

Hedging Risks & Strategies under Energy and Food Crisis

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Abstract. Oil, gas and food are essential for modern human life. The price fluctuation of these things will significantly affect the economy of the world. This essay discusses the price changes of energy, bulk food, and hedging financial assets against the backdrop of global uncertainty, influenced by geopolitical conflicts such as the Russia-Ukraine war and the Saudi oil renewal crisis, as well as factors like the COVID-19 pandemic and climate change. The prices of energy sources are highly volatile from geopolitical influences. The prices of bulk food commodities fluctuate around a baseline level, with specific trends varying by type of food. Hedging financial assets like gold and Bitcoin have seen gradual increases in price with some volatility. Companies develop their hedging strategies based on the prices of these derivatives, holding different quantities of risk assets and adjusting their asset holdings based on expectations of changes in the prices of these derivatives.

Keywords: Energy Crisis; Price Fluctuation; Hedging Strategy; Risk Management.

1. Introduction

The recent crisis of war between Ukraine and Russia has a great impact on global trade and development. As one of the major suppliers of essential products, especially in energy and food field, the war significantly increases the risk of food and energy security and supply chain difficulties. As a result, people around the world gradually felt the difficulties of higher food and energy prices and suffered from reduced availability of goods exported from Russia and Ukraine. Higher price of food and energy will depress real incomes, and reduce consumption and investment worldwide, which will in turn lower the global import demand [1]. According to recent research, robust evidence showed that oil demand shocks played an important role in all major oil price shock circumstances. The current global situation, through this cyclical mechanism, has influenced oil prices and simultaneously precipitated a food crisis. The oil and food crises are closely related to companies' use of these commodities as derivatives for hedging. Severe fluctuations in oil and food prices increase the market uncertainty, which directly affects the operational costs and revenues of companies in the world.

By using derivatives such as futures, options, and swap contracts, companies can lock in future prices for oil and food. This means that regardless of market price fluctuations, companies can purchase the needed commodities at predetermined prices, thereby avoiding additional costs due to the price increase. This is especially important for companies that rely on oil and food as major production factors. For centuries, many companies use derivative contracts in hedging commodity natural exposure. Modigliani and Miller's theory proposed that financial strategies do not increase firms' value under perfect competition, yet firms use hedging to minimize risk exposures [2].

Hedging plays a crucial role in the futures market, serving as an effective risk management strategy that helps businesses mitigate severe commodity price volatility. By employing hedging techniques, companies can shift from a reactive stance to a proactive one, allowing them to manage production costs more effectively, secure profitability, and strive for superior development outcomes. It will initiate this analysis by examining the determinants of several derivative pricing mechanisms, incorporating an evaluation of how international geopolitical dynamics influence these prices, and reviewing their historical data. Additionally, this paper will explore examples of corporate risk hedging to understand how stakeholders mitigate risks.

2. Energy Commodities

2.1. Oil

Energy commodities, including crude oil, etc., with inelastic demand and supply, in the foreseeable future, will still remain the primary source of global energy. Its price is influenced by global supply and demand, inventories, market sentiment, and geopolitical factors. Political risks, such as oil trade friction and economic growth, directly impact prices, with strong economies driving up demand and slowdowns lowering it. Geopolitical events, e.g., the Middle East conflicts and the Russian-Ukraine war have consistently supported oil prices. For instance, attacks on oil infrastructure and transportation have boosted the price of oil. Additionally, OPEC+ production cuts, by reducing output by 2.2 million barrels per day, further support prices. In early 2024, global deflation and downward oil demand revisions by organizations like the IEA added pressure. A significant shift also occurred when Saudi Arabia declined to renew its petrodollar agreement with the U.S., signaling a move in global energy trade from the U.S. to emerging nations. The following passage will be an analysis of the historical trend of crude oil prices.

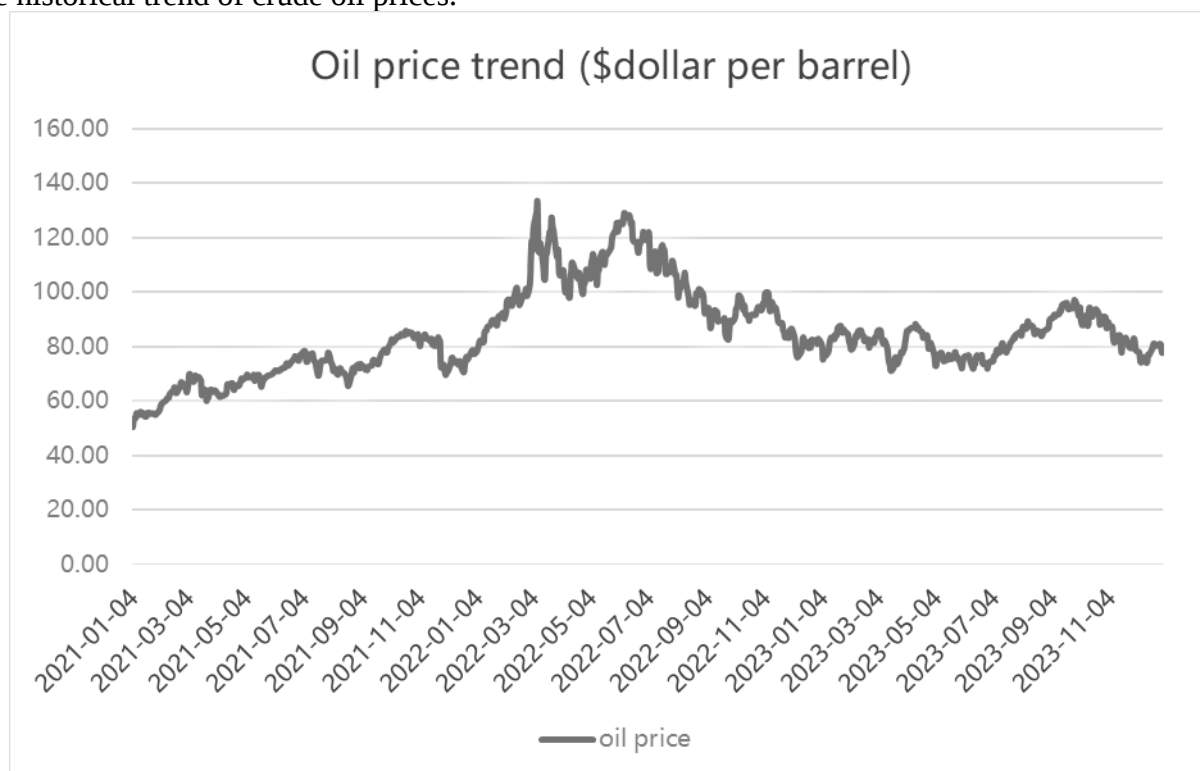


Fig. 1 Price trend of oil from January 2021 to November 2023.

As shown in Figure 1, the fluctuations in Brent crude oil prices from 2021 to 2023 were influenced by a complex mix of demand and supply shocks, as well as market expectations and geopolitical risks. One way to understand these price movements is through two key frameworks in economic literature: one that emphasizes the role of inventories and the another that focuses on shocks to oil supply and demand. These frameworks help explain the underlying dynamics that drove oil price changes during this period [3].

In the first framework, oil prices are seen as an asset. Shifts in trader expectations, which are often influenced by geopolitical events, can lead to changes in the price of oil. For instance, speculative demand shocks can cause rapid price increases even in the absence of immediate changes in supply or demand. This was evident in 2022, when the Russian invasion of Ukraine caused a dramatic rise in oil prices, with Brent crude exceeding \$130 per barrel in March. This surge was driven by market concerns over potential disruptions to global oil supplies, reflecting forward-looking behavior by traders rather than any immediate supply shock. Similarly, the recovery of global demand in 2021,

combined with OPEC+ production adjustments, contributed to rising prices, with Brent crude climbing from around \$50 per barrel in early 2021 to about \$80 by December.

The second framework posits that oil prices are primarily driven by changes in the flow of supply and demand for oil. Historical trends suggest that shocks to the demand side, such as changes in the global business cycle, have been responsible for long-term price swings. The 2003-2008 oil price increase, for example, was largely driven by unexpected growth in emerging markets, especially in Asia, and strong demand from OECD countries [4]. This mirrors the dynamics of the 2021-2023 period, where the global economic recovery post-COVID-19, combined with rising industrial demand and OPEC+ supply constraints, led to upward pressure on prices. However, these increases were tempered by broader economic concerns, including inflation and fears of a global slowdown, ND caused fluctuations in oil prices, with Brent crude fluctuating between \$80 and \$130 per barrel throughout 2022 and into 2023. Overall, oil price fluctuations during this period can be attributed to a combination of shocks to both supply and demand, as well as speculative behavior and geopolitical events. While the market absorbed shocks like the Russia-Ukraine conflict and the COVID-19 pandemic, price stability remained elusive, with ongoing risks to both supply and demand keeping prices elevated compared to historical averages.

2.2. Gas

Several factors may influence the supply and demand of natural gas. Economic growth, particularly for industrial and power generation sectors, may lead to an increase in gas demand. Seasonal patterns and weather conditions may also affect natural gas demand. For example, an exceptional cold winter can increase heat demand, thereby driving up the natural gas price. Moreover, environmental protection concepts and clean energy development have significant effects on the application of gas. Being an environment-friendly and cleaner energy, natural gas is more high-quality than other fossil fuels. What's more, the trade of liquefied natural gas (LNG) has changed the traditional pipeline-dependent model, allowing natural gas to be freely traded on the global market like oil, which has led to new geopolitical dynamics. The market prices of natural gas displayed in Trading Economics are based on over-the-counter (OTC) and contract for difference (CFD) financial instruments [5].

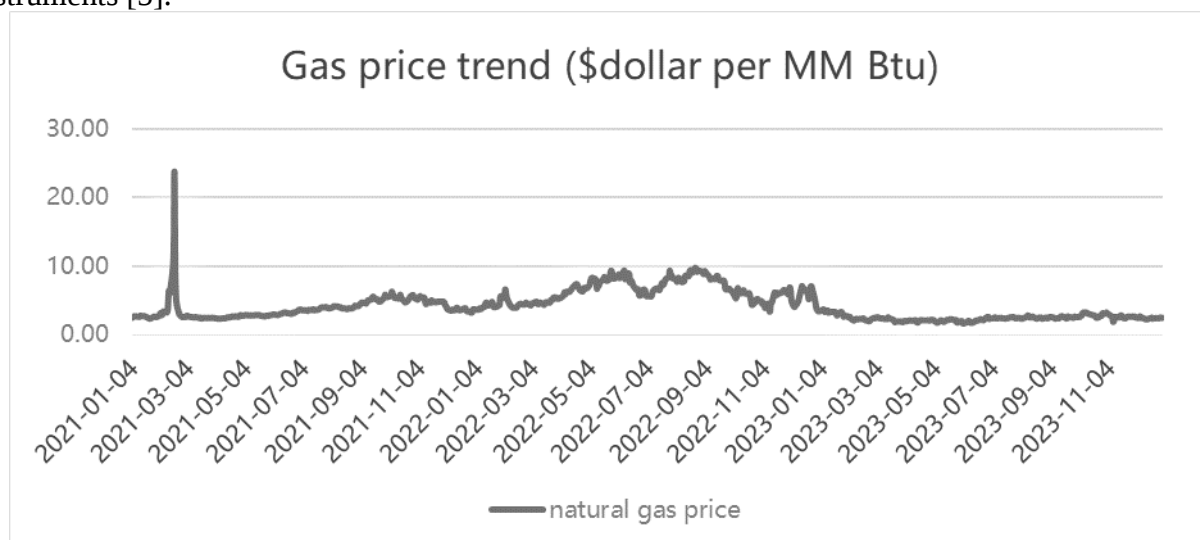


Fig. 2 The price trend of natural gas from January 2021 to November 2023

Over the past three years, the natural gas price has experienced significant volatility. At the start of 2021, the price was relatively low, hovering around \$2.60 to \$3.00 per MM Btu (see Figure 2). However, in early 2021, the price began to climb sharply, reaching a dramatic peak of \$23.86 by February 2021, driven by extreme cold weather and tight supply conditions. This spike was followed by a quick drop back to below \$3.00 in the months that followed, fluctuating between \$2.50 and \$3.50. In 2022, prices rebounded, largely due to the geopolitical tensions and energy supply disruptions

caused by the Russia-Ukraine conflict. By March 2022, prices surged past \$5.00, peaking again in June and July above \$9.00, reflecting heightened global demand and instability. By the start of 2023, natural gas prices had decreased significantly, falling back below \$3.00 by early February, marking a period of price stabilization after the previous peaks. The global economic recovery was slow and uneven, and multiple factors influenced the trend in natural gas prices. During the first six months, the prices of JKM (Japan Korea Marker) and TTF (Title Transfer Facility) fluctuated and fell, while in the second half of the year, JKM and TTF rebounded with fluctuations. Due to competition between Europe and Asia in the LNG market, the prices of JKM and TTF were strongly correlated and showed similar trends.

As fossil fuel reserves are gradually depleted, the importance of natural gas in the energy supply chain continues to increase. Historical trends in gas prices indicate that policy and political factors, supply-demand dynamics, and hurricanes can lead to significant fluctuations in natural gas prices.

2.3. Typical Companies' Hedging Strategies

This section will use the annual report of Royal Dutch Shell as a starting point to analyze the general risk hedging strategies when dealing with energy. Shell faces a myriad of risks, including shifts in consumer demand, advancements in production technology, rising raw material costs, and the departure of key executives. Additionally, the oil and gas sector is currently experiencing challenges. For instance, refineries operate in a volatile environment characterized by fluctuating crude prices, increasing demand for lighter products, and stringent product regulations and emission standards. To mitigate some of these risks, commodity derivative hedging contracts are used to offset price volatility in future LNG transactions.

In 2022, geopolitical tensions from Russia's invasion of Ukraine caused supply chain disruptions and heightened commodity price volatility. Further complicating trading dynamics were sanctions and export controls imposed by various countries. Shell manages these market uncertainties through financial instruments such as futures, options, and contracts for differences. However, due to mismatches between available hedging tools and actual market risks, perfect risk offset is not always feasible. Consequently, there have been instances where hedging strategies did not perform as expected, and this trend may continue, exposing Shell to potential credit risks.

Table 1. Values at risk of global oil and European gas and oil between 2021 and 2023

\$million	2021		2022		2023	
	Average	Year-end	Average	Year-end	Average	Year-end
Global oil	26	30	72	56	43	25
Europe gas and oil	11	13	54	40	31	12

Data source: Shell annual reports

Moreover, commodity derivative hedge contracts are employed to partially reduce price volatility in future LNG transactions. These contracts utilize a combination of European and North American gas price indices, global crude price indices, as well as Asian LNG price indices. In 2021, Shell experienced significant volatility in these gas markets (see Table 1) [6]. Consequently, a sensitivity analysis was conducted for a 50% increase or decrease in the value of this basket of derivative contracts at year-end 2021, which would result in a gain or loss of \$0.3 billion (pre-tax) on the income statement. At year-end 2022, the impact would be a gain or loss of \$2.7 billion (pre-tax), and at year-end 2023, it would be either a gain or a loss of \$1.5 billion (pre-tax) in the consolidated Statement of Income (see Table 2).

To summarize these factors, the ongoing energy transition will persist in introducing volatility, and there is considerable uncertainty regarding the future trajectory of commodity prices over the coming decades. Whether financial firms should hedge commodity price risk depends on how closely it is related to the core business of the firm and whether it extends to the competitive advantage of the firm or not. Moreover, it is economically sensible for financial firms to hedge their exposure to

financial risks if the cash flow variability arising from these risks could entail costs for the firm. To this end, the decision by many multinationals to currently no longer hedge FX risk reflects them taking a view on the volatility and direction of exchange rates [7].

Table 2. Commodity derivatives between 2021 and 2023

	less \$million than 1 year	Between 1 and 2 years	Between 2 and 3 years	Between 3 and 4 years	Between 4 and 5 years	5 years and later	Total	Difference from carrying amount	Carrying amount
2021	12614	1401	783	274	158	531	15761	(29)	15732
2022	17273	3678	1203	515	270	793	23732	(874)	22858
2023	5767	1902	799	381	225	597	9671	(510)	9161

Data source: Shell annual reports

3. Agricultural Products

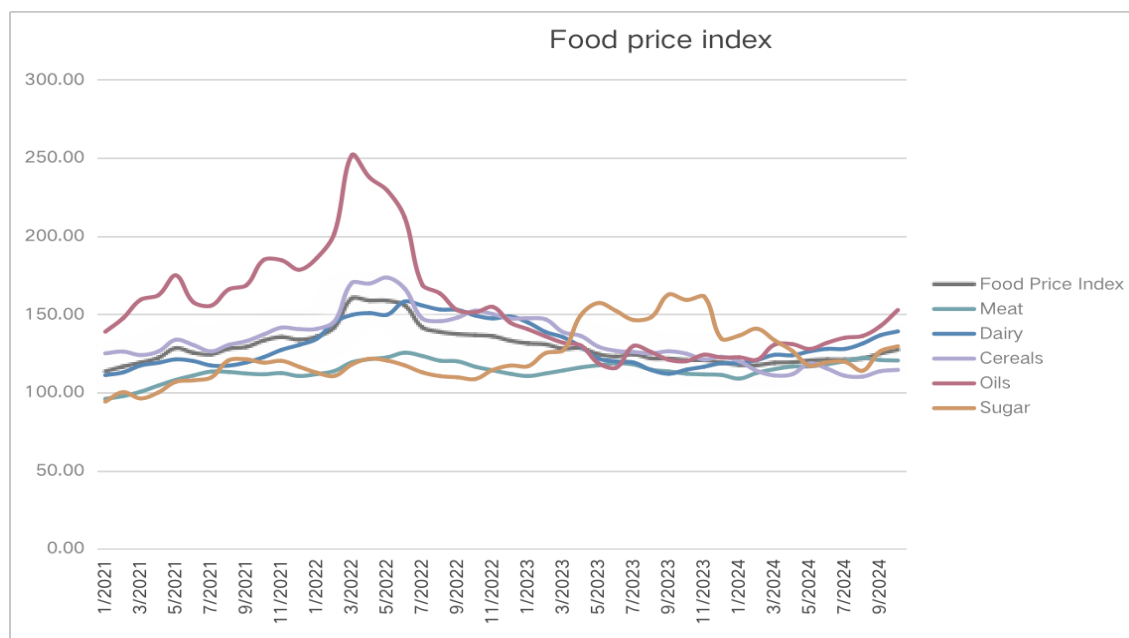


Fig. 3 Food price index between January 2021 and September 2024

As shown in Figure 3, food prices from January 2021 to October 2024 showed a consistent upward trend, with significant fluctuations across different categories. The overall food price index increased steadily, peaking in mid-2022 before stabilizing in 2023 and 2024. Meat prices showed gradual increases over time, reaching their highest in the second half of 2024. Dairy prices followed a similar upward trend, with a noticeable peak in early 2024. The cereals index, while volatile, saw its highest jump around mid-2022, reflecting global supply chain disruptions and inflationary pressures. Oils and sugar prices also rose steadily, with oils peaking in mid-2022 and sugar reaching a high in 2023. Overall, the data indicates that food prices, especially for meat, dairy, and cereals, experienced inflationary pressure, largely driven by global economic factors, supply chain disruptions, and increased demand in the wake of the COVID-19 pandemic. The trends also reflect ongoing price adjustments in response to global market conditions.

The followings are some bulk food companies along with their fundamental hedging strategies. For associated wholesome grocers, their financial risk management efforts involved in using derivative financial instruments to lower the effects of market price risks through short-term foreign currency forward contracts (see Table 3). AmCon Distributing Company does not currently hedge against interest rate risk or fuel costs. As a result, significant price fluctuations in these areas can and

do affect the company's profitability. For Louis Dreyfus Company, the derivative financial instruments are as follows:

Table 3. Derivatives at fair values in 2021 and 2022

\$million	2021		2022	
	Assets	Liabilities	Assets	Liabilities
Derivatives at fair value through profit and loss	2426	2480	1543	1206
Derivatives at fair value through OCI - cash flow hedges	17	160	76	244
Total derivatives	2443	2640	1619	1450

Data source: Acerinox annual reports

In summary, raw material prices can be highly unpredictable due to factors like weather, geopolitical events, and changes in global supply and demand; thus, bulk food companies often use derivatives to hedge against the volatility of raw material prices. By using financial instruments such as derivatives, bulk food companies can manage the impact of price fluctuations, stabilize cash flows, and ensure profitability in uncertain market conditions.

4. Safe-Haven Financial Assets

Investors utilize safe-haven assets to mitigate their risk exposure amidst market volatility. Given that market downturns are a natural part of economic cycles, it is prudent for investors to be well-prepared for such scenarios [8].

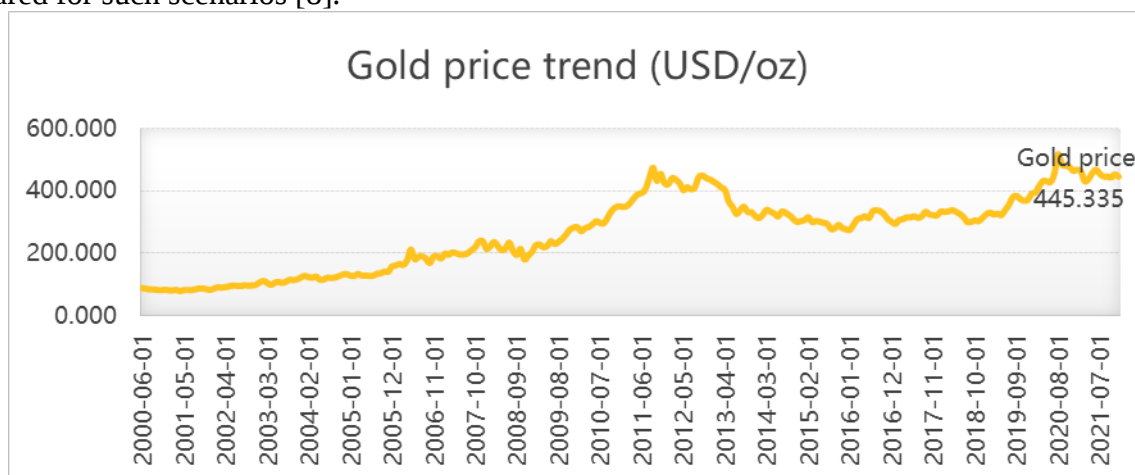


Fig. 4 Gold price trend between June 2000 and March 2021

Gold has historically been considered a safe-haven asset. As a medium-risk investment asset, it serves as a monetary equivalent and a universal means of payment. During periods of substantial market instability, investors flock to precious metals as a safe haven. Since the year 2000, there has been a consistent increase in both global gold production and its market price, underscoring gold's enduring appeal as a reliable investment option (see Figure 4). The year 2024 appears poised to be favorable for gold investments, with prices reaching an all-time high on July 17, buoyed by expectations of an upcoming interest rate reduction and a weakening dollar. The momentum is set to continue, with Bank of America (NYSE:BAC) predicting gold prices could reach \$3,000 in the next year, while the current spot price for gold is over \$2,400 [9].

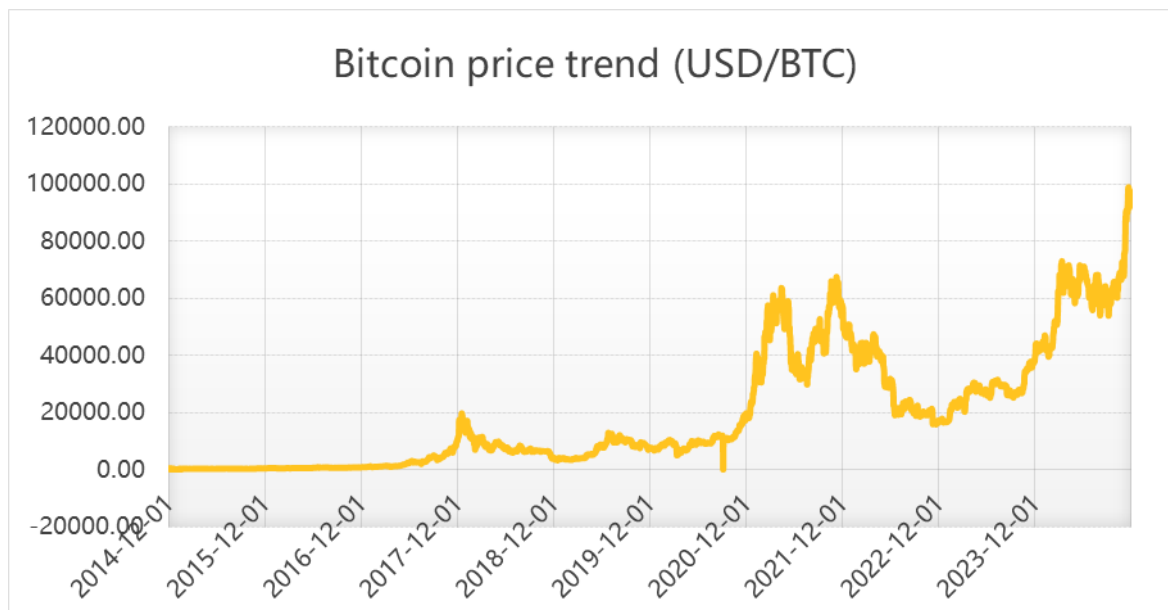


Fig. 5 Price trend of Bitcoin between December 2014 and the beginning of December 2023

Bitcoin has the characteristics of a price rise when the economic situation is terrible under high risk aversion. At this time, Bitcoin has the property of a safe-haven asset, and when economic conditions are good and risk aversion is low, it has a pro cyclical nature [10].

The scarcity and inflation-resistant characteristics of Bitcoin have led many investors to consider it "digital gold." Since the onset of COVID-19, Bitcoin has exhibited more robust characteristics as a safe-haven asset compared to gold (see Figure 5). Between March and June, Goldman Sachs entered the cryptocurrency ETF market, acquiring \$418 million in bitcoin funds. While Wall Street investment banks are gradually entering this space, hedge funds are adopting a more aggressive stance. Millennium Management, which manages \$62 billion, currently holds over \$1.1 billion in shares across at least five Bitcoin ETFs. It is the largest shareholder in Black Rock's bitcoin fund, with shares valued at over \$371 million, according to its August report.

In summary, it can be observed that gold and bitcoin are gaining wider application as hedging financial assets in corporate risk management strategies.

5. Conclusion

In the context of the current unstable international situation and geopolitical economy, the prices of energy, food, and safe-haven financial assets are subjected to fluctuations. Firms should use derivatives effectively and adopt appropriate hedging strategies to increase their inner value depending on their category and economic stage which is associated with. In the energy field, according to J.P. Morgan Commodities research, there could be a sustained geopolitical premium in crude prices until tensions are resolved. Due to strong worldwide demand for oil with a limited supply, it might be witnessing the onset of another energy boom cycle. What's more, according to historical trends, it predicted that food prices and gold prices would still grow steadily with slight fluctuations, while bitcoin would sustain a rapid growth. It assumed that equities were expected to surpass the overall stock market performance, serving as a macroeconomic safeguard against escalating inflation, increasing interest rates, and geopolitical uncertainties.

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