American Metal Company in New York as a subsidiary in 1887.[3]

MG's history mirrored the rise and fall of Germany's industrial history through World War I and World War II. By 1945, many of MG's businesses were in ruins, but, just as the country achieved a remarkable recovery, MG was able to recover from the wars and grow into an industrial conglomerate over the next four decades. In 1989, Heinz Schimmelbusch was appointed the chairman of the MG board. A young and energetic executive with a vision, Schimmelbusch completed a series of acquisitions, dramatically increasing the size of the company and expanding into new businesses. By the early 1990s, MG had more than 50,000 employees with US$17 billion in revenue.[4]

MG's U.S. operation went through a significant reorganization in the 1980s. MG established capabilities to trade financial instruments and commodities. MGRM, a U.S. subsidiary, started a new energy business in the early 1990s that offered contracts to its customers that allowed them to buy oil products (e.g., gasoline and heating oil) from MGRM at a fixed price over many years. MGRM's new business took off quickly, and it had accumulated a significant amount of contracts by 1993. Instead of securing physical oil and storing it for future sale, MGRM adopted a synthetic storage strategy that allowed it to secure its oil supply via futures markets.[5] The ability to secure oil via derivative trades was at the core of MGRM's hedging program.

MGRM'S CUSTOMER TRADES AND HEDGES

For many gas station and small business owners who did not have much bargaining power against large oil companies, MGRM's contracts were attractive ways to hedge themselves against wild oil price fluctuations that could potentially hurt profitability. Moreover, falling oil prices following the Gulf War offered an attractive opportunity to lock in oil prices at low levels.

MGRM offered various types of contracts to its customers. The most typical contract involved MGRM selling a fixed volume of an oil product at a fixed price every month for up to 10 years. The contracts gave the buyer an option of early termination with a specified mechanism, and some contracts allowed the buyers to set the delivery schedule.[6]

[3] Encyclopedia.com, loc. cit.

[4] Ibid.; Reier, loc. cit.

[5] Christopher L. Culp and Merton H. Miller, "Metallgesellschaft and the Economics of Synthetic Storage," *Journal of Applied Corporate Finance* 7, no. 4 (Winter 1995): 66.

[6] Antonio S. Mellow and John E. Parsons, "Maturity Structure of Hedge Matters: Lessons from the Metallgesellschaft Debacle," *Journal of Applied Corporate Finance* 8, no. 1 (Spring 1995): 106.

For the analysis of this case, consider the following simplified structure:

- MGRM puts on a trade (the term 'trade' is interchangeable with the term 'contract') with a client where MGRM sells a fixed amount of oil products at a fixed price every month for 10 years.
- MGRM expects that the fixed price is higher than the prevailing oil price, thereby allowing MGRM to capture profit.

For example, suppose the spot price of crude oil is US$17 per barrel. A customer who wants to reduce his exposure to oil price risk can put on a trade with MGRM to buy 1,000 barrels of oil every month at US$20 per barrel for 10 years. The amount of oil that MGRM commits to deliver to the customer over the life of the contract is 120,000 barrels (1,000 barrels per month x 12 months per year x 10 years).

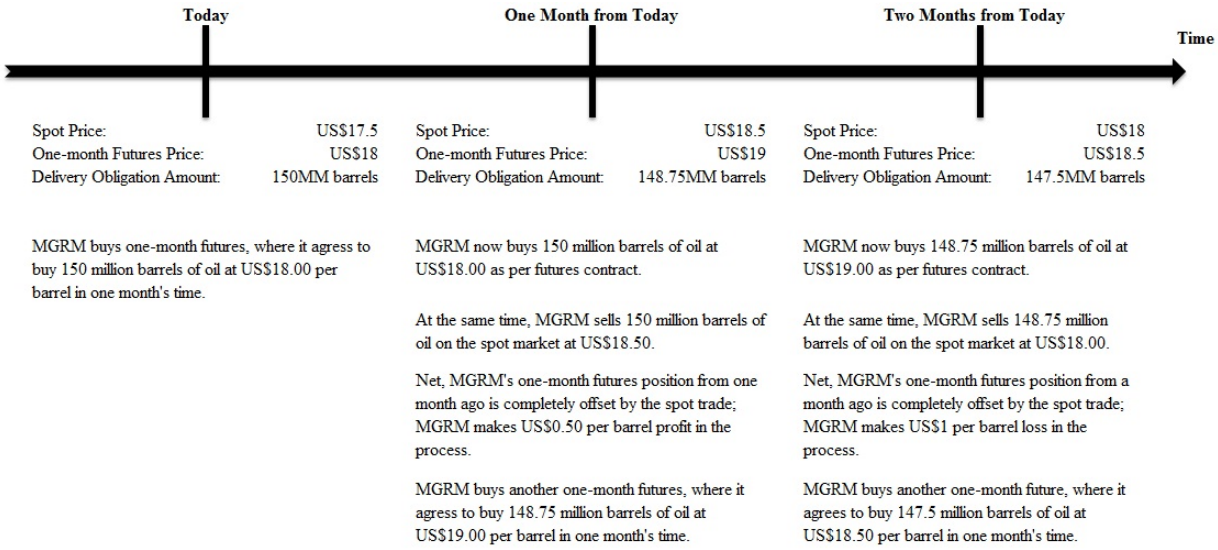
By 1993, MGRM had put on trades to sell more than 150 million barrels of oil products to its customers over the next 10 years.[7] Since MGRM did not have oil in its inventory, the customer trades exposed MGRM to huge market risks. Since MGRM sold the oil products at fixed prices, it lost money if the oil price rose; in this case, MGRM had to go out to the market, buy the oil at a higher prevailing market price, and sell it to the customer at the lower, fixed price. Inversely, if the oil price fell, MGRM would have made money from the customer trades.

To hedge this risk, MGRM entered into a futures trade where it agreed to buy oil at a fixed price on a future date. The advance purchase of oil at a fixed price and guaranteed delivery in the future allowed MGRM to secure the oil it would sell to the customer; buying oil on the futures market, essentially, had the same effect as putting the oil in storage—hence the term synthetic storage. Though the details of the structure of the hedging program were not publicly available, consider the following simplified structure (see Figure 1):

- MGRM buys one-month futures where it agrees to buy, in one month's time, the same amount of oil as the outstanding amount of MGRM's total delivery obligation.
- At the end of the one-month period, MGRM rolls the futures contracts where it buys the oil at the futures price and then sells the oil at the spot price.
- MGRM then buys another set of one-month futures where it agrees to buy the reduced amount of oil in one month's time.

[7] Kenneth N. Gilpin, "Trying to Rescue a Soured Oil Bet," *The New York Times*, March 9, 1994.

Figure 1: Illustration of MGRM's Rolling Strategy



Suppose the spot price of crude oil is US$17.50 per barrel and the one-month futures price for crude oil is US$18 per barrel. Also, suppose MGRM's total delivery obligation amounts to 150 million barrels (i.e., MGRM is obligated to sell 1.25 million barrels a month over the next 10 years). To hedge its exposures, MGRM would buy 150 million barrels of crude oil via 1-month futures at US$18 per barrel (i.e., MGRM agrees to buy 150 million barrels of crude oil in 1 month's time at US$18 per barrel). One month has passed and suppose the spot price of crude oil is now US$18.50 per barrel and the new one-month futures price is US$19 per barrel. Because 1 month has passed, MGRM's obligation to buy 150 million barrels of oil in 1 month's time at US$18 per barrel becomes an obligation to buy 150 million barrels of oil now at US$18 per barrel. MGRM can simply offset its buying obligation by selling 150 million barrels now at the spot price of US$18.50 per barrel. In the process, MGRM makes a US$0.50 per barrel profit. MGRM's new total delivery obligation to the customer is now 148.75 million barrels. The final step of rolling the futures involves MGRM buying 148.75 million barrels of crude oil via 1-month futures at US$19 to offset exposure from the customer's trade. MGRM would then roll the position again after one month.

As the above example illustrates, the rolling strategy works such that when the oil price rises, MGRM generates a gain, and when the oil price falls, MGRM generates a loss. Hence, this strategy should work as a hedge against MGRM's customer trades where MGRM loses money when the oil price rises and makes money when the oil price drops (see Table 1).

Table 1: Summary of MGRM's Risk Exposures

Position	When Spot Price Rises	When Spot Price Falls
Customer Trades	Loss	Gain
Hedges	Gain	Loss

FORWARD VS. FUTURES

Forward and futures are the simplest derivative instruments in the market. Understanding the differences between the two is critical to understanding what happened at MGRM.

Forward

A forward is a contract between two parties to buy or sell an asset on a specified future date at a fixed price. A forward is:

- Non-standardized which means the two parties have the freedom to tailor various parts of the contract (e.g., delivery date and method) to suit their needs. The price is negotiated between the two parties.
- An over-the-counter (OTC) contract which means the two parties trade directly with each other and are responsible for settling the trade.
- Settled on the delivery date—there is no exchange of cash flows before maturity.

MGRM's customer trades can be viewed as a series of forward contracts. As illustrated above, a seller of a forward contract loses money when the price of the underlying asset rises (i.e., he is short the asset). The perfect hedge for this market risk is an opposite forward trade where the seller agrees to buy the asset on the same date at a fixed price (i.e., go long on the asset) which would offset the short position. All risks, however, have not been eliminated. If the counterparty for the seller's hedge goes bankrupt, the seller's long position disappears, leaving the seller short again and exposed to the original market risk.

Because a forward is an OTC contract, both parties of a forward trade assume counterparty risk. If the price of the underlying asset falls too much, it is possible that the buyer of the forward contract could lose money to the point where he would be better off just declaring bankruptcy rather than honoring the contract and buying the asset at the fixed price. This situation is analogous to a borrower who does not have the ability to pay back the lender. Hence, the creditworthiness of the counterparty matters in a forward trade.

Futures

A futures contract is also a contract between two parties to buy or sell an asset on a specified future date at a fixed price, but significant differences exist:

- A futures contract is standardized.
- Futures contracts are traded on an exchange; hence, the clearinghouse is the counterparty to all market participants.
- Price is quoted on the exchange.
- Futures contracts are settled every day.

Because the clearinghouse acts as the counterparty and gains/losses from every position are settled every day, the counterparty credit risk is minimized. However, since the party losing money in the futures trade needs to settle his losses every time, this could potentially cause a

serious cash flow risk (i.e., significant negative cash flow) if the losses accumulate and the exchange keeps requiring cash settlements to cover the losses.

One advantage of trading standardized contracts on an exchange is that there is a lot more liquidity for such contracts. There is an infinite number of possible specifications of a forward contract and finding a counterparty who would be interested in the particular structure of the forward contract and willing to take the opposite side would be a challenge. This problem is further complicated by the fact that the potential buyers and sellers are scattered throughout the world. However, when everyone in the market trades the same contract in one place (i.e., the exchange), it is a lot easier to find a buyer or a seller—hence, there is more liquidity.

MGRM's forward and futures positions and risk exposures are summarized in Table 2.

Table 2: MGRM's Forward and Futures Positions and Risk Exposures

Position	Instrument	When Spot Price Rises	When Spot Price Falls
Short	Forward	Loss	Gain
Long	Futures	Gain	Loss

ISSUES TO CONSIDER FOR A HEDGING PROGRAM

In theory, there exists a perfect hedge for every trade. In reality, however, there is no such thing as a perfect hedge because it is never possible to eliminate all risks associated with a trade. Important factors that make it impossible to create a prefect hedge include:

- Mismatch between the trade and the hedge that cause the risks to not be completely offset.
- Introduction of new market risks from the hedge.
- Non-market risk issues, such as reputation and accounting.

While it is impossible to construct a perfect hedge, there are some hedges that are better than others. The job of a manager, therefore, is to consider all risks and construct an optimal hedging program.

Matching Cash Flows

In constructing a hedge, it is important to match the cash flow of the underlying position. For example, for a seller who agrees to sell 10,000 barrels of oil in 1 month's time via a forward contract, a good hedge would be a forward contract where he agrees to buy 10,000 barrels of oil in 1 month's time that matches the cash flow of the underlying position. A forward contract to buy 15,000 barrels of oil in 3 months' time would be a less ideal hedge. However, matching cash flow of the underlying position may be a difficult task if the underlying position is made up of tens of thousands of cash flows that follow a complex schedule. In this situation, the manager can still aggregate risks and construct a hedge that offsets the aggregated risks. For example, in considering a hedging program for a portfolio of forward trades with maturity dates up to 10 years, the manager would ask, "How much money would the portfolio make, or lose, when the

price of the underlying asset changes?" If the portfolio loses US$1 million for every US$1 movement in the price of the underlying asset, putting on only one trade that makes US$1 million for every US$1 movement in the price of the underlying asset could actually provide a reasonable hedge for the portfolio. MGRM's decision to hedge a series of forwards that stretched up to 10 years with a large 1-month futures position followed this idea.

Matching Instruments

Ideally, the manager would use the same instrument for the hedge as the underlying position. For a forward position, a good hedge would be another forward trade in the opposite direction. However, there are many times when this is not possible for many reasons. Then the job of the manager is to figure out the next best instrument. For example, using futures to hedge a forward position is quite common because the futures market generally moves in the same direction as the forward market (e.g., when the spot price of crude oil goes up, both forward and futures prices generally go up) and futures are a lot more liquid than forwards.

Matching Assets

If possible, the asset for the hedging instrument should be the same as the underlying position. For example, crude oil positions are best hedged with crude oil instruments. However, crude oil positions can be reasonably hedged by other oil products, such as gasoline and heating oil, because all of them generally move in the same direction and in similar magnitudes. Buying gold on the spot market to hedge long-term U.S. inflation and U.S. dollar depreciation risk is one example of a hedge that does not match the cash flow, instrument, and asset; however, it is one that could potentially work very well.

Basis Risk

It is better to have a hedge that matches well with the underlying position because it reduces basis risk. A basis risk is any difference between the underlying and hedge positions that could cause the two to diverge. A mismatch of cash flows, instruments, and assets between the underlying position and the hedge subject the manager to a varying degree of basis risks. Short-dated and long-dated instruments for the same asset could move in different directions and magnitudes. Futures and forward markets could move in different directions and magnitudes from the spot market. Gasoline could move in a different direction and magnitude from crude oil, and so on. A perfect hedge would generate the same magnitude of gains/losses as the gains/losses from the underlying position, thereby resulting in a zero net gain/loss, but the mismatch causes the hedge to not offset the gains/losses from the underlying position. Basis risks explain many of the reasons why a hedged position still generates gains/losses.

ADDITIONAL ISSUES TO CONSIDER FOR HEDGING A SERIES OF LONG-DATED FORWARDS WITH SHORT-DATED FUTURES

Notional Amount

Suppose the spot price of crude oil is US$20 per barrel and a buyer enters into a one-day forward contract where he agrees to buy a barrel of crude oil tomorrow at US$20. A few minutes after the trade, the spot price jumps to US$21 per barrel. How much money does the buyer make? The buyer can buy a barrel of crude oil that now costs US$21 at US$20 tomorrow because of the forward contract. The US$1 increase in the spot price translates to a US$1 gain in the one-day forward position.

What if the buyer enters into a forward contract where he agrees to buy a barrel of crude oil 10 years from now at US$20? If the spot price jumps up to US$21 per barrel and stays there for 10 years, he would still make US$1. Hence, a US$1 increase in the spot price translates to a US$1 gain in 10 years. However, because of discounting, a US$1 gain in 10 years is a lot less than a US$1 gain today; in fact, a US$1 gain in 10 years is equivalent to a US$0.27 gain today. In other words, a US$1 increase in the spot price translates to a US$0.27 gain in the 10-year forward position. Table 1 shows how much a US$1 gain in various future dates are equivalent in today's gain.

Table 3: Relationship Between Future Gain and Today's Gain[8]

Delivery Date of a Forward Trade	How Much a US$1 Gain in the Future is Equivalent in Today's Gain
1 month	0.991
6 months	0.941
12 months	0.884
2 years	0.776
3 years	0.678
4 years	0.594
5 years	0.520
6 years	0.454
7 years	0.398
8 years	0.348
9 years	0.304
10 years	0.266

Now, suppose a manager has a portfolio of forward contracts where he is obligated to sell: 1) one barrel of crude oil one year from now at US$20 and 2) another barrel 10 years from now at US$20. If the spot price of crude oil falls US$1, how much money does he make today on the

[8] Mellow and Parsons, loc. cit.

portfolio of two forward contracts? To hedge this portfolio that amounts to two barrels, suppose the manager bought two barrels of oil through a one-month futures trade. If the spot price of crude oil falls, once again, by US$1, how much money does he lose today on his futures trades? Is he hedged? As the above example illustrates, notional amount can also present a basis risk to the manager.

Rollover Risk

The spot and futures prices of an asset, such as crude oil, are almost always not the same because they measure different things. The spot price is what the buyer needs to pay to buy the asset now; futures price (determined today) is what the buyer will need to pay on a future date to buy the asset on that date. In a way, the futures price can be interpreted as the future price of the asset implied by the current market conditions. If an investor/speculator believes that the actual future price of the asset will be different from the futures price, he can put on a trade (buy or sell futures contracts) so that, if his views are correct, he will benefit from the trade. For example, suppose the spot price of crude oil is US$20 per barrel and the one-month futures price is US$19.50 per barrel. An investor/speculator who believes that the price of crude oil will be higher than US$20 in the future can buy the crude oil on the spot market for US$20 and wait for the price to appreciate. Alternatively, if he believes the price of oil will be higher than US$19.50 in one month's time, he can buy the one-month futures contract at US$19.50. The oil price can fall from the current US$20, but, as long as it doesn't fall by more than US$0.50 in one month, the buyer of the futures contract would generate a gain.

What determines the futures price? No arbitrage rule is usually used to explain how futures price is determined, but, like everything else in the market, the futures price is ultimately determined by supply and demand. When the futures price is higher than the spot price, the market is said to be in contango. In the opposite case, when the futures price is lower than the spot price, the market is said to be in backwardation (see Table 4).

Table 4: Definition of Contango and Backwardation Markets

Market	Definition
Contango	Spot Price < Futures Price
Backwardation	Spot Price > Futures Price

Consider a contango market where the spot price of crude oil is US$20 per barrel and the one-month futures price is US$20.50 per barrel. Suppose a manager bought one-month futures today and the spot price did not change over the next month. At the end of the month, he would have lost US$0.50 per barrel because he was obligated to buy crude oil at a higher price than the prevailing market price. When the manager rolls his futures position and buys another one-month futures, he would, once again, enter into a contract to buy crude oil in the future at a higher price than the spot price and stand a chance of losing money if the spot price stays constant or drops. Consider a backwardation market where the spot price of crude oil is US$20 per barrel and the one-month futures price is US$19.50 per barrel. A manager who buys a one-month futures contract would generate a gain of US$0.50 per barrel if the spot price stays constant for one month.

Hence, a futures position would generate a gain or loss when the spot price does not converge to the futures price—this risk is called a rollover risk. For a manager who has a rolling long futures position, the most ideal situation is a backwardation market with a rising price environment since it offers two opportunities to generate gains: 1) a rising price will obviously generate gains for the long futures position and 2) a backwardation market allows the buyer to buy futures at a discount to the spot price, therefore, allowing him to generate more gains when the spot price rises. What would be the worst situation for the manager who has a rolling long futures position and why?

Managing Cash Flows

Futures are settled daily, and the manager has to be mindful of the cash flow impact of the futures position. When his futures contracts make money, there will be a positive cash flow. When his futures contracts lose money, there will be a negative cash flow, and the manager has to make sure that he has enough cash available to be able to meet his margin calls from the exchange when the market moves against his futures position.

When a manager uses futures contracts to hedge a forward position, he should be mindful about the different cash flow features of each instrument. For example, consider a manager who uses long futures positions as a hedge for his short forward positions with customers. When the spot price of the underlying asset drops, he will make money on the short forward positions but lose money on his long futures positions; hence, they will offset each other. However, the gains from the short forward positions are unrealized, and the manager does not receive cash for the gains. This is similar to the situation when an investor buys a stock and the price subsequently increases—the investor made money on the stock, but he does not realize the gain and receive cash for his gain until he sells the stock. However, the losses from his long futures positions are realized and the manager needs to make payments to the exchange to settle his losses (see Tables 5 and 6). When the market moves significantly and the losses become huge, this could have a serious impact on the company's cash flow, as the company is forced to settle the losses by making payments to the exchange. If the company does not have enough cash or cannot raise any more capital, it can be forced into bankruptcy.

Table 5: Cash Flow Impact When Spot Price Rises

Position	Instrument	Gain/Loss	Cash Flows
Short	Forward	Loss	None
Long	Futures	Gain	Positive
Net			**Positive**

Table 6: Cash Flow Impact When Spot Price Drops

Position	Instrument	Gain/Loss	Cash Flows
Short	Forward	Gain	None
Long	Futures	Loss	Negative
Net			**Negative**

Funding Risks

When a manager has access to unlimited capital, the cash flow issues discussed above become trivial as he will always be able to meet the margin calls from the exchange. However, all companies face capital constraints, and managers face a risk that they will not have enough cash available on the company's balance sheet to meet the margin calls from the exchange. Hence, managers face funding needs when the market moves against their positions. What are their options?

Managers can access capital markets by either issuing bonds or equities. Alternatively, they can borrow from banks. However, there is a risk that, when the manager goes out to the market to secure funds to settle the losses from futures positions, the market will view the company as being distressed. Losses from derivative trades have a very negative connotation and the market would certainly react negatively toward the news of its losses and the manager's effort to secure funds, potentially increasing the funding cost significantly. Ideally, the manager can use the forward positions, which have been generating gains, as collaterals to mitigate the negative perception, claiming that the company actually has valuable assets on its balance sheet in the form of contracts with customers that will generate positive cash flows going forward. However, convincing the market would still be a difficult task.

To avoid going out to the market and revealing the news of the trading losses, managers can consider borrowing funds from the company's shareholders. This could be a viable option if the shareholders include banks, who would understand the nature of the company's business by virtue of being a shareholder; banks would also be able to correctly assess the profitability and risks of the company's derivative positions and have the capability to make large loans.

Alternatively, the manager can potentially ask its customers to post collateral for the forward contracts. Since the customers are obligated to buy the asset at fixed prices in the future, when the spot price falls, the contracts are making money for the company and losing money for the customers. The company, therefore, faces counterparty credit risk against the customers. To mitigate these risks, managers can demand cash payments from the customers. However, the margin calls from the manager would certainly not be appreciated by the customers.

Accounting Treatments

The accounting treatments for derivative trades are complex. Without getting into details, the treatments are different for speculative trades and hedge trades. Moreover, the treatments for unrealized and realized gains could potentially have an impact on the company's income

statement and earnings. For example, the German accounting standards in 1993 did not allow companies to recognize unrealized gains on forward positions but required companies to recognize unrealized losses.[9] In other words, "when energy prices fell in late 1993, MG had to recognize the unrealized losses on MGRM's derivatives positions (futures and swaps) but was unable to recognize any unrealized gains that it may have had on its forward-supply contracts. Thus, MG reported huge derivatives-related losses, leaving the impression that these losses were incurred by inappropriate and possibly speculative trading in derivatives. Not recognizing the gains on MGRM's forward-supply contracts resulting from the fall in energy prices distorted the true picture of its financial position."[10] On the other hand, the U.S. accounting standards in 1993 did not "require that either unrealized gains or unrealized losses on hedged positions be recognized. Thus, had MGRM adhered to U.S. accounting principles, it may not have had to report its unrealized losses at all."[11] The conflicting accounting standards certainly contributed to the confusion about the nature and magnitude of MGRM's losses. Managers should consult with accountants and understand the impact of derivative trades on the company's financial statements before executing the trades.

MGRM'S HEDGING PROGRAM

In 1993, the price of oil dropped and the futures market turned from backwardation to contango (see Exhibits 1 and 2). The combination of these market movements led to serious losses on MGRM's futures position. Even though MGRM's forward position was generating gains, the gains were not enough to offset the losses from the futures position. Moreover, the losses from the futures position needed to be settled immediately. This meant that MGRM had to use its cash to make payments to the exchange throughout the year. MGRM and its parent company, MG, clearly did not have enough cash at hand to meet all the obligations and, by the end of 1993, this serious cash shortage drove MG to the verge of bankruptcy.

Ultimately, it was the shortage of cash—not necessarily the losses themselves—that drove MG to the verge of bankruptcy. Even if the forward contracts generated more gains than the losses from the futures contracts, the negative cash flow from the futures contracts would have subjected MGRM to distress if the losses from the futures were significant enough. Still, even though the gains from the forward trades did not translate to positive cash flow, MGRM could have potentially mitigated the negative cash flow situation by either borrowing against the customer contracts (i.e., use the customer contracts as a collateral) or by selling the customer contracts to another party to bring in cash. If MG could have convinced the market that the distress was short-term and that the strategy would have worked in the long run, the funding problem would not have been so fatal.

Instead, MG was saved by a massive bailout amounting to US$1.9 billion in January 1994, by a consortium of German and other international banks, many of which, such as Deutsche Bank AG and Dresdner Bank AG, were also shareholders of MG—these 2 banks owned 23 percent of

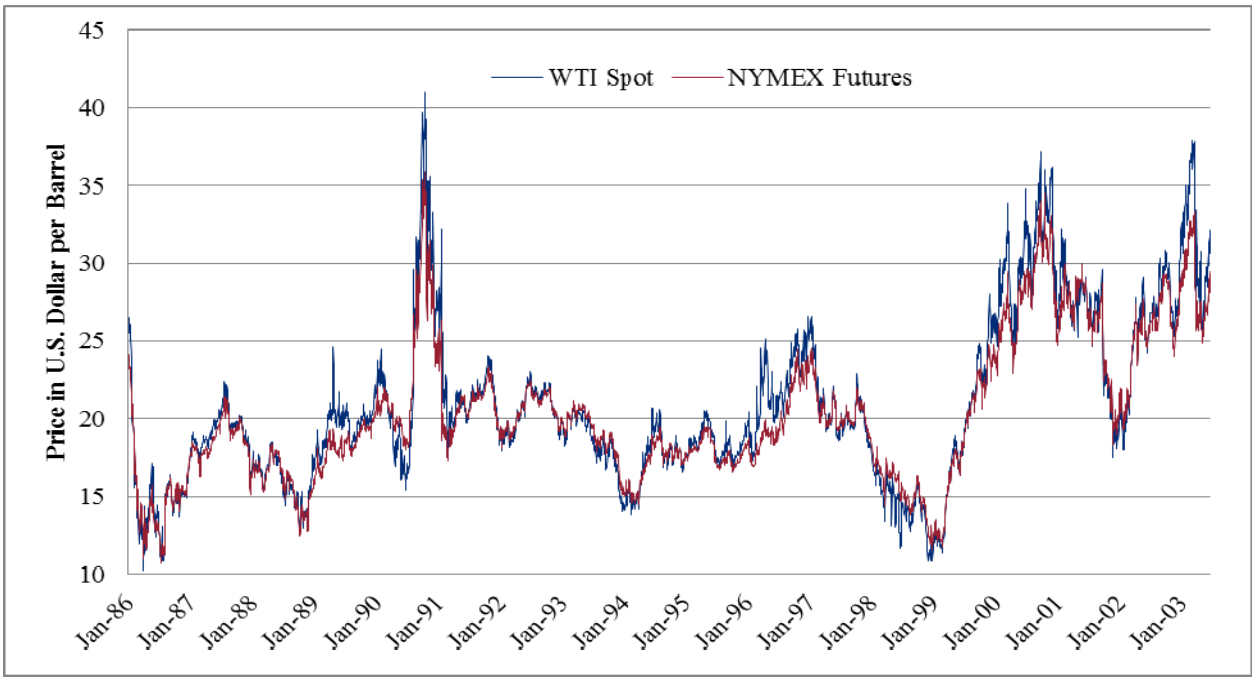
[9] Franklin R. Edwards and Michael S. Canter, "The collapse of Metallgesellschaft: Unhedgeable risks, poor hedging strategy, or just bad luck?" *The Journal of Futures Markets* 15, no. 3 (May 1995): 211.
[10] Ibid.
[11] Ibid.

MG.[12] The proceeds were used to liquidate MGRM's hedges; this decision was made by MG's management which, effectively, ended MGRM's hedging program. The customer trades, however, were left intact which still exposed MGRM to significant risks.

Interestingly, the oil price rose in 1994 and the market rebounded, which would have benefited MGRM's hedging program. However, many questions remained. Was MGRM's strategy of selling oil products via long-dated forward contracts and hedging the position with short-dated futures contracts fundamentally flawed? Was MGRM's hedging program a sound strategy or was it destined to fail from the beginning? Was the hedging program prematurely terminated? Could MGRM have done anything differently?

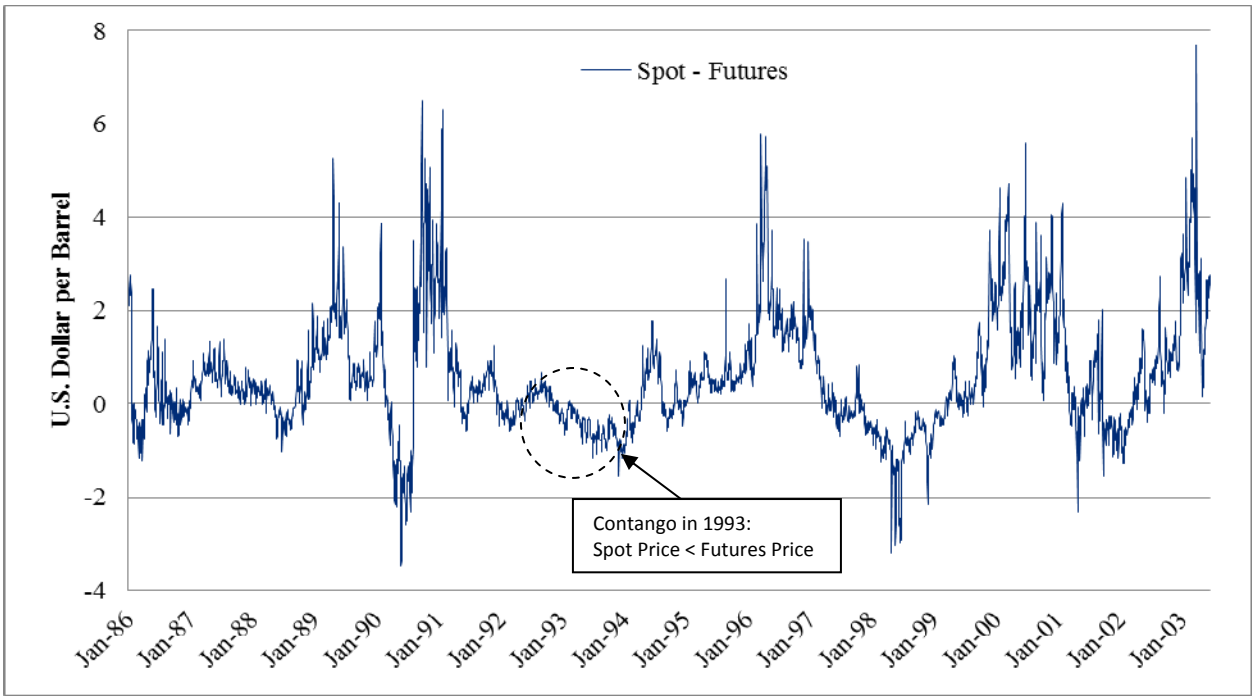
[12] Gilpin, loc. cit.; Craig R. Whitney, "German Metal Group Turns to Its Bankers," *The New York Times*, December 24, 1993.

Exhibit 1: Historical West Texas Crude Oil Spot and One-Month Futures Prices



Source: U.S. Energy Information Administration.

Exhibit 2: Historical Spread Between West Texas Crude Oil Spot and One-Month Futures Prices (Expressed as Spot – Futures)



Source: U.S. Energy Information Administration.