

Financial Derivatives and Gold: Choosing the Appropriate Risk Hedging Instrument under COVID-19 Crisis

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Abstract. This essay delves into the strategic use of financial derivatives and gold as instruments for hedging against market volatility, with a specific focus on the energy and food sectors. By analyzing case studies of prominent entities like Sinopec, BP, Bunge, and the Russian Federation, the paper elucidates how these entities have leveraged futures, options, swaps, and gold to shield themselves from the perils posed by price fluctuations, exchange rate fluctuations, and geopolitical tensions. In this examination, the essay thoroughly assesses the merits and drawbacks of these hedging tools. Financial derivatives, it argues, offer an efficient means of short-term risk mitigation, particularly when dealing with anticipated fluctuations within a defined range. On the other hand, gold emerges as a robust choice for long-term hedging, providing a stable refuge against pervasive uncertainties. Furthermore, this essay extends valuable guidance to investors and managers, advocating for a tailored approach grounded in individual risk appetites and the prevailing market dynamics. It underscores the importance of choosing between financial derivatives and gold based on the specific requirements of their risk management strategies. This essay asserts that a judicious blend of financial derivatives and gold can protect against market volatility. It serves as a testament to the nuanced decision-making required in navigating the complex landscape of risk management in the energy and food sectors.

Keywords: Financial Derivatives, Risk Hedging, Gold Instrument.

1. Introduction

The global pandemic and ongoing conflicts have brought about significant market volatility, negatively impacting the energy and food sectors and related industries. Travel restrictions, trade barriers, geopolitical tensions, and lockdowns have disrupted the supply and demand for oil, gas, electricity, and agricultural products. As a result, the prices for these commodities have experienced extreme fluctuations, increasing the levels of uncertainty and risk for producers, consumers, and investors alike.

Many companies have turned to financial derivatives as a means of risk hedging in the face of present crises. Several classic examples demonstrate the efficacy of financial derivatives. In the energy sector, Sinopec utilized crude oil futures and options to hedge their risk of purchasing and selling during the epidemic. During the 2005 food crisis, Malawi purchased call options on maize to hedge its position in the food market, considering the high risk of a meager harvest and the expensive reliance on food security stocks. This provided protection against price fluctuations and allowed for the physical delivery of 60,000 metric tons of maize. The successful outcomes of Sinopec and Malawi demonstrate the potential use of hedging instruments to manage price risk and lessen price volatility when appropriate.

However, although financial derivatives serve to stabilize market prices and mitigate business risks, they themselves carry inherent risks as a financial product. During the 2008 economic crisis, China Eastern Airlines and China Southern Airlines inaccurately predicted risks. The portfolio strategy provided insufficient protection when oil prices plummeted, causing the leverage effect to accentuate losses. China Aviation Oil Singapore Company's overconfidence led them to adopt the rollover and unlimited open positions method to cover book losses at the beginning of 2004. They also bet on a decline in oil prices; however, the price continued to rise, ultimately suspending the company's shares in November 2004 [1].

Black swan events may arise unexpectedly, which makes protecting oneself against market volatility imperative. Achieving this goal entails a comprehensive comprehension of market dynamics and hedging instruments' properties and a meticulous appraisal of potential risks and benefits in hedging approaches. In addition, it is vital to keep a close eye on market conditions and adjust hedging strategies accordingly. Financial derivatives are a useful tool for managing market volatility. Still, they are not a panacea, so weighing the costs and risks against the expected returns and selecting the appropriate hedging instruments, including gold or cryptocurrencies is essential.

This paper analyzes the utilization of hedging strategies during times of high market volatility and identifies viable methods enterprises can utilize to reduce risk through financial derivatives. By examining case studies of enterprise and national hedging, it is determined that such investments can be effective measures to safeguard against unprecedented volatility and consecutive black swan events that are progressively prevalent in today's economic climate.

2. Hedging Strategies in the Energy Market

Energy risk refers to the uncertainty of losses or gains for producers or consumers caused by fluctuations in energy prices within energy markets. These fluctuations can be attributed to changes in supply and demand, political events, geopolitical conflicts, weather anomalies, and exchange rate changes. To mitigate energy risk, numerous companies employ financial derivatives to hedge against fuel price volatility.

China International Petrochemical Union Limited is a noteworthy example. In 2017, Sinopec's wholly-owned subsidiary, China International Petrochemical Union Limited Company, imported 185 million tons of crude oil, making up 44% of total domestic crude oil imports. As crude oil trading involves a large volume of transactions and substantial price fluctuations, it requires hedging. Taking the period from 2017 to 2018 as an illustration, the cost of a barrel of U. WTI crude oil rose from \$46.04 on April 1, 2017, to \$74.15 on April 1, 2018, as seen in the Figure 1. Had the company not hedged, it would have suffered an over \$30 billion cost surge.



Figure 1. WTI crude oil price [2]

BP Public Company Limited is among the six largest oil companies worldwide and within the top ten private sector conglomerates. The company encounters different risks in its production and operations, such as credit, liquidity, and market, wherein market risk is segregated into price and foreign exchange risks. Commodity foreign exchange risk refers to the potential impact of fluctuations in the prices of major commodities on the Company's operations, including oil, gas, and electricity. To mitigate this risk, the Company analyzes crude oil price trends to anticipate price

changes and enters into contracts to lock prices. For instance, in 2015, the Company signed a forward contract to sell oil one year later at \$52 per barrel, thereby reducing price risk and generating profits based on the difference between the current price and the contract expiry price. Foreign exchange risk is the risk that a company faces due to changes in the exchange rate between the settlement currency and the U. S. dollar. The company employs hedging strategies to mitigate this risk by buying corresponding futures contracts at the appropriate time [3].

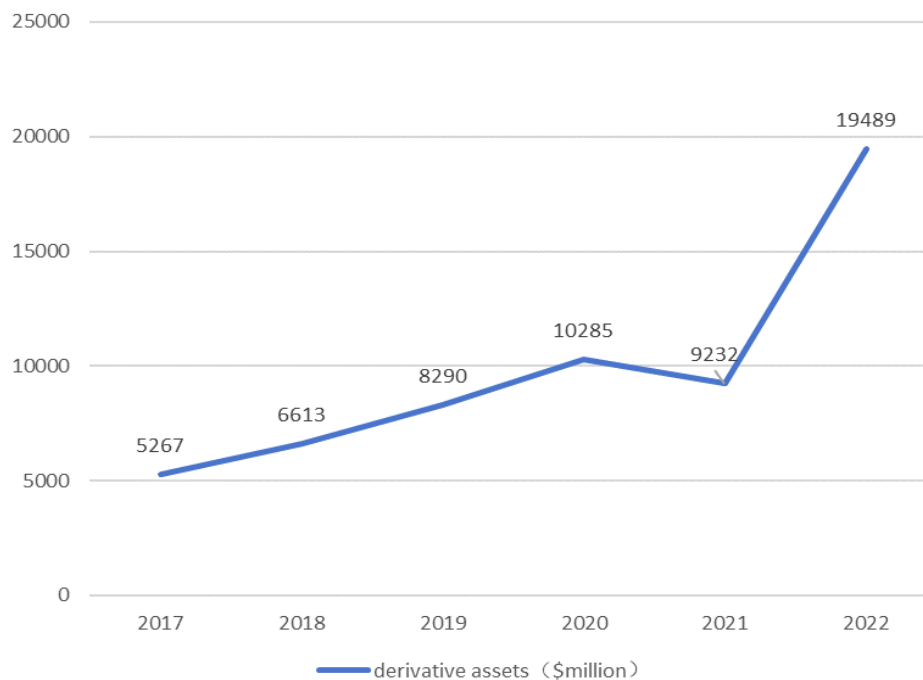


Figure 2. BP's derivative assets [3, 4]

BP's annual report revealed the value of its derivative assets spanning from 2017 to 2022 [4]. Based on the retrieved data, Figure 2 depicts BP's investment in derivatives on an upward trajectory. Although there was a decrease in 2021, the investment doubled in 2022 to \$194.89 billion. In recent years, BP has noticed several consecutive black swan events, driving home the considerable price volatility of commodities. To hedge its risks, BP is expanding its holdings of financial derivatives and approving their usefulness in countering risks and generating revenue. These financial instruments consist of futures, options, swaps, and other contracts that are tethered to the price fluctuations of oil, gas, and other commodities. Through this employment, BP can secure favorable prices, mitigate its exposure against unfavorable price shifts, and seize arbitrage opportunities. Additionally, these derivatives facilitate BP in expanding their portfolio and enter new markets and customer segments.

Financial derivatives can partially mitigate price and market risks. However, they are not a panacea for market volatility, as mentioned above, and some risks are difficult to hedge with financial derivatives, such as climate change and geopolitical risks, as the international community pays more and more attention to environmental governance [3]. With implementing policies, regulations, and technological advancements, enterprises' carbon emissions are being restricted. This will ultimately lead to a change in enterprises' preferred type of energy, causing a ripple effect on market sentiment and composition. As a result, the impact on the price cannot be accurately predicted or hedged, similar to the butterfly effect. Geopolitical risk encompasses a range of political factors that can impact the operations of a business. When such risks materialize, they may lead to fluctuations in exchange rates and alterations in business operations. Examples of geopolitical risks include the potential impact of climate change and other political developments. The ongoing conflict between Russia and Ukraine poses a risk to the market, compounded by the unforeseeable occurrence of events such as the COVID-19 pandemic. Given the unpredictable and rare nature of these so-called "black swan" events,

investors cannot accurately anticipate their impact on the market and must rely upon broader trends. This uncertainty is further compounded by the inability to forecast the future with certainty.

3. Hedging Strategies in the Food Market

Food risk pertains to uncertainty of losses or gains for producers or consumers caused by food price volatility in the food market. The primary causes of food price volatility include supply and demand fluctuations, policy interventions, climate change, and exchange rate fluctuations. Numerous companies and governments rely on financial derivatives to hedge against food price volatility to minimize the risk.

The unpredictability of natural factors, such as weather, strongly impacts the volatility of the grain market in contrast to the energy market. Yet, predicting these weather events remains challenging, as witnessed by extreme events like ENSO, which pose significant risks to the grain market in coastal areas. ENSO has three unpredictable states — Neutral (N), El Niño (EN), and La Niña (LN). El Niño and La Niña have a significant impact on the countries along the Pacific coast, with El Niño causing abnormally warm sea surface temperatures and La Niña causing unusually cold temperatures. By incorporating the ENSO climate component into the optimal hedging ratio model, the impact of climate on hedging and cross-hedging strategies can be verified. Through this analysis, it was found that the adoption of appropriate hedging strategies can mitigate the price risk of the corn spot market [5].

This is supported by the practices of several companies, including Bunge, in the United States. Bunge is a global company that operates along the entire value chain of agriculture and food processing, from cultivation and purchase to transportation, processing, and marketing of various agricultural and food products. Owing to its business nature, Bunge Inc. is exposed to commodity market risks marked by fluctuating prices, which have the potential to impact its financial position and results. In 2022, the company encountered a substantial cost of goods sold increase by US\$3.497 billion because of higher commodity prices, an increase in energy costs, inflationary pressures, unfavorable results from fair value remeasurements, and expenditure of US\$52 million towards losses associated with the Ukraine-Russia war. Additionally, the company incurred a \$40 million impairment charge due to the reclassification of the Russian operations as held for sale in the current financial year. To manage potential risks, Bunge implements various hedging tactics using financial derivatives to counterbalance fluctuations in commodity prices. The company's hedging strategy safeguards its margins and cash flows by securing future commodity prices via futures, options, or swaps contracts. It selects the most suitable contract based on each commodity's type, volume, location, and timing. For instance, the company uses futures contracts for soybeans, corn, and palm oil to lock in the future costs of purchasing, selling, and processing these commodities.

The strategy is designed to mitigate the risk of commodity fluctuations. The 2022 annual report reveals that the organization engages in derivative contracts to mitigate potential losses from price fluctuations of its agricultural commodities, which are utilized and produced in its business operations.

Additionally, the report notes that the daily net position in agricultural commodities includes inventories, forward contracts, over-the-counter (OTC), and exchange-traded derivatives, all valued at market prices. During 2021 and 2022, Bunge had a daily maximum aggregate position fair value of \$1,809 and \$1,706, respectively. These figures suggest that Bunge is heavily exposed to commodity markets and must mitigate price risks through effective hedging. As a result, in 2022, Bunge traded 20,493,679 metric tons of forward contracts and 4,092,772 metric tons of futures on agricultural commodities. In addition, this agricultural and food company faces currency and interest rate risks when conducting foreign trade due to its significant import and export requirements. The company employs currency swaps, forwards, and option contracts to hedge against currency risk by locking future exchange rates based on its foreign assets, liabilities, revenues, and expenses. This minimizes the impact of exchange rate fluctuations on the company's financial position and performance. For instance, the company utilizes Brazilian Real, Euro, and Argentine Peso currency

forwards to secure future exchange rates and reduce the impact of exchange rate fluctuations on cash flows. The corporation's strategy to mitigate interest rate risk is to secure upcoming rates by choosing suitable interest rate swaps or option contracts based on its fixed-rate and floating-rate debt profile. This approach minimizes interest expense and debt valuation sensitivity to fluctuations in interest rates [6].

In conclusion, prices in the grain market are influenced by international and weather factors, making it crucial for grain companies to hedge their risks using financial derivatives during uncertain times. Notably, grain companies recognize and are agreeable to implementing this strategy to reduce their risks during market volatility. However, as with the energy market, the potential impact of financial derivatives in the grain market is contingent upon the prevailing situation. Through simulation of two hedging schemes - the discretionary futures scheme and the non-discretionary futures scheme in Zambia - and comparison with existing import strategies and food security stock reliance, it was discovered that hedging policy has a negligible effect on volatility and is only expected to be effective during years of significant food shortages. Therefore, it can be concluded that clear policies, transparent implementation, and reduced transportation costs may help Southern African governments achieve better outcomes in mitigating food crises rather than relying on hedging [7].

4. Gold Investment Strategies

As previously noted, the volatility in the energy and food markets has exceeded the expectations of investors and operators due to an array of unforeseeable black swan events in recent years. Financial derivatives are frequently utilized to mitigate risk. Applying them as a form of wind control strategy can also be effective in minimizing losses and even generating gains. Nevertheless, financial derivatives embody the principle that higher profits come with higher risks, as they are a type of financial product. In response to the crisis, certain enterprises have utilized suitable financial derivatives for hedging and attained favorable outcomes. However, some enterprises have incurred amplified losses caused by financial derivatives' high leverage due to misguided risk or price trend predictions that led to inappropriate hedging strategies.

Market volatility not only affects enterprises but also impacts investors. Some investors may choose to invest in financial derivatives to preserve value or seek profitability. However, like business managers, the law of high yield and high risk remains unchanged. The 2020 forced liquidation of Crude Oil Bao serves as a warning to investors in financial derivatives. Crude Oil Bao, a structured financial derivative product issued by the Bank of China in early 2018, has offshore crude oil futures as its underlying asset. On April 20, 2020, at New York time, the May WTI crude oil futures contract price plummeted unprecedentedly to a negative value. The settlement price of -37.63 USD was recorded as the May contract closed on its penultimate trading day. Likewise, Crude Oil Bao, which tracks the futures, suffered the same fate, necessitating investors holding long positions to settle or move their positions at -37.63 USD. The Bank of China confirmed via its website that investors in crude oil futures will be settled at a negative value of \$37.63 per barrel. Furthermore, long investors will be liable for all losses incurred, along with the additional loss resulting from the depletion of their positions [8]. This situation highlights the risks associated with high-return financial derivatives and signifies the importance of avoiding blind investments, even during market volatility.

Under prolonged market volatility, the role of gold as a rare and precious metal with good value preservation and appreciation is highlighted, and it is widely used as an investment and reserve instrument. Gold is also considered a "safe haven" due to its hedging role. Madani et al. show a negative, significant, and long-tail dependence between gold and the US dollar exchange rate, consistent with gold's role as an effective hedging and risk-averse asset. In addition, the evidence of average independence over all time scales and negative and significant tail dependence between gold and oil in the short run suggests that investors can use gold as a weak hedge and, in exceptional circumstances, as an effective short-term safe-haven asset. The results of the change in gold's

dependence as market conditions change also suggest that gold provides investors with the benefits of intraday hedging and risk aversion during certain periods [9]. The role of gold as a hedging and risk aversion asset is evident in the context of volatile currency markets.

Taking the U.S. Islamic stock index as an example, Abdullah and colleagues explored the correlation between the U.S. Islamic stock index, Bitcoin, gold, and commodities like oil. Islamic stock index. They ultimately found that gold has the lowest price return volatility and is negatively correlated with the U.S. Islamic Stock Index. Thus, investors impacted by the U.S. Islamic stock index can consider investing in gold for diversification [10].

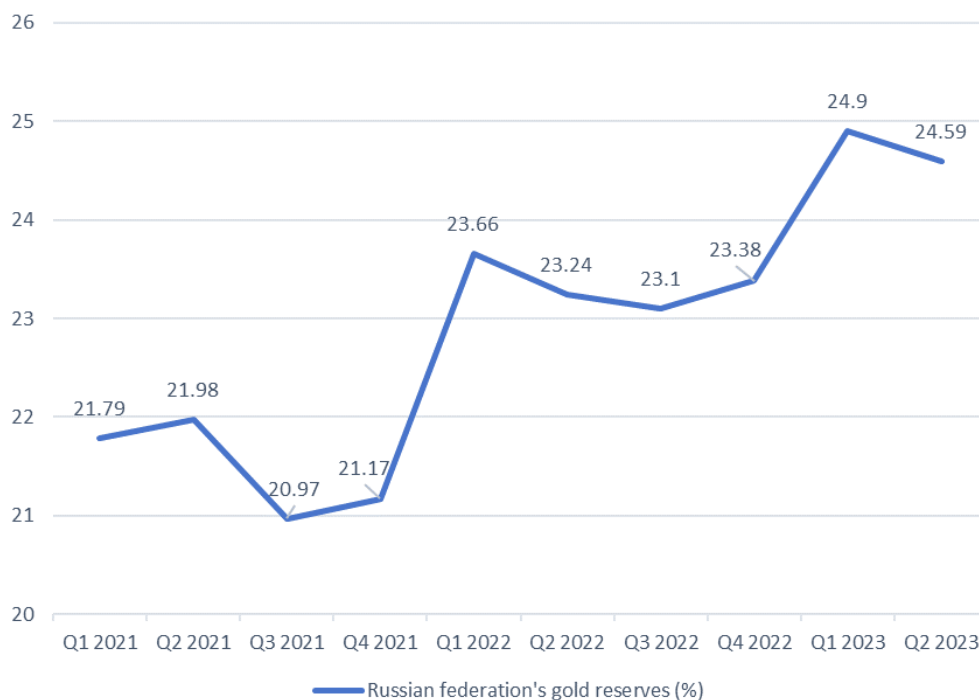


Figure 3. Russian Federation's gold reserves [11]

According to monthly statistics on central bank gold reserves by the World Gold Council, Figure 3 depicts the proportion of gold reserves held by the Russian Federation each quarter from 2021 to the present [11]. It is evident that since the official outbreak of the Russian central bank's gold reserves in the first quarter of 2022 during the Russian-Ukrainian war, the level has been maintained at a high level compared to the previous year. This indicates that the central bank of the Russian Federation has opted to increase its gold holdings to hedge against the risk of foreign exchange and trade resulting from the impact of the Russian-Ukrainian war.

In conclusion, gold is often utilized as a historically proven hedging product to hedge against the risk of financial derivatives and the unpredictable and significant fluctuations of the long-term market. Despite its widespread use for managing long-term volatility, gold cannot be considered a perfect hedge due to its high cost, unstable correlation, and inability to eliminate risk. Therefore, a specific hedging strategy based on actual variations is necessary.

5. Conclusion

This paper examines the use of financial derivatives in managing risk, focusing on the energy and food sectors. In recent years, market turbulence has severely damaged several companies because of their inadequate preparation to deal with such risks. However, some firms have successfully employed futures and options to hedge and mitigate losses. Gold is also a valuable asset during long-term market upheavals as it is less volatile and can preserve value.

Recent years have seen two major unpredictable events: the COVID-19 pandemic and the Russian-Ukrainian conflict. Due to the impact of economic globalization, no country or enterprise can assure complete immunity from their influence. Using financial instruments to hedge the risks could be a

viable strategy in this context. Currently, this option is worth considering. Amidst short-term cost fluctuations within a predictable range, financial derivatives prove to be a viable option. Many successful cases have been observed, attesting to the effectiveness of financial derivatives. However, in the face of long-term uncertainties, holding gold serves as a reliable option for hedging.

This paper provides a preliminary analysis of the application of financial derivatives in risk management without addressing detailed or complex content related to financial derivatives, pricing, combinations, or evaluations. These topics require additional theoretical knowledge, practical experience, and modeling support. Additionally, as risk increases, so too does potential return. Numerous alternatives exist between financial derivatives and gold, including cryptocurrency (such as bitcoin), and countless hedging strategies are waiting to be discovered and selected according to different risk preferences.

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