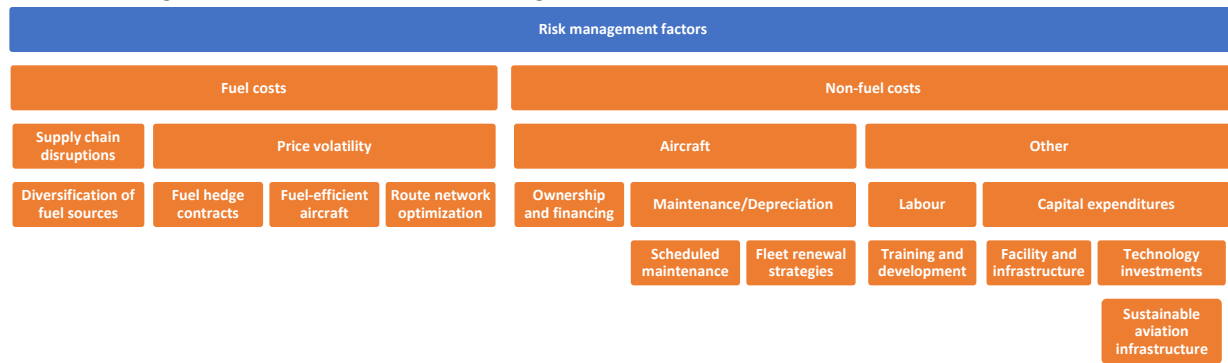


How has the fuel crisis impacted the airline industry?

The objective of this research project is to investigate the impact of the fuel crisis on the airline industry, especially in recent years, fuel prices have been subject to unprecedented volatility, which stand out as a significant contributor to airlines' operational costs and profitability. Therefore, understanding the relationship between fuel prices and the airline industry is crucial for the development of effective strategies to mitigate the impact of fuel price volatility.

First, *Risk Management* is an important aspect for any business, and the airline industry is no exception. In the airline industry, risk management involves identifying and mitigating factors that can impact the profitability and financial stability of an airline. The chart below shows a generic view on how some of these factors come into place in respect to fuel-related costs. It is reasonable to focus on fuel costs as one of the most significant variables in cost management, as we'll see later.



It's important to note, that there are so many other factors affecting the present strategy of an airline, which the airline often can't have much control of, such as political factors, the US Dollar & Euro strength, GDP growth, etc. The relationship between the growth in revenue passenger kilometers (RPK) and GDP growth is illustrated in the plot below, suggesting important variations in the demand for air services from different impactful global events and crisis.

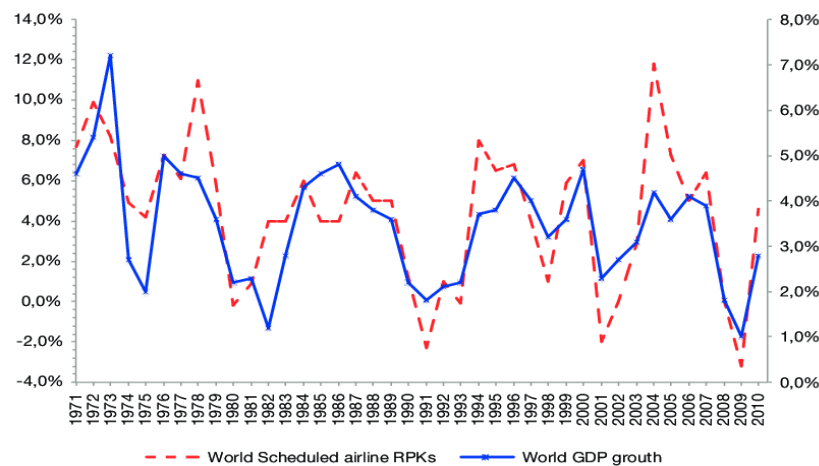


Figure 1. Co-evolution of world GDP growth and Revenue Passenger Kilometer (RPK). Source: O'Connell, 2012.

Another insight to be analyzed is how much impact a certain factor has on its cost distribution. In the table (Table 1) and pie chart (Figure 2) below we can distinguish the clear impact of how much fuel has on the airline industry.

	PERCENTAGE
Fuel	33.4
Aircraft Ownership	10.6
Maintenance and Overhaul	9.4
General and Administrative	7.3
Flight Deck Crew	6.8
Reservation, Ticketing, Sales and Promotion	6.5
Station and Ground	6.5
Cabin Attendants	5.1
Airport Charges	4.9
Passenger Service	4.2
Air Navigation Charges	4.1
Other	1.2

Table 1. Ferjan, C. (2014). Airline Operational Cost Task Force (AOCTF), Airline Cost Management Group (ACMG), Airline Cost Conference, Swiss, August 26-27, 2014, pp 12.

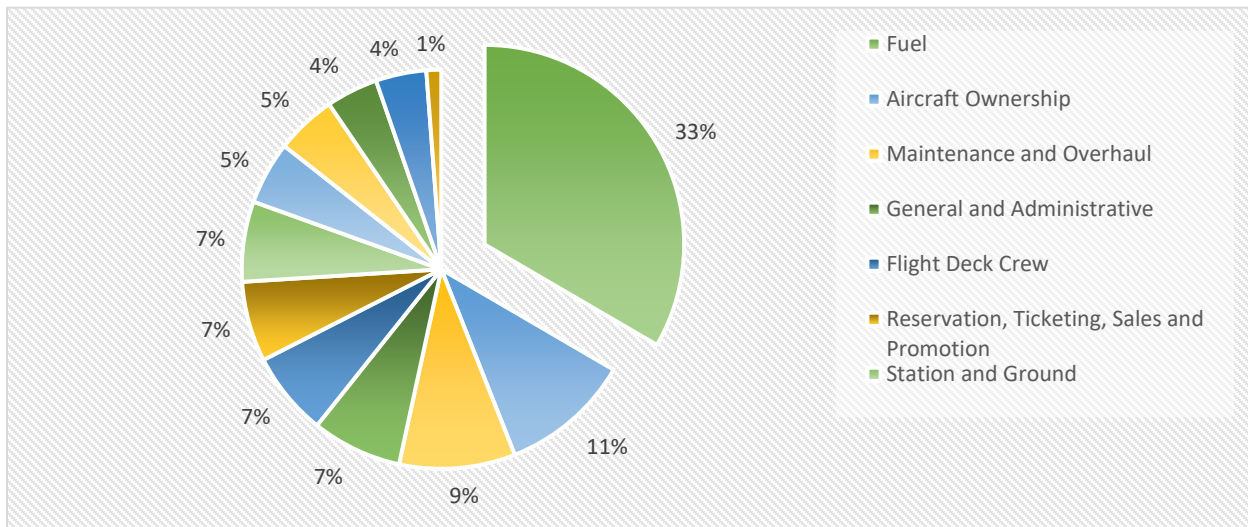


Figure 2. Visual representation of the cost distribution from Table 1

The magnitude of this number is high for a variety of reasons. One of them is its volatility due to the fact that it is highly dependent on the global oil market, which depends on its reserves, the distributor's own profitability management and many other geopolitical factors (an important magnitude to note, when fuel prices are particularly high, the total Aircraft Operation costs can add up to 60% of the total costs).

In the next analysis we'll see how these fuel distributors are highly independent in profitability, further justifying the impact of the deregulation of the aviation industry since the 1980s.

We'll showcase to major fuel distributors, BP p.l.c. (formerly The British Petroleum Company plc) and Shell p.l.c., observing how their profitability versus the growth of fuel prices have an evident correlation.

Starting with the BP stock trend dataset, we can see a clear parallel growth behavior with the fuel price tendency, with an exception between years 1994 and 2000 where its impactful boom could have been due to merging with an American oil company, which made BP the largest producer of both oil and gas in the United States.

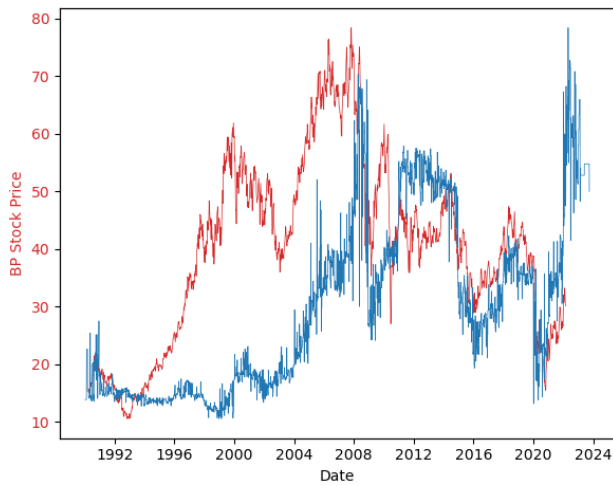


Figure 3. BP Stock price vs Fuel price.

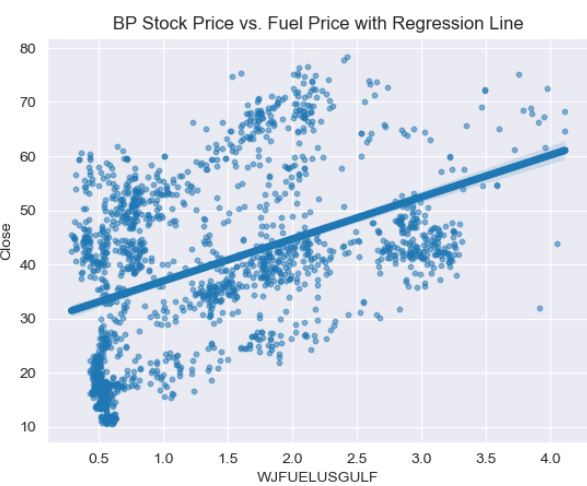


Figure 4. BP Stock price vs Fuel price regression analysis plot.

Making some statistical analysis, we obtain some interesting results.

	coef	std err	t	P> t
const	29.1660	0.650	44.878	0.000
WJFUELUSGULF	7.7620	0.389	19.955	0.000

BP R-squared: 0.19309927046327935

Based on the regression analysis, the results show that there is a significant positive correlation between BP's stock prices and the jet fuel prices. Specifically, the **R-squared** value of **0.193** suggests that approximately 19% of the variation in BP's stock prices can be explained by changes in jet fuel prices. Additionally, the **coefficient** of **7.7620** indicates that for each one unit increase in jet fuel prices, BP's stock prices are expected to increase by 7.7620 units. Both the coefficient and its associated **p-value** of **0.000** suggest that the relationship between jet fuel prices and BP's stock prices is statistically significant.

And now analyzing the Shell stock trend dataset, we see a very similar trend as with BP, as well with a particular growth between those same years, possibly due to their international expansion, especially in northern Europe.

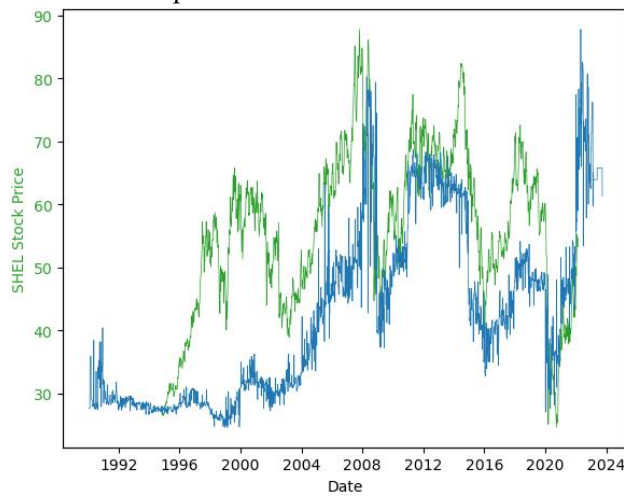


Figure 5. BP Stock price vs Fuel price.

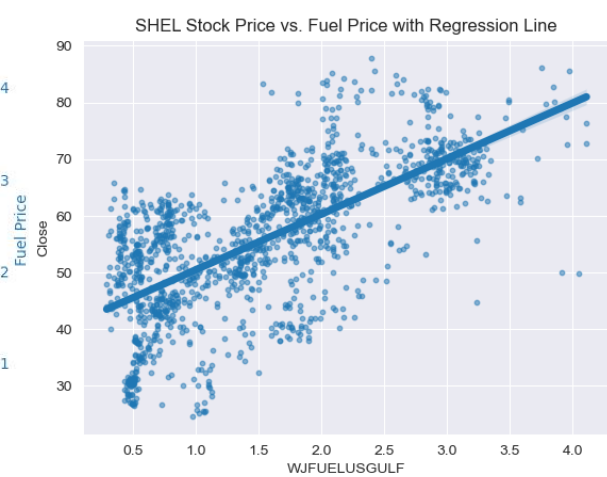


Figure 6. BP Stock price vs Fuel price regression analysis plot.

Making some statistical analysis for Shell as well, we obtain these results.

	coef	std err	t	P> t
const	40.6060	0.496	81.815	0.000
WJFUELUSGULF	9.8266	0.278	35.411	0.000

SHEL R-squared: 0.46807713496585346

For the SHEL stock, the **coefficient** of the WJFUELUSGULF (Fuel price) variable is **9.8266**, which means that a one-unit increase in WJFUELUSGULF is associated with an increase of \$9.83 in the closing price of SHEL stock. The **p-value** is less than **0.05**, indicating that this relationship is statistically significant. The **R-squared** value is **0.468**, which suggests that approximately 46.8% of the variance in the closing price of SHEL stock can be explained by changes in the WJFUELUSGULF variable.

Consequently, from both examples, we see the statistical analysis revealed a strong noticeable relationship in their trends.

In conclusion, given the complex and interconnected nature of some of the factors that we've mentioned and more, it's clear that the airline industry is deeply intertwined with the broader economic landscape. Therefore, airlines must continuously evaluate their cost management strategies, invest in future sustainable practices, and develop flexible operational plans to respond to unforeseen events. By doing so, airlines can better position themselves to navigate the ever-changing landscape of the industry and help ensure their long-term success.