

# Fuel Hedging Strategy Analysis for Southwest Airlines

Linkai Liu\*

Department of Economics and Finance, The Hang Seng University of Hong Kong, Hong Kong, China

\*Corresponding author: s225060@hsu.edu.hk

**Abstract.** As the global economy experiences heightened volatility in stock prices, interest rates, and exchange rates, risks in financial markets have intensified significantly. In response to these growing risk exposures, investors and corporations are increasingly turning to financial derivatives—such as futures, options, and swaps—to manage their vulnerabilities. These sophisticated instruments empower market participants to hedge against adverse price movements, optimize portfolios, and seize strategic opportunities through advanced data analysis. The derivatives market offers a wide array of benchmark products, including those tied to critical commodities like energy. This paper presents a focused case study on the hedging strategies of Southwest Airlines, a prominent US carrier renowned for its proactive use of derivatives to mitigate the financial impact of jet fuel price fluctuations. The analysis delves specifically into the structure and mechanics of its short call and short put options strategies, examining their intended outcomes and inherent risks. By providing a detailed examination of this real-world application, the study offers valuable empirical insights. It serves as a practical reference for other airlines and commodity-dependent industries seeking to design and implement effective risk management frameworks using derivative market instruments.

**Keywords:** Derivatives Market; Aviation Market; Hedging Strategy.

## 1. Introduction

Ordinary investors may believe that investing in the stock and bond markets can yield substantial returns. However, derivatives trading is currently the world's largest market, with an estimated daily turnover of over \$2.5 trillion [1]. A derivative is a complex financial security established between two or more parties. Traders can use derivatives to access specific markets and trade different assets. Derivatives are generally considered a form of advanced investment, with the most common assets being commodities and currencies. Despite the large share of the derivatives market, Warren Buffett pointed out that "derivatives are time bombs in the economic system and are called financial weapons of mass destruction." However, with the emergence of various financial derivatives, these potential risks can be effectively managed in the derivatives market.

In 1952, Harry M Markowitz published his famous paper "Portfolio Analysis", which provided a basic idea for measuring the returns and risks of securities [2]. Financial practitioners also began to apply these developed theories to make asset portfolio selection and hedging decisions. In 1973, Fisher Black and Myron Scholes published a famous paper "Options and Corporate Debt Pricing" in the American Journal of Political Economy, which successfully derived a general model for option pricing, providing theoretical support for the originally vague option pricing [3]. However, these theories are based on the analysis results of complex mathematical statistical models. Therefore, an analysis that can easily understand the hedging strategies used by companies in the aviation industry is very useful in the derivatives market, allowing investors or other companies to practice similar hedging strategies.

The global aviation industry is a typical high-leverage, strong-cycle, and low-profit industry, and its profitability is extremely vulnerable to the impact of the external macro-environment [4]. During the special period of 2019-2023, airlines continued to be affected by the new coronavirus epidemic and the Russo-Ukrainian war. The COVID-19 epidemic dealt a huge blow to the global aviation industry. Travel restrictions led to a sharp drop in demand for air transportation in the United States, resulting in a sharp drop in passenger volume, the depletion of airline cash flow, increased survival

pressure, and the risk of bankruptcy. At the same time, the Russo-Ukrainian war the outbreak and continuation of the conflict disrupted the stability of global energy and financial markets. The war pushed up international crude oil prices and dramatically increased their volatility. Jet fuel is an airline's single largest operating cost, and its price fluctuations directly impact its profits and losses.

This paper begins with an introduction to Southwest Airlines, covering the company's background and financial status. Next, Southwest Airlines' hedging strategy will be analyzed. Its primary fuel hedging methods, the income and loss hedging risks, and the advantages and disadvantages of its hedging strategy will be examined in detail. The potential impacts of this hedging strategy will also be discussed in detail.

In this context, how to effectively hedge using financial derivatives, lock in future costs, and smooth profit fluctuations is a key development and survival strategy for Southwest Airlines.

## 2. Company Description

Southwest Airlines is a domestic airline in the United States. It is known as the pioneer of low-cost airlines in the United States and has become one of the models for low-cost airlines around the world to emulate [5]. As the airline with the most flights to the cities in the United States, Southwest Airlines' annual passenger volume ranks among the top in the world. Southwest Airlines has a record of profitability for more than 40 consecutive years and has survived the cycle of oil price fluctuations many times. One of the main reasons for achieving these achievements is that it has always adhered to the fuel hedging strategy. This strategy has always played an important role in the company's continued profitability. In recent years, Southwest Airlines has also adhered to the fuel oil hedging strategy. Southwest Airlines mentioned in its 2019 annual report that the current hedging ratio of crude oil futures held in 2021 will account for 54% and 31% in 2022. Therefore, 54% and 31% of fuel prices are locked in in 2021 and 2022 respectively. Even if the crude oil price plummets in 2022, they will still maintain the hedging strategy unchanged and will not be affected by changes in the market environment.

Jet fuel is one of the company's largest operating costs. Its price is highly correlated with international crude oil prices, which are driven by a variety of complex factors, including geopolitics, and are highly volatile and unpredictable. A unilateral upward trend in oil prices will quickly squeeze airlines' profit margins and even lead to industry-wide losses. Therefore, this risk exposure has become the greatest source of uncertainty in Southwest Airlines' operations. Effectively managing this risk is one of the company's key strategies.

## 3. Hedging Strategy Analysis

### 3.1. Existing Risks

The COVID-19 pandemic has inevitably impacted the aviation industry. As the pandemic ravaged the United States, the federal government, in collaboration with state and local governments, implemented various policies to protect the public's personal safety, such as stay-at-home orders, paid leave, and free vaccinations. These policies have fundamentally restricted people's ability to travel for their own health. Furthermore, the federal government canceled international flights from affected areas to prevent the spread of the virus, leading to a sharp drop in flight and passenger demand for the US aviation industry, causing operational and financial difficulties for major airlines, including Southwest Airlines.

The Russo-Ukrainian War has also significantly impacted the survival of airlines already under the shadow of the pandemic. While the pandemic has restricted flights and passenger traffic, the geopolitical implications of the Russo-Ukrainian War could lead to a sharp rise in energy prices, exposing already energy-dependent airlines to the double whammy of rising fuel costs and declining passenger demand within a few years.

Fuel hedging strategies involve airlines attempting to purchase fuel at low prices to mitigate the risk of future fuel price increases. As shown in the Table 1, the Company's Average Cost of Jet Fuel. Jet fuel costs are one of Southwest Airlines' largest operating expenses. However, in reality, most jet fuel hedging plans are short-term [6]. In 2020 and 2021, Southwest Airlines may have been in a state of over-hedging for a long time because the demand for air travel has decreased, and the company's demand for fuel has also decreased. However, after the outbreak of the Russo-Ukrainian war, the company's hedging plan can better cope with the increase in energy prices caused by the war, and can also gradually get rid of the impact of the epidemic on passenger traffic.

**Table 1.** The Company's Average Cost of Jet Fuel

Year	Cost (Millions)	Average Cost Per Gallon	Percentage of Operating Expenses
2017	\$4,076	\$1.99	23%
2018	\$4,616	\$2.20	24.6%
2019	\$4,347	\$2.09	22.3%
2020	\$1,849	\$1.45	14.4%
2021	\$3,310	\$1.98	23.5%
2022	\$5,975	\$3.10	26.2%
2023	\$6,217	\$2.89	24%

### 3.2. Fuel Hedging Strategy

Southwest Airlines uses financial derivatives to hedge against fuel prices in both the short and long term, primarily employing a range of portfolios, including long call options, collar structures (including long calls and short puts), put spreads (including long calls and short puts), put spreads (including long puts and short puts), and fixed-price swaps.

This paper will primarily discuss and analyze the common hedging strategies in financial markets: short call and short put options. Based on Southwest Airlines' 2020 annual report, the company projected jet fuel consumption of approximately 284 million gallons in the first quarter of 2021. By assuming a reasonable range of option strike prices, the company's revenue and losses from jet fuel consumption in the first quarter of 2021 will be analyzed.

As shown in the Table 2, the short call strategy in options trading involves selling a call option, betting on a decline in the price of the underlying asset. While the seller can earn a premium, the risk lies in the potential for unlimited losses if the asset price rises above the strike price. In practice, the call option has a strike price between \$1.63 and \$2.02 per gallon. If the jet fuel price is above \$2.02 per gallon, Southwest Airlines will incur a loss, multiplied by the price above \$2.02 per gallon times 284 million gallons. If the price is between \$1.63 and \$2.02 per gallon, the company will earn a premium.

**Table 2.** Short Call Option

	Minimum	Maximum	Total gains/losses
Strike price (above the maximum)	\$1.63/gallon	\$2.02/gallon	(Fuel Price - \$2.02) x \$284 million
Strike price (in the range)	\$1.63/gallon	\$2.02/gallon	The option premium

As shown in the Table 3, put shorting occurs when a trader initiates an option transaction by selling or writing a put. A trader who buys a put is long the option, while a trader who writes the put is short the option. The writer (short) of a put option receives a premium (the cost of the option). In this case, if Southwest Airlines holds a put contract with a strike price of \$1.63 per gallon, it will earn a premium if the fuel price is above the strike price. Alternatively, if the market price falls below the strike price, Southwest Airlines will suffer a loss equivalent to \$1.63 per gallon minus the market price, multiplied by 284 million gallons.

**Table 3. Short Put Option**

	Strike price	Total gains/losses
Market price exceeds the strike price	\$1.63/gallon	The option premium
Market price below the strike price	\$1.63/gallon	$(\$1.63 - \text{market price}) \times \$284 \text{ million}$

## 4. Impact

### 4.1. Basis Risk

Although financial derivatives can offset some of the fuel price risk for Southwest Airlines, it also introduces a common basis risk [7]. Basis risk refers to the financial risk that the prices of the offsetting investments in a hedging strategy will not move in exactly the opposite direction. This imperfect correlation between the two investments may result in excessive gains or losses in the hedging strategy, thereby increasing the risk of the position. Although the prices of crude oil and aviation fuel are highly correlated, if the relationship between these commodities disappears, the basis risk will be magnified.

Product basis risk may be one of the risks worth paying attention to. It refers to the mismatch between the quality and specifications of the product and the original contract. In the aviation industry, companies generally use the original contract to hedge aviation fuel, but in fact, the two are not completely equivalent. Aviation fuel has higher quality standards than crude oil, so product basis risk is unavoidable in the aviation industry. Another risk is time basis risk, which also exists in the aviation industry. When the time of hedging cannot be matched, time basis risk will occur. The hedger may want to hedge a long-term contract, but there are only short-term contracts available in the market, so time basis risk is worth paying attention to.

### 4.2. Liquidity Risk

Liquidity risk is a hard-to-hedge risk. Liquidity affects the volatility of profits of US airlines [8]. Liquidity risk refers to the possibility that an institution cannot obtain funds at a reasonable price or within the necessary timeframe to meet its financial obligations. This risk may affect financial institutions and businesses, threatening their operations and financial stability. When airlines need to adjust or close their hedge positions, they are unable to complete transactions at fair prices, which incurs additional costs and thus makes it impossible to achieve effective hedging.

Hedging tools themselves have limitations. The biggest risk exposure of airlines is the price of jet fuel and its futures or options market, which is far less liquid than crude oil. When market prices fluctuate drastically, counterparties may widen the bid-ask spread in order to control their own risks. At this time, when airlines want to adjust their hedging strategies, they will be in a very passive situation, incurring huge transaction costs, or even being unable to trade.

During the COVID-19 pandemic, the demand for aviation in the aviation industry dropped sharply. Airlines may need to close some of their hedge positions to make up for the cash flow gap due to tight cash flow, but the market liquidity was low at the time, and closing positions would result in huge losses. Secondly, oil prices will also plummet as aviation demand drops sharply, directly leading to huge paper losses on hedge positions, thereby requiring the recovery of margin and further exacerbating the cash flow crisis of airlines.

### 4.3. Political Risk

Political risk is also one of the risks that is difficult for the aviation industry to hedge. Political risk is closely related to the oil and stock markets [9]. Increased political tensions will increase the volatility of the oil and stock markets [10]. Political risk refers to the risk that investment returns may be affected by political changes or instability in a country. Unstable factors that affect investment returns may come from changes in the government, legislature, other foreign policy makers or

military control. As the investment period extends, the impact will become increasingly greater, causing the original hedging strategy to fail, incurring additional costs or even the risk of losses. This poses a huge risk to airlines involved in global routes.

The aviation industry is extremely susceptible to national political policies, which may lead to embargoes, trade barriers and other policies. This will directly affect the supply and price stability of energy. Policy sanctions against major oil-producing countries will lead to the termination of related crude oil derivative contracts, making it impossible to settle the original aviation hedging contracts. In addition, national policies may adjust the currency settlement method of hedging contracts, which will naturally introduce foreign exchange risks, leading to direct book losses through exchange rate differences, and even preventing the normal execution of hedging contracts.

## 5. Conclusion

Southwest Airlines has been impacted by the dual impacts of the COVID-19 pandemic and the Russia-Ukraine war in recent years. Its hedging strategy is crucial to the company's future survival and development. Southwest Airlines employs a comprehensive hedging strategy to hedge against fuel price fluctuations, enabling it to maintain stable fuel costs despite major events. This is a representative case study in the aviation industry. Southwest Airlines is a leading company in the industry, actively participating in the financial derivatives market and using derivatives to hedge future fuel demand. This example is worthy of reference and emulation by investors and other companies in the aviation industry, helping the company offset the significant operating cost of fuel.

However, while a relatively perfect hedging strategy can mitigate losses for the company, some risks are unavoidable, such as basis risk, liquidity risk, and policy risk. When facing these risks, the company should fully consider its corporate strategy and develop a diverse hedging strategy to proactively address these hard-to-hedge risks.

This paper still has some shortcomings. The specific execution price of Southwest Airlines when applying option hedging strategy is not available, and there is no specific analysis of the performance of Southwest Airlines' hedging strategy in its financial statements during the COVID-19 pandemic and the Russo-Ukrainian war.

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