

Fintech 096292 Project: American Airlines Stock Prediction

Doron Heller (214422750) Niv Maman (326497377) Rom Himmelstein (325482768)
Yarden Adi (212585848)

July 2024

1 Introduction

We aim to forecast the stock price of American Airlines (AAL) over a short-term period (somewhere between a day forward and a month forward). To achieve this, we intend to incorporate external variables into our analysis. The final section provides the sources for our data, specifically the datasets utilized in this project.

2 Prediction Task

As stated in the introduction, our objective is to forecast the stock price of American Airlines (AAL) for a short-term period. In some of the papers that serve as the foundation for our project, predictions were made one day forward, but in our case we want to use data gathered every quarter so we need a longer prediction period for it to be relevant. We plan to split the data to train, validation and test sets, and treat the prediction interval as a hyper-parameter we tune on the validation set.

3 Variables & Justifications

To provide context and clarity to the various factors influencing the stock prices of airline companies, the following variables and their justifications are examined:

Crude Oil Prices According to [3], crude oil prices significantly impact the stock market in general and the stock prices of airline companies in particular. The article presents a forecasting model for airline stocks that uses an LSTM model, which takes crude oil prices as one of the features. It demonstrates how changes in oil prices can affect stock prices.

Jet Fuel Prices Jet fuel prices are a significant factor influencing the stocks of airline companies. When fuel prices rise, the operating costs of airlines increase, which can reduce their profitability and lower their stock values. However, there are instances where rising fuel prices are perceived as a sign of future economic growth, which can lead to an increase in the value of airline stocks [4]. Notably, crude oil is used to manufacture jet fuel, thus their prices are heavily correlated. For now, we will keep both of them into consideration.

Costs and Profits of the Company The costs and profits of airline companies significantly impact their stocks. High costs, particularly fuel and labor costs, can increase financial pressure on the companies, leading to increased financial debt and a negative impact on stock prices. Following [2], efficient cost management and increased profits can improve the stock performance of the companies and contribute to their market value.

S&P 500 The S&P 500 index is a stock market index that measures the performance of 500 large companies traded on US exchanges. It is considered a representative index of the US economy and the US stock market. [5] finds that airline stocks react more strongly to movements in the S&P 500 index, meaning changes in this index cause larger changes in airline stocks.

Dollar Exchange Rate The dollar exchange rate, representing the value of the US dollar relative to other currencies, significantly impacts airline stocks. Changes in the dollar exchange rate can increase or decrease the operating costs of airline companies, especially concerning fuel purchases, labor costs, and other expenses. According to [1], changes in the exchange rate can also affect the companies' revenues, as most of their income is received in different currencies and needs to be converted to dollars, which can increase their financial risk.

4 Datasets

For our analysis and prediction of the stock price of American Airlines (AAL), we used several datasets from reliable sources.

1. **Daily** stock prices of American Airlines (AAL) is sourced from <https://finance.yahoo.com/quote/AAL/>.
2. **Daily** crude oil prices is obtained from <https://www.kaggle.com/datasets/mabusalah/brent-oil-prices/data>.
3. **Daily** jet fuel prices is available at https://www.eia.gov/dnav/pet/hist/EER_EPJK_PF4_RGC_DPGD.htm.
4. **Quarterly** revenue of American Airlines is available at <https://www.macrotrends.net/stocks/charts/AAL/american-airlines-group/revenue>.
5. **Quarterly** net income (net profit or loss after all revenues, income items, and expenses) of American Airlines is available at <https://www.macrotrends.net/stocks/charts/AAL/american-airlines-group/net-income>.
6. **Daily** stock market index price of S&P 500 is available at <https://finance.yahoo.com/quote/%5EGSPC/>.

References

- [1] Abdulkadir Alici. Analysis of macroeconomic factors affecting airline stock prices. *ANDULI. Revista Andaluza de Ciencias Sociales*, (25):93–137, 2024.
- [2] Abdulkadir ALICI and Güven Sevil. Analysis of internal financial factors affecting stock price in airline businesses. *The Journal of International Scientific Researches*, 5(Ek):28–46, 2020.
- [3] Jae Won Choi and Youngkeun Choi. A study of prediction of airline stock price through oil price with long short-term memory model. *International Journal of Advanced Computer Science and Applications*, 14(5), 2023.
- [4] Werner D Kristjanpoller and Diego Concha. Impact of fuel price fluctuations on airline stock returns. *Applied Energy*, 178:496–504, 2016.
- [5] Andre Varella Mollick and Md Ruhul Amin. Occupancy, oil prices, and stock returns: Evidence from the us airline industry. *Journal of Air Transport Management*, 91:102015, 2021.