

# Analysis of the Jet Fuel Price Risk Exposure and Optimal Hedging in the Airline Industry

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**Abstract.** As a classic industry with high competitiveness, the airline companies are constantly exposed to external risks like oil price fluctuations. The volatility of the oil market as well as the global evolving unpredictable situations are putting uncertain adverse pressure on their financial performance and operation. It is without doubt that jet fuel price is remained as always, a hot spot of the insiders' communication. The nature of the industry, as well as the interactions between various market players and evolving international changes make the risk analysis and management an essential practice. This paper provides an analysis of the airline industry, with emphasis on related counterparties such as the oil market. Risk analysis on jet fuel fluctuations and the perspectives of hedging was discussed as a financial measure for reducing risk exposure and gaining more constant revenues. Examples of hedging adopted by the players in the industry were provided. The results of the study strengthen previous studies that report an impact of fuel hedging mitigates the risks, rather than reinforce the firm value.

**Keywords:** Airline industry, jet fuel hedging, oil market, globalization.

## 1. Introduction

With the development of industrial revolutions since the eighteenth century, the world transitioned to new manufacturing processes with emerging attention on effective transportations of not only goods, but also travelers and passengers. The foundation of airline companies in early twentieth century undoubtedly marked a new milestone boosting the development of global economic and financial progress. The airline industry, characterized by its ability to make transportations possible worldwide speedily, takes a market size of 841.4 billion US dollars in 2023 which seems to have been nearly fully recovered from the industrial downturn during the COVID-19 pandemic. (Data from IBIS world) It is expected to adopt a growth of 7.1% in market size in 2023. With nowadays global market trading as one of the predominant developmental models, it is thus becoming increasingly important for people to draw attention on the analysis of Airline Industry, especially in terms of their management facing various risks in the market. Firms are continuously exposed to risks present in the market, with fluctuations on jet fuel prices and exchange rate. Hedging typically is regarded as one method to manage the risks faced by the firms. Discussions have long been active on the topic of whether hedging is efficient enough on profitability or it is only valuable in terms of risk management and mitigating financial risks [1]. Typical hedging strategies used by the airline companies is also a topic worth for analysis. Hedging could be subdivided into operational hedging and financial hedging in the Airline Industry [2]. Various Airline companies hedge differently in terms of their hedging ratio and hedging tools used to prevent decrease in business's financial performance, when facing risks such as foreign exchange risk and jet fuel price fluctuation. This paper will make an attempt on providing a reasonable analysis on the jet fuel hedging strategies in the airline industry with a global perspective. Further with insights on suggestion on lowering market risk exposure for a purpose of constraining potential loss.

## 2. General Case Description

The airline industry today is arguably defined as an oligopolistic industry. Oligopoly exists when a market is dominated by a small number of companies, usually out of a reason of high market entry

barrier which is significantly enough. Thus, discouraging potential new competitors from entering the market resulting in a model of oligopoly like that in the airline industry. Oligopolistic industry is often characterized by only several firms operating by the same token and delivering similar services or products. To put in the setting of the airline industry, it is fair to rationalize that very high market entry barriers are limiting the entry of potential new airline corporations in the following two ways. Capital expenditure faced by the investors to establish and develop necessary infrastructures such as the parking slots for the aircraft is massive. Gathering such enormous amount of capital to initiate the business is unlikely for most of the investors in realistic settings. In addition, existing players in the market wouldn't be willing to confront such a situation where competition is worsened in a market that is already crucial in terms of competition. As a result, stepping back and making room to accommodate for new competitors entering existing markets that is already full of crucial competitions is highly unlikely for existing airline companies.

Domination of the market by only a few numbers of players result in high competition, especially in the setting of the airline industry wherein the firms operate and structure in high resemblance. Ensuring the price, arrival time, and extraordinary services for the customers are often seen in this oligopolistic market to avert from being outcompeted. The competitive pressure forces the companies to analyze and respond briskly and accordingly to new changes, whether operational, political, or financial, that are adopted by their opponents so that to add weight on their competitive power in such a market.

Further, the airline industry has been overseen with a cyclicity as there is a continuing cycle of fluctuations in their revenues and profits which are heavily dependent on the state of the economy and many other global factors such as the volatility present in the oil market as well as international situations which will be discussed in later section. This has been incessantly putting pressure on their financial operation, when external risks, such as oil price surging, faced by the industry is unquestionably a negative influence on their business performance. It is not hard to believe that fuel price has always been a troublemaker for the whole airline industry concerning the nature of the global oil market [3].

Last but not the least trait in the airline industry is its low-profit margin, which is the profit measured in percentage with the overall revenue. This feature is ubiquitous even during economic boost. The outcome is the strain of capital shortage not being able to cover the operational cost during economic downturns.

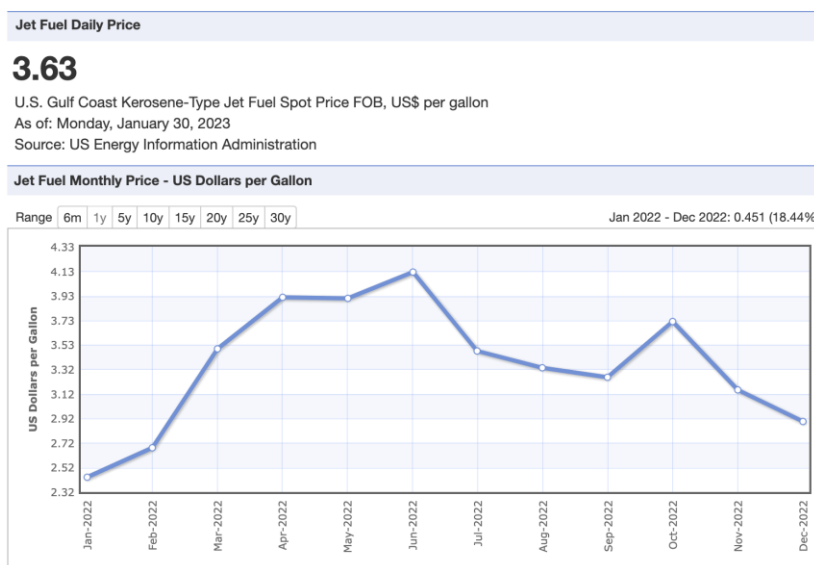
### 3. Analysis

There are always some corporations that can exhibit the ability to counter the general trend in the airline industry. While it is important to analyze multiple causes behind the cyclic trend of profits, concerning the nature of inter-dependency of the airline industry with global development, as well as the services they provide. During world economic downturn, which is marked usually with a higher oil price [4], would typically result in a lower demand of the transportation services of passengers and cargos as a consequence of decreasing international trade activities. Further, the impact of a high oil price, which is something in close correlation with jet fuel price, worsen the situation that the airline companies need to cope with.

Further risks faced by the airline industry heavily depends on global events and international situations which exhibit enormous impacts on the volatility of oil market and the demand for the airline industry. The nature of operational model in the airline industry is largely in close association with the state of the world, and often corporate many aspects of current situations ranging from not only economy, but also political relations, global healthcare situation, and even religious issues. Such example could be government regulations or inter-country conflicts. With the worldwide COVID-19 pandemic outbreak, not only the demand for global even regional transportation is decreasing as citizens' fear of viral circulation and exposure were constantly increasing, but also restraints from government regulations on travel is also putting pressure on the airline industry performance. With

dramatic cutoff on international and intranational flights, airlines bear low revenue with high operational cost.

The unforeseen Russia-Ukraine conflict later followed put the airline industry into another cold spot. It has led to a striking increase of international energy prices, especially the natural gas price and the crude oil price. Jet fuel price surges alongside with that of the crude oil as crude oil is the main ingredient for producing jet fuel necessary for aircrafts. Being one of the major producers and exporters of crude oil in the international energy markets [5], the pressure that Russia and Ukraine imposed in global financial market was unexpected before the conflict. With Russia supplying about 11% of its oil [6], a sharp increase in the geopolitical risk (GPR) faced by regional and international financial market give rise the harm to the financial markets in both short- and long-term [7]. Europe is particularly highly affected due to its heavy dependency on Russian gas and oil exports. The spot price of oil has almost doubled in the same period compared to a year before the conflict outbreak [6]. As shown in Fig. 1, it is clearly showing how jet fuel price is increasing dramatically with the increase of crude oil price, following the outbreak of Russia-Ukraine war. With the outbreak took place on February 24, 2022, the jet fuel price surge from 2.72 US dollars per gallon in February to as high as 4.13 US dollars per gallon in June 2022.



**Figure 1.** Jet Fuel Monthly Price Curve in US Dollars per Gallon in 2022

The nature of the oil market being highly volatile originates from its underlying high demand and essential role in transportation industry, leading to its unshakable position in modern societal and economic development. The supply and demand for oil is price inelastic, leading to drastic oil price fluctuations as a cause of small alteration in supply and demand chain. Change in oil price hardly affect the buying habitats of the customers as the demand for oil remains constant whether it's during economic boost or whether the world is facing an economic downturn.

All above discussed features spotlighted the airline industry being a crucial and restraint market, with necessary financial measures very critical to be implemented so that to prevent future potential losses and reduce risk exposure to the volatile marketplace.

Some most common risks that could be significantly influencing a corporation's operation and financial performance includes operational risk, reputational risk, exogenous risks, market risk, liquidity risk. The extent of the influence that the risks imposed to the firms varies with different airlines. Airline companies, though with similar operational models and firm structures, vary due to different factors. Scandals and rumors, whether airline-specific or related to its partners or suppliers, that could potentially affect a firm's reputation might have the ability to potentially signify or relieve firm's reputational risk. Ultimately, leading to customer defection and negatively impacting the firm's operation and financial performance.

According to Merkert [1], jet fuel expenses take a 30%-50% of total airline's operational costs. Previous studies have been actively discussing if jet fuel hedging policies are positively impacting airline companies' financial performance or is it only reducing exposure to oil price fluctuations as a measure of preventing risk exposure. Taking into account the undiversifiable financial market risk, a firm can only diversify firm-specific risks by means of high-quality management, active cooperation and of course using derivatives to mitigate the volatile risk of the market. The effectiveness of hedging could be classified in 2 forms, with the first one as reducing risk exposure and limiting potential financial losses. While the other motive for hedging is identified as maximizing firm value, as higher income would be taxed at higher percentage [8]. By reducing income volatility through hedging, relieve on tax payment could be potentially achieved for corporations.

The airlines usually adopt 3 main financial measures to minimize the risk of fuel price exposure [9]. The corporations could also endeavor to increase the fuel efficiency of the aircrafts. Aircraft upgrade which further implies additional maintenance cost and disposal costs are all factors that the investors should incorporate into their incentive for improving fuel efficiency. Another one method could be transferring the risk to customers, widely known as the airline surcharges. However, surcharges never guarantee a 0 loss from the jet fuel fluctuation and other risks such as the exchange rate due to the fact that the tickets were sold before the actual expense and usage of the jet fuel. In the event that there is a shocking increase in jet fuel price in the near future, the surcharges from passengers would fail to cover the jet fuel expenditure of the airlines. Hedging with derivatives also comes into the play as a widely used way to lower the risk of exposure. Hedging policy and the choice of hedging derivatives in essence depends on the firm's situation in terms of managers' interpretation of the market, in addition with the hedging ratio and hedging horizon that are suitable for the airline corporation itself. The most widely used hedging derivatives in the airline industry are futures and forward contracts, options, and swaps.

In conclusion with all above analysis, it's convincible that risks faced by the airline industry, taken into consideration the nature of the airline market and the oil market analysis, optimal risk management strategies should be wisely discussed to avoid potential unaffordable financial losses due to unforeseen market volatility. Taken into consideration the nature of high competitiveness within the industry, passing the fuel price fluctuation risk to passengers would not be incisive. Hedging as a strategy to reduce risks come into play.

The whole hedging market and the oil market is huge compared to the airlines, and with many professional traders and hedgers actively participating. The whole airline industry is insignificant in terms of exposing significant impact on the whole oil market by ways of their hedging strategies. It is more likewise for the airlines to get incentive of keeping constant profits through reducing risk factors rather than of seeking more profits and increasing firm values. This is also reconfirmed by the Capital Asset Pricing Model, in which it is believed that the stock price and thus the firm values wouldn't be affected by optimal management of risks.

#### 4. Suggestions

Different airlines might hedge differently, with different hedging horizon and strategies adopted. Risk management on fuel price fluctuations came into play as early as 1989. Most airlines hedge derivatives with commodities like crude oil, heating oil, or directly jet fuel to hedge against the fuel expense risk. Swaps, futures, and options in short-term contracts are widely seen in the industry [10].

With more recent data disclosed from airlines in 2022, several major international airlines hedge a portion of their jet fuel consumptions to offset the surging crude oil price. Within the context of Russia-Ukraine war, the global market experienced a shocking surge in crude oil price in the year of 2022. With a prominent rise starts as early as February, the crude oil price increases strikingly. Consequently, the jet fuel price dramatically jumps alongside due to the fact that jet fuel comes from crude oil. With a price of about 2.72 dollars per gallon in February 2022, the rise did not come to an end until June, where it hit 4.13 dollar per gallon. The situation is completely unforeseen by the global

marketplace even though it is a common insight that the oil market is volatile as always. Political decisions and global events that lead to the spike is out of control of any financial markets nor industries. It is nor out of expectation that crude oil export should be restricted as a political measure.

Hedging against price fluctuations in early 2022 doubtlessly saved losses. Referring to Table 1, in the first 3 months in 2022, Air France hedged 72% of their total fuel consumption and also a subsequent 63% in the following quarter. Whereas for the case of Air New Zealand, in contrast, announced a rise of international fares of about 5%, passing on the fuel price cost to customers due to mainly the cost of oil price rise and in addition general inflation.

**Table 1.** Data from Thomson Reuters

Airline	Amount of oil hedged (Jan to Mar 2022)	Amount of oil hedged (April to June 2022)	Amount of oil hedged (July to December 2022)	Contract price
Air France	72%	63%		\$90 per barrel
Air New Zealand	1.34 million barrels		707500 barrels	NA
Cathay Pacific	100%	50%	NA	NA
European Airline		60%	NA	\$504 per metric ton
British Airways		60%		NA
German Airline		63%		\$74 per barrel
Australian Airline		>60%	NA	NA
Singapore Airline		30%	NA	\$57 per barrel

Optimal hedging in the airline industry should be reasonable to be regarded as a meaningful measure though hedging policies might not be as significant in increasing the firm value as expected and previously thought by many people. It is without doubt in many cases and situations, serving the industry with the benefits of avoid future potential price fluctuation exposure and preventing high loss due to market volatility. The underlying reasonability is in high accordance with the nature of the airline industry where continuous high competition and risks from worldwide situations are faced by the insiders, as well as the unpredictability of the oil market.

It should however be aware of the double faces of hedging as the deal is never a win-win for all counterparties. A significant amount of loss on jet fuel hedging was pointed out in several major airline companies. [1] Protecting financial performance by hedging when during economic downturns is ideal, while firms might have to pay more than their rivals who did not participate in hedging activities if oil price drop during the horizon of their existing hedging contracts.

## 5. Conclusion

The airline industry serves the global economy with high-speed transportations of cargos and passengers, and thus contribute significantly to financial development and modern society construction. With the convenience that the industry brought to life kept in mind, and the great interest of the overall hedging policy within the industry, this paper provides a decent analysis on the nature of the airline industry and the risk exposure faced by the corporations. An emphasis on the investigation of hedging effectiveness gives the reasonable insight of the reasonability of hedging policies that is a widely adopted measure within the industry. By optimal hedging, there is a great chance of voiding future potential loss due to the volatility of the oil market, characterized by price

inelasticity. The influence exerted on the oil market which in turn affects the crude oil and jet fuel price could be multipartite. A steadier revenue and profits thus are more guaranteed with optimal hedging policies. Some successful examples within the industry also proved this hypothesis, as Air France who hedged successfully against the strikingly high oil price, which is due to the unforeseen shocking international conflict between Russia and Ukraine, in the year of 2022. This paper provides a foundation for future research to explore further into detailed optimal hedging strategies against jet fuel price fluctuations.

## References

- [1] Merkert. Flying with(out) a safety net: Financial hedging in the airline industry. 2019.
- [2] Treanor. Maximizing exposure therapy: an inhibitory learning approach. 2014.
- [3] Samunderu. Air Transport Management - Strategic Management in the Airline Industry. 2016.
- [4] Oladosu. Impacts of oil price shocks on the United States economy: A meta-analysis of the oil price elasticity of GDP for net oil-importing economies. 2018.
- [5] Huang. Correlations between the crude oil market and capital markets under the Russia–Ukraine conflict: A perspective of crude oil importing and exporting countries. 2023.
- [6] Orhan. The effects of the Ruuaia-Ukraine war on global trade. 2022.
- [7] Umar. The impact of the Russia-Ukraine conflict on the connectedness of financial markets. 2022.
- [8] René M. Stulz. Optimal Hedging Policies. 2009
- [9] Morrell. Governance and the public good. 2009.
- [10] Carter. Fuel Hedging in the Airline Industry: The Case of Southwest Airlines. 2004.