

ANALYSING THE IMPACT OF OIL PRICE FLUCTUATIONS AND TRAVEL & TOURISM DEMAND ON THE AVIATION INDUSTRY

¹Ayush Anand

¹Student

¹School of Business and Management

¹Christ (Deemed to be University), Bangalore, India

Abstract: The study examined the impact of oil prices and the travel and tourism industry on the aviation industry. It focused on the aviation sector along with the oil industry and the travel and tourism industry as key influencing factors. The results revealed that changes in oil prices and travel and tourism activity influenced aviation industry performance. Specifically, variations in travel and tourism activity and fluctuations in oil prices showed significant relationships with aviation industry performance during the study period from January 1, 2016 to January 1, 2026. The data for the study was collected from the Dow Jones database. These findings have implications for individual investors, institutional investors, airline companies, and policymakers. Data evaluation and analysis were conducted using EViews software, applying descriptive statistics, correlation analysis, multivariate regression, and ARIMA forecasting. Other important things include Unit Root Test for each variable and Goodness of Fit Evaluation (like Normality Test, Linearity Test, Heteroskedastic, Multi-Collinearity Test and Auto Regression Test) The results reveal that oil and tourism sectors have a significant effect on the U.S. airline industry.

Keyword: Oil Prices, Travel and Tourism Industry, Aviation Industry, Multiple Regression, Descriptive Statistics, Unit Root Test, Correlation Analysis, Regression Analysis

1. Introduction

The aviation industry is an important part of the U.S. economy and is closely connected with sectors like oil and travel and tourism. Oil prices affect airline operating costs, while tourism demand influences passenger traffic and aviation performance. This study examines how **Oil & Gas Returns** and **Travel & Tourism Returns** impact **Aviation Returns** in the United States using time-series data from 2016 to 2026. Econometric models such as Multiple Regression, ARDL, and ARIMA are used to analyse the relationship and study trends over time.

1.1. Fluctuations in the Stock Market and Crude Oil Prices

The efficient market hypothesis theory suggests that the price of stocks is influenced by all accessible public and private information (Maitra, 2023) The fluctuations in crude oil prices were found to have a detrimental effect on the stock price But (Nandha & Faff, 2008) discovered that fluctuations in crude oil prices affected the stock price of individual companies in the crude oil sector, but had minimal impact on broader stock market indices. The price of crude oil could impact stock prices in three distinct ways as outlined below. Changes in production costs and anticipated cash flows driven by fluctuating crude oil prices would consequently influence stock prices through cash flows. Table.1, shows percentage increase of crude oil consumption by the selected countries. (Maitra, 2023) Changes in crude oil prices can potentially cause inflation, leading to higher interest rates. Increased interest rates would result in a rise in discount rates, which could impact the stock price of a specific company (Maitra, 2023). Changes in crude oil prices can impact the prices of commodities for a specific business, and may also affect the stock price of a company involved in commodity trading (Edelstein & Kilian, 2009). Figure 1 illustrates the various ways in which fluctuations in crude oil prices can impact the stock market.

Table 1: Percentage of increase of crude oil consumption by the selected countries

Countries	% Change
Brazil	39
China	122.5
India	90.9
Indonesia	58.6
Japan	-9
Malaysia	45.5
Pakistan	2.9
Russia	-31.2
Thailand	57.4
United States	25.8

1.2 USA's Aviation Industry

The aviation industry of the United States is one of the most developed and economically important aviation systems in the world. It plays a major role in supporting economic growth, employment, trade, tourism, and national connectivity. The industry includes airlines, airports, air navigation service providers, and civil aviation manufacturing, all of which together contribute significantly to the U.S. economy. In the United States, around 2.3 million people are directly employed in the aviation sector, generating nearly USD 433.3 billion of economic output, which is equal to 1.6% of the country's GDP. When indirect effects such as supply chain activities, employee spending, and tourism supported by aviation are considered, the total contribution of aviation increases to USD 1.3 trillion, accounting for 4.7% of GDP and supporting 7.6 million jobs across the country. Airlines in the U.S. alone contribute USD 183.5 billion and provide employment to 552,000 people. Airports, air navigation service providers, and civil aviation manufacturing contribute USD 249.9 billion and employ 1.7 million people. In addition, tourism supported by aviation contributes USD 95.9 billion to GDP and supports 734,300 jobs. International tourists who arrive in the U.S. by air contribute nearly USD 156.1 billion every year through their spending on goods and services. The aviation network of the United States is highly developed and well connected. The country has 666 airports with scheduled commercial flights and direct connections to 107 countries through 266 international airports. There are around 2,161 outbound international flights per day operated by 165 airlines, showing the strong global connectivity of the U.S. aviation system.

1.3 Travel and Tourism Industry of USA

The Travel and Tourism industry of the United States is one of the most important sectors of the national economy. It is not only related to hospitality and leisure, but it is also a major source of income, employment, exports, and international connection for the country. Inbound international travel plays a vital role in promoting cultural exchange and strengthening economic activity across different regions of the U.S. Travel and tourism is the largest single services export of the United States. In 2023, this sector accounted for 22 percent of the country's total services exports and nearly 7 percent of all exports. In 2022, the industry contributed around \$2.3 trillion to the U.S. economy, which was approximately 2.97 percent of the national GDP, and supported nearly 9.5 million jobs in areas such as hotels, airlines, restaurants, transport services, entertainment, and tourist attractions. The U.S. government actively supports the growth of this industry through the International Trade Administration (ITA), mainly through the National Travel and Tourism Office (NTTO) and the U.S. Commercial Service. These organizations help U.S. destinations and tourism businesses to attract more international visitors by providing data, market research, promotional assistance, and business support. With more than 100 offices in the United States and presence in over 80 countries, they help U.S. tourism businesses reach global markets effectively. Thus, the Travel and Tourism industry of the United States is a key economic pillar. It supports exports, generates employment, encourages international engagement, and contributes significantly to GDP. It is also closely supported by government institutions to ensure its competitiveness and growth in the global tourism market.

1.4 Oil and Gas Industry of USA

The Oil and Gas industry of the United States is a major component of the country's economic structure and plays an important role in supporting industrial activity, transportation, trade, and overall economic performance. Oil is considered a key macroeconomic indicator because changes in oil prices affect production costs, inflation, transportation expenses, and business profitability across many sectors. The United States is one of the largest producers and consumers of crude oil in the world. Oil is essential for operating industries such as transportation, manufacturing, aviation, logistics, and power generation. Because of this wide usage, fluctuations in oil prices directly influence the cost structure of many industries and indirectly affect economic growth and stock market performance. Therefore, the Oil and Gas industry of the United States is not only an energy sector but also an important economic factor that influences multiple industries, especially aviation and transportation. Its price movements play a significant role in determining operating costs, profitability, and overall sector performance, making it a key variable in this research study. As shown in the Figure. 1 data.

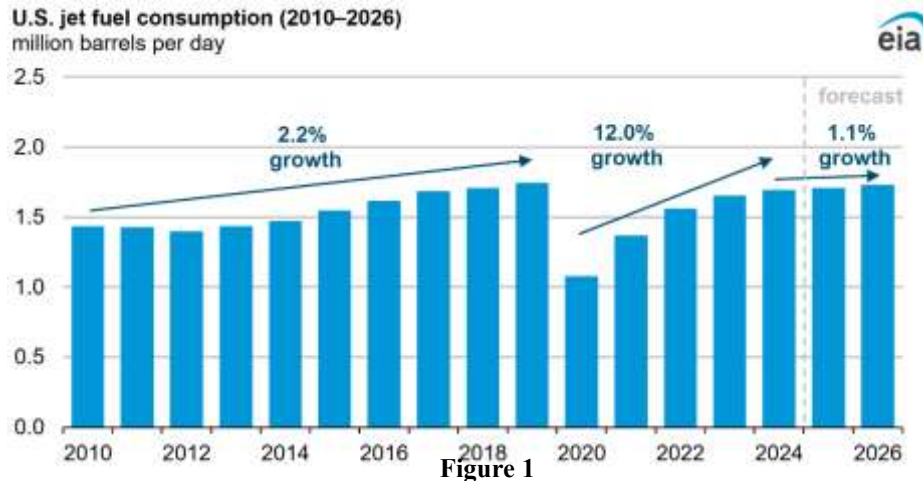


Figure 1

2. REVIEW OF LITERATURE

2.1 Literature Review

Putrik, Y., Nelzina, O., Borisov, A., Tsapuk, D., & Tretyak, E. (2022) “Air Transport Impact on the Development of the Tourism Industry.” This study examines how the growth of air transport directly contributes to tourism development through integrated logistics and mobility systems. Using analytical and systematization methods, the authors establish that more than half of international tourism depends on air transport connectivity. The findings indicate that aviation acts as a driving force for tourism expansion in a globalized economy. However, the study identifies a research gap in not examining how cost-side factors such as fuel price fluctuations influence this aviation–tourism relationship. The findings suggest that while aviation promotes tourism, external economic variables affecting airlines need further exploration.

Hesami, S., Rustamov, B., Rjoub, H., & Wong, W. K. (2020) “Implications of Oil Price Fluctuations for Tourism Receipts: The Case of Oil Exporting Countries.” This research investigates the long-run relationship between oil prices and tourism income using SYS-GMM and Granger causality for MENA countries from 2000 to 2017. The findings reveal a cointegrated long-run equilibrium and a unidirectional causality from oil prices to tourism receipts. The study highlights tourism as a diversification tool against oil dependency. However, the research does not analyze how aviation companies, which connect tourism and oil usage, are financially affected by oil price changes. The findings suggest a need to connect oil, tourism, and aviation performance in one framework.

Seth, D., Giridhar, B. S., & Krishnaswami, S. (2016) “Impact of Crude Oil Price Changes on Select Indian Industries.” This study analyzes how crude oil price changes affect production, sales turnover, and raw material costs of Indian industries using correlation analysis. The findings show that oil price fluctuations significantly impact industries dependent on oil either directly or indirectly. However, the study does not include the aviation or transportation stock performance perspective, creating a gap in understanding how oil impacts service industries like airlines. The findings suggest extending oil-industry analysis toward transport-based sectors.

Dieaconescu, R. I., Belu, M. G., & Gheorghe, M. (2022) “Impact of Oil Price Evolution on Logistics Industry.” This study evaluates how oil price volatility during COVID-19 and the Russia-Ukraine war disrupted logistics and transport costs across sea, road, and air modes. The findings indicate that oil price spikes directly increased logistics costs and contributed to inflationary pressures. However, the research does not examine how these cost changes translate into stock market performance of aviation companies. The findings suggest linking oil price, logistics cost, and airline financial performance.

Xiao, Y., & Yoon, S. M. (2019) “Impact of Oil Price Change on Airline’s Stock Price and Volatility.” This study uses a VAR-GARCH-BEKK model to examine return and volatility spillovers between oil prices (WTI, Brent, Dubai) and airline stocks of China and South Korea. The findings reveal strong volatility spillover effects, with airline stocks being highly sensitive to oil price movements due to fuel cost dependence. However, the study is limited to Asian airlines and does not connect these findings with tourism or broader transportation sectors. The findings suggest expanding this analysis across different regions and related sectors.

Horobet, A., Zlatea, M., Belaşcu, L., & Dumitrescu, D. (2022) studied the effect of oil price volatility on global airline stock returns using econometric modeling. The findings indicate that oil price volatility has a persistent negative impact on airline stock performance in both short and long run. However, the study does not integrate macro-linkages with tourism and logistics sectors. The findings suggest a broader sectoral approach is needed.

Gabbiadini, M., Meoli, M., & Paleari, S. (2026) analyzed oil price shocks and valuation of aviation company stocks. Using financial valuation models, the study finds that oil shocks significantly alter expected cash flows and firm valuation of airlines.

However, the research does not account for external industry linkages such as tourism demand. The findings suggest incorporating sector interdependence in analysis.

Kristjanpoller, W., & Concha, D. (2016) examined oil price uncertainty and airline stock returns and found that in some cases oil price increases positively affected airline stocks due to demand-side expectations. However, the study does not explain this contradiction through sectoral cost structures. The findings suggest deeper investigation into mixed outcomes.

Gabbiadini, M., Meoli, M., & Paleari, S. (2026) “The Impact of Oil Price Changes and Oil Shocks on the Market Value of Aviation Firms.” This study analyzes how oil price changes and demand–supply oil shocks influence the valuation of airlines and airports using Tobin’s Q and panel regression (2000–2023). The findings highlight two effects: a **cost effect** where rising oil prices increase jet fuel expenses and reduce airline profitability, and a **revenue effect** where oil prices linked to economic growth increase air travel demand. The results show that the cost effect dominates for airlines, while airports are less affected. The study points out a gap in earlier research that examined airlines and airports separately and suggests analyzing both together while distinguishing demand and supply shocks.

Horobeț, A., Zlatea, M. L. E., Balașcu, L., & Dumitrescu, D. G. (2022) “Oil Price Volatility and Airlines’ Stock Returns: Evidence from the Global Aviation Industry.” This study uses a Panel ARDL model (2007–2020) to examine the long- and short-run impact of oil prices, oil volatility, exchange rates, and market volatility on airline stock prices. The findings show that rising oil prices negatively affect airline stock returns in the long run, despite hedging practices. It also reveals exposure to exchange rate and market risks. The study suggests viewing oil price risk as part of wider macroeconomic risks but does not link it with tourism or logistics sectors.

2.2 RESEARCH GAP

Previous studies have separately examined the impact of crude oil prices on airline stock performance, the effect of oil prices on logistics and transportation costs, and the role of air transport in promoting tourism. Some research also studies the relationship between oil price fluctuations and tourism receipts. However, most of these studies analyse these sectors in isolation and do not combine them in a single framework.

Very few studies have examined how oil price movements influence aviation stock performance through its connection with the tourism sector. Also, earlier research mainly focuses on short-term effects or uses limited models without examining both short-run and long-run relationships together.

Therefore, there is a clear gap in integrating oil returns, tourism performance, and aviation stock returns into one time-series model to understand their combined impact in both the short term and long term.

2.3 Need for the Study

- The aviation industry is highly dependent on fuel, and changes in crude oil prices directly affect airline costs and profits.
- Aviation also supports tourism and transportation, making it sensitive to travel demand and economic conditions.
- Oil price changes can influence airfare, tourism flow, and aviation stock returns at the same time.
- Most previous studies have examined oil prices, tourism, and airline performance separately.
- Very few studies have combined these factors into a single model to understand their joint impact.
- There is limited research using time-series models to study both short-run and long-run effects together.

2.4 Objectives of the Study

- **Impact of Oil Returns on Aviation Performance:** The study seeks to explore how changes in Oil & Gas returns influence Aviation returns, considering the fuel dependency of the aviation industry. It aims to identify how fluctuations in the oil sector affect airline performance and stock returns over time.
- **Influence of Tourism Activity on Aviation Returns:** Another objective is to examine how Travel & Tourism returns shape aviation performance. Since aviation supports tourism, this objective focuses on understanding how changes in tourism activity affect aviation stock behaviour.
- **Short-Run and Long-Run Relationship:** This objective studies both the immediate and long-term relationship between oil, tourism, and aviation returns using the ARDL model. Understanding these time-based effects is essential for analysing sectoral interdependence.
- **Forecasting Aviation Returns:** The study also aims to forecast Aviation returns using the ARIMA model to understand future trends based on past performance.

2.5 PROBLEM STATEMENT

The airline industry is a crucial component of the global transportation system and is highly sensitive to external factors, particularly crude oil price fluctuations, which directly affect operating costs, profitability, and stock market performance.

Mohanty et al. (2014) noted that rising crude oil prices negatively impact airline stock returns due to increased fuel expenses, while **Horobeţ et al. (2022)** found that oil price volatility has a significant and persistent negative effect on airline stock performance in both the short and long run. Airline stocks are also vulnerable to global crises and market uncertainty. **Dieaconescu et al. (2022)** highlighted that oil price volatility intensified during events such as the COVID-19 pandemic and geopolitical conflicts, amplifying its impact on transportation and logistics sectors. Evidence from Asian markets by **Xiao and Yoon (2019)** showed strong return and volatility spillover effects between crude oil prices and airline stock prices, whereas **Kristjanpoller and Concha (2016)** reported mixed outcomes, with positive effects for some airline companies. **Nandha and Faff (2008)** further emphasized that oil price changes significantly influence stock market volatility, while **Maitra (2023)** confirmed the broader impact of crude oil prices on equity market returns.

Research Hypothesis:

H1 (Oil Prices):

H₀: Oil price returns have no significant impact on airline sector returns.

H₁: Oil price returns have a significant impact on airline sector returns.

H2 (Tourism):

H₀: Travel and tourism sector returns have no significant impact on airline sector returns.

H₁: Travel and tourism sector returns have a significant impact on airline sector returns.

3. Methodology

3.1 Research Goal

This study was carried out to analyse the performance of the U.S. airline sector. The main focus is on forecasting Aviation industry performance using the ARIMA time-series model and examining the effect of macroeconomic and industry factors through multiple regression analysis.

3.2 Sample and Data Collection

In this research only data has been taken. The dataset covers **ten years of daily historical data from 1 January 2016 to 1 January 2026**, collected from the **Dow Jones database**. The variables used in the study include the U.S. airline industry (dependent variable) and two key macroeconomic and industry variables: the oil sector, and tourism sector (independent variables). Data was carefully sourced to ensure accuracy and consistency.

3.3 Analyses and Results

The analysis was conducted using **EViews software**. The ARIMA model was applied to forecast the future trends of the U.S. airline industry. Multiple regression analysis was then used to evaluate the impact of the oil and tourism sectors on the airline industry. To ensure the reliability of the models, diagnostic tests such as normality, autocorrelation, multicollinearity, and heteroskedasticity were performed.

Multiple Regression Analysis

Table 2: Regression Table

Dependent Variable: AVIATION_RESTURNS
 Method: Least Squares
 Date: 01/18/26 Time: 18:52
 Sample (adjusted): 1/05/2016 12/30/2025
 Included observations: 2514 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
OIL_AND_GAS_RETURNS	0.293528	0.022087	13.28940	0.0000
TRAVEL_AND_TOURISM_RETURNS	0.662940	0.020771	31.91618	0.0000
C	-0.000249	0.000366	-0.679954	0.4966
R-squared	0.453190	Mean dependent var	3.30E-05	
Adjusted R-squared	0.452755	S.D. dependent var	0.024788	
S.E. of regression	0.018337	Akaike info criterion	-5.158586	
Sum squared resid	0.844324	Schwarz criterion	-5.151629	
Log likelihood	6487.342	Hannan-Quinn criter.	-5.156061	
F-statistic	1040.545	Durbin-Watson stat	2.052664	
Prob(F-statistic)	0.000000			

To evaluate the collective role of the Key Macroeconomic Variables on the dependent variable (Aviation Returns), a multiple regression analysis was carried out in EViews. The Key Macroeconomic Variables considered were the **Returns Series of Oil and Gas** and the **Returns Series of Travel and Tourism**. As stated in the table 2.

Step 1: At the first stage, the **Returns Series of Travel and Tourism** was introduced into the regression model. This variable showed the strongest explanatory power, with a coefficient of **0.6629** and a highly significant probability value ($p = 0.000$). The model at this step indicated that changes in travel and tourism returns had a direct and significant positive effect on aviation returns. The regression equation used in the first step is: $AVIATION_RETURNS = 0.6629 (TRAVEL_AND_TOURISM_RETURNS)$

Step 2: In the second stage, the **Returns Series of Oil and Gas** was added to the model. The **coefficient of oil and gas** returns was found to be **0.2935**, with a p-value of 0.0000, showing a positive and significant relationship. This suggests that aviation sector returns are also influenced by movements in the oil and gas sector, reflecting the importance of energy-related cost dynamics and their impact on airline profitability. The regression used in the second

equation:

$$AVIATION_RETURNS = 0.2935 (OIL_AND_GAS_RETURNS) + 0.6629 (TRAVEL_AND_TOURISM_RETURNS)$$

This is the final and the last Independent Variable was taken for this study and the final equation is:

$$AVIATION_RETURNS = 0.2935 (OIL_AND_GAS_RETURNS) + 0.6629 (TRAVEL_AND_TOURISM_RETURNS) - 0.000249$$

After taking into consideration of all major Key Macro-Economic Variables or Independent variables, the final regression model achieved an **R-squared of 0.4531** and an **Adjusted Rsquared of 0.4528**, meaning that approximately 45% of the variation in aviation returns can be explained collectively by the two **Key Macro-Economic Variables or independent variables**. The F-statistic (1040.545) was significant at the 1% level ($p = 0.0000$), confirming the overall validity of the regression model.

Ramsey RESET Test

Table 3: Linearity Test

Ramsey RESET Test			
Equation: UNTITLED			
Omitted Variables: Squares of fitted values			
Specification: AVIATION_RESTURNS OIL_AND_GAS_RETURNS TRAVEL_AND_TOURISM_RETURNS C			
	Value	df	Probability
t-statistic	0.171319	2510	0.8640
F-statistic	0.029350	(1, 2510)	0.8640
Likelihood ratio	0.029397	1	0.8639
F-test summary:			
	Sum of Sq.	df	Mean Squares
Test SSR	9.87E-06	1	9.87E-06
Restricted SSR	0.844324	2511	0.000336
Unrestricted SSR	0.844314	2510	0.000336
LR test summary:			
	Value		
Restricted LogL	6487.342		
Unrestricted LogL	6487.357		

Ramsey RESET test was used to check the linearity of the model, in order to identify if the model suffers from any kind of specification error, omitted variables or any kind of nonlinear relationships.

The study indicates if, t-statistic with (value = 0.1713 and $p = 0.8640$), F-statistic with (value = 0.0294 and $p = 0.8640$), and Likelihood ratio with (value = 0.0294 and $p = 0.8639$) are all statistically insignificant at the 5% level. Since the probability value for all the macroeconomic variables are greater than 0.05, we fail to reject the null hypothesis and thus the model is correctly specified, with no specification error. As stated in the table 3.

This result indicates that the regression model applied to examine the effect of Oil and Gas Returns and Travel & Tourism Returns on Aviation Returns is properly specified. This means that the key macroeconomic variables affect the performance of the aviation sector. Thus, the Ramsey RESET test supports that the estimated relationships between macroeconomic variables and aviation returns are reliable.

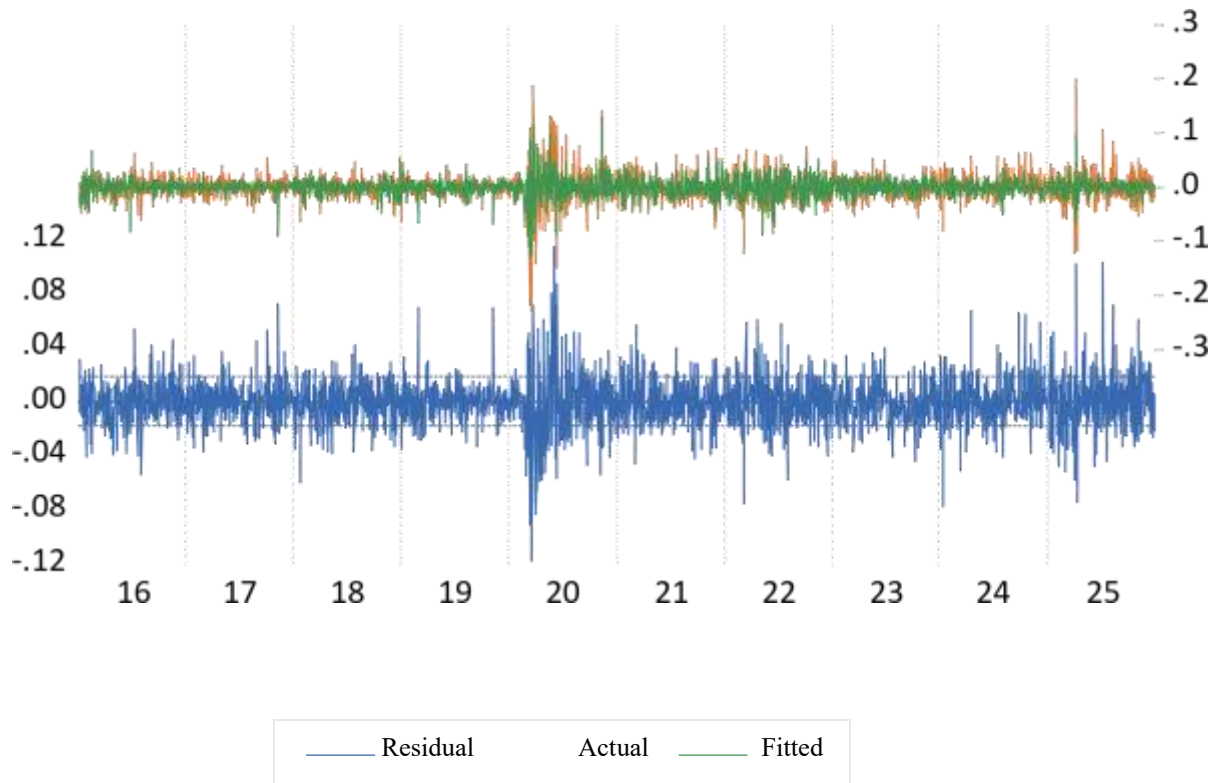


Figure. 2

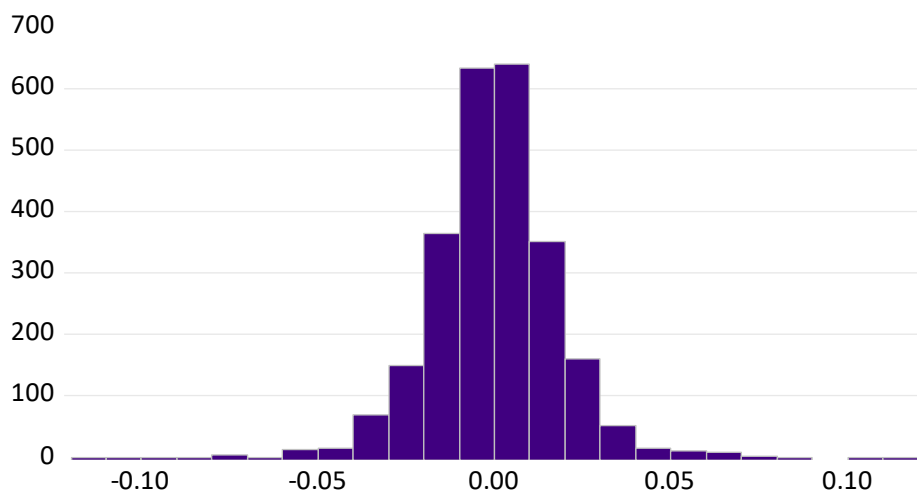


Figure. 3

Series: Residuals	
Sample 1/05/2016 12/30/2025	
Observations 2514	
Mean	-4.76e-20
Median	-2.38e-05
Maximum	0.114745
Minimum	-0.117248
Std. Dev.	0.018330
Skewness	0.092707
Kurtosis	7.235770
Jarque-Bera	1882.999
Probability	0.000000 ^{***}

Normality Test of Residuals

The normality of residuals was checked to ensure the reliability of the regression model. The histogram shown in Figure. 2 and explains the distribution of the residuals. The results indicate that the skewness value is 0.0927, which is slightly above zero, showing that the residuals are positively skewed. The kurtosis value is 7.2358, which is higher than the normal value of 3, indicating a leptokurtic distribution, meaning the distribution has a sharper peak and fatter tails. **In figure 1 and figure 2** Further, the Jarque–Bera statistic (1882.999) with a probability value of 0.0000 indicates that the residuals do not follow a perfect normal distribution. This deviation from normality is common in financial return data and does not significantly affect the reliability of the regression results given the large sample size.

Auto-Correlation Test
Table 4. Auto-Correlation Test

Heteroskedasticity Test: Breusch-Pagan-Godfrey
 Null hypothesis: Homoskedasticity

F-statistic	0.936792	Prob. F(2,2511)	0.3920
Obs*R-squared	1.874424	Prob. Chi-Square(2)	0.3917
Scaled explained SS	5.830299	Prob. Chi-Square(2)	0.0542

Test Equation:
 Dependent Variable: RESID^2
 Method: Least Squares
 Date: 01/18/26 Time: 21:39
 Sample: 1/05/2016 12/30/2025
 Included observations: 2514

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.000336	1.67E-05	20.09521	0.0000
OIL_AND_GAS_RETURNS	0.000128	0.001010	0.126558	0.8993
TRAVEL_AND_TOURISM_RETURNS	-0.001194	0.000950	-1.256579	0.2090
R-squared	0.000746	Mean dependent var		0.000336
Adjusted R-squared	-0.000050	S.D. dependent var		0.000839
S.E. of regression	0.000839	Akaike info criterion		-11.32788
Sum squared resid	0.001767	Schwarz criterion		-11.32092
Log likelihood	14242.14	Hannan-Quinn criter.		-11.32535
F-statistic	0.936792	Durbin-Watson stat		1.531702
Prob(F-statistic)	0.392020			

The Breusch-Pagan-Godfrey test was used to examine whether the residuals of the regression model suffer from heteroskedasticity. The null hypothesis of the test states that the residuals are homoscedastic, meaning they have constant variance. The results show an F-statistic of 0.9368 with a probability value of 0.3920, and an Obs*R-squared value of 1.8744 with a probability of 0.3917. Since both probability values are greater than 0.05, the null hypothesis cannot be rejected. This indicates that the residuals do not suffer from heteroskedasticity and that the assumption of constant variance is satisfied. Therefore, the regression estimates are efficient and reliable. The results of the heteroskedasticity test are reported in Table 5.

Table 5: Variance and Inflation Factor

Variance Inflation Factors
 Date: 01/18/26 Time: 21:50
 Sample: 1/04/2016 12/31/2025
 Included observations: 2514

Variable	Coefficient Variance	Uncentered VIF	Centered VIF
OIL_AND_GAS_RE...	0.000488	1.299000	1.298907
TRAVEL_AND_TO...	0.000431	1.299311	1.298907
C	1.34E-07	1.000311	NA

In this study **Table 5**, all the key macroeconomic variables recorded VIF values as **Oil and Gas Returns = 1.29** and **Travel and Tourism Returns = 1.29**, which are below the threshold level of **5**. Thus, it is concluded that there is no significant multicollinearity among the regressors (Macro-Economic Variables) in this model. This means that the model is reliable.

Table 6: Heteroskedasticity Test: Breusch-Pagan-Godfrey

Heteroskedasticity Test: Breusch-Pagan-Godfrey
 Null hypothesis: Homoskedasticity

F-statistic	0.936792	Prob. F(2,2511)	0.3920
Obs*R-squared	1.874424	Prob. Chi-Square(2)	0.3917
Scaled explained SS	5.830299	Prob. Chi-Square(2)	0.0542

The test results in **Table 7** show that the probability values for the **F-statistic (0.3920)** and **Obs*R-squared (0.3917)** are both well above the **0.05** significance level. Hence, the null hypothesis of **homoskedasticity** cannot be rejected. This indicates that the residuals do not suffer from heteroskedasticity, meaning the error variance is stable across observations. Therefore, the model satisfies the assumption of homoskedasticity, supporting the reliability of the regression results.

Table 7: Unit Root Test

Null Hypothesis: AVIATION_RESTURNS has a unit root
 Exogenous: Constant
 Lag Length: 2 (Automatic - based on SIC, maxlag=26)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-29.43280	0.0000
Test critical values:		
1% level	-3.432760	
5% level	-2.862490	
10% level	-2.567321	

Null Hypothesis: OIL_AND_GAS_RETURNS has a unit root
 Exogenous: Constant
 Lag Length: 6 (Automatic - based on SIC, maxlag=26)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-17.17468	0.0000
Test critical values:		
1% level	-3.432765	
5% level	-2.862493	
10% level	-2.567322	

Null Hypothesis: TRAVEL_AND_TOURISM_RETURNS has a unit root
 Exogenous: Constant
 Lag Length: 0 (Automatic - based on SIC, maxlag=26)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-49.28833	0.0001
Test critical values:		
1% level	-3.432758	
5% level	-2.862490	
10% level	-2.567321	

The Augmented Dickey-Fuller (ADF) test results indicate that all the macroeconomic variables (**Oil Returns, Travel & Tourism Returns**) as well as the dependent variable (**Aviation Returns**) have test statistics less than the 1%, 5%, and 10% critical values, with p-value for all the variables being 0. Thus, we reject Null Hypothesis. Conforming that all the series are stationary at level form.

Table 8: Auto-Regressive Distributed Lag (ARDL)

Dependent Variable: AVIATION_RETURNS
 Method: ARDL
 Date: 01/28/26 Time: 21:30
 Sample (adjusted): 1/07/2016 12/30/2025
 Included observations: 2512 after adjustments
 Maximum dependent lags: 4 (Automatic selection)
 Model selection method: Akaike info criterion (AIC)
 Dynamic regressors (4 lags, automatic): OIL_AND_GAS_RETURNS
 TRAVEL_AND_TOURISM_RETURNS
 Fixed regressors: C
 Number of models evaluated: 100
 Selected Model: ARDL(1, 2, 1)
 Note: final equation sample is larger than selection sample

Variable	Coefficient	Std. Error	t-Statistic	Prob.*
AVIATION_RETURNS(-1)	-0.024773	0.019921	-1.243535	0.2138
OIL_AND_GAS_RETURNS	0.295453	0.022067	13.38873	0.0000
OIL_AND_GAS_RETURNS(-1)	0.023171	0.022847	1.014198	0.3106
OIL_AND_GAS_RETURNS(-2)	-0.042707	0.019413	-2.199862	0.0279
TRAVEL_AND_TOURISM_RETURNS	0.664422	0.020744	32.02889	0.0000
TRAVEL_AND_TOURISM_RETURNS(-1)	0.069726	0.024653	2.828272	0.0047
C	-0.000288	0.000365	-0.790058	0.4296
R-squared	0.458038	Mean dependent var		3.03E-05
Adjusted R-squared	0.456740	S.D. dependent var		0.024797
S.E. of regression	0.018277	Akaike info criterion		-5.163558
Sum squared resid	0.836797	Schwarz criterion		-5.147315
Log likelihood	6492.429	Hannan-Quinn criter.		-5.157662
F-statistic	352.8496	Durbin-Watson stat		1.999858
Prob(F-statistic)	0.000000			

*Note: p-values and any subsequent tests do not account for model selection.

To examine the dynamic relationship between Aviation Returns, Oil & Gas Returns, and Travel & Tourism Returns, the Auto Regressive Distributed Lag (ARDL) model was applied using EViews. The ARDL technique is suitable for this study because it allows the estimation of both short-run and long-run relationships in time-series data and can be used when variables are integrated at different levels. The lag structure was selected automatically by EViews based on the Akaike Information Criterion (AIC), which chooses the model that best balances goodness of fit and model simplicity.

The selected ARDL (1,2,1) structure indicates that:

- Current aviation performance is influenced by its own past value
- Oil price movements affect aviation with a lag effect up to two periods
- Travel and tourism activity influences aviation with a lag of one period

Table 9: Long Run Form and Bounds Test

ARDL Long Run Form and Bounds Test
 Dependent Variable: D(AVIATION_RETURNS)
 Selected Model: ARDL(1, 2, 1)
 Case 2: Restricted Constant and No Trend
 Date: 01/28/26 Time: 21:31
 Sample: 1/04/2016 12/31/2025
 Included observations: 2512

Conditional Error Correction Regression				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.000288	0.000365	-0.790058	0.4296
AVIATION_RETURNS(...	-1.024773	0.019921	-51.44112	0.0000
OIL_AND_GAS_RETU...	0.275917	0.037474	7.362954	0.0000
TRAVEL_AND_TOURI...	0.734148	0.031716	23.14770	0.0000
D(OIL_AND_GAS_RE...	0.295453	0.022067	13.38873	0.0000
D(OIL_AND_GAS_RE...	0.042707	0.019413	2.199862	0.0279
D(TRAVEL_AND_TO...	0.664422	0.020744	32.02889	0.0000

* p-value incompatible with t-Bounds distribution.

Levels Equation Case 2: Restricted Constant and No Trend				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
OIL_AND_GAS_RETU...	0.269247	0.036046	7.469603	0.0000
TRAVEL_AND_TOURI...	0.716400	0.028228	25.37885	0.0000
C	-0.000281	0.000356	-0.790135	0.4295

$$EC = AVIATION_RETURNS - (0.2692*OIL_AND_GAS_RETURNS + 0.7164 *TRAVEL_AND_TOURISM_RETURNS - 0.0003)$$

F-Bounds Test		Null Hypothesis: No levels relationship		
Test Statistic	Value	Signif.	I(0)	I(1)
Asymptotic: n=1000				
F-statistic	662.8097	10%	2.63	3.35
k	2	5%	3.1	3.87
		2.5%	3.55	4.38
		1%	4.13	5
Finite Sample: n=80				
Actual Sample Size	2512	10%	2.713	3.453
		5%	3.235	4.053
		1%	4.358	5.393

ARDL Model Analysis

To further strengthen the time-series relationship between Oil & Gas returns, Travel & Tourism returns and Aviation returns, the ARDL (AutoRegressive Distributed Lag) model was applied.

The optimal lag length selected using AIC criteria was ARDL (1, 2, 1) with 2512 observations.

Bounds Test for Long Run Relationship

The Bounds test result shows an F-statistic value of 662.8097, which is significantly higher than the upper bound critical value at 1% level. This clearly indicates the presence of a longrun relationship among Aviation returns, Oil returns and Tourism returns.

Hence, the null hypothesis of no long-run relationship is rejected.

Long Run Equation

The long run coefficients obtained from the levels equation are:

- Oil & Gas Returns = 0.269247 (p = 0.0000)
- Travel & Tourism Returns = 0.716400 (p = 0.0000)

This shows that in the long run, both oil and tourism have a positive and significant impact on aviation returns, with tourism having a stronger influence compared to oil.

Short Run Dynamics

The short run impact is observed from the differenced variables:

- D(Oil & Gas Returns) = 0.295453 (p = 0.0000)
- D(Oil & Gas Returns(-1)) = 0.042707 (p = 0.0279)
- D(Travel & Tourism Returns) = 0.664422 (p = 0.0000)

This indicates that immediate changes in oil and tourism returns significantly affect aviation returns in the short run.

Error Correction Term (ECT)

The coefficient of the error correction term is -1.024773 (p = 0.0000), which is negative and significant. This confirms that any short run deviation from equilibrium is corrected quickly, and the system returns to long run equilibrium at a fast rate. Thus, the ARDL results confirm that Aviation returns are influenced by Oil and Tourism returns in both the short run and long run.

ARIMA of Dependent Variable (Aviation Industry)

Table 10

Dependent Variable: AVIATION_RETURNS
 Method: ARMA Maximum Likelihood (OPG - BHHH)
 Date: 01/27/26 Time: 22:15
 Sample: 1/05/2016 12/31/2025
 Included observations: 2515
 Convergence achieved after 47 iterations
 Coefficient covariance computed using outer product of gradients

Variable	Coefficient	Std. Error	t-Statistic	Prob.
AR(1)	0.336433	0.589851	0.570370	0.5685
MA(1)	-0.320960	0.592712	-0.541511	0.5882
SIGMASQ	0.000614	6.74E-06	91.03968	0.0000
R-squared	0.000268	Mean dependent var	3.35E-05	
Adjusted R-squared	-0.000528	S.D. dependent var	0.024783	
S.E. of regression	0.024790	Akaike info criterion	-4.555597	
Sum squared resid	1.543678	Schwarz criterion	-4.548643	
Log likelihood	5731.664	Hannan-Quinn criter.	-4.553073	
Durbin-Watson stat	2.016825			
Inverted AR Roots	.34			
Inverted MA Roots	.32			

Date: 01/18/26 Time: 22:38
 Sample (adjusted): 1/05/2016 12/31/2025
 Included observations: 2515 after adjustments

Autocorrelation	Partial Correlation	AC	PAC	Q-Stat	Prob
1	0.008	0.008	0.1429	0.705	
2	0.052	0.051	6.8277	0.033	
3	-0.054	-0.055	14.210	0.003	
4	-0.027	-0.029	16.047	0.003	
5	-0.009	-0.002	16.229	0.006	
6	-0.039	-0.039	19.992	0.003	
7	0.073	0.071	33.288	0.000	
8	-0.040	-0.039	37.318	0.000	
9	0.041	0.030	41.515	0.000	
10	0.012	0.021	41.885	0.000	
11	0.040	0.035	45.942	0.000	
12	0.043	0.043	50.683	0.000	
13	0.002	0.005	50.691	0.000	
14	0.009	0.002	50.907	0.000	
15	-0.029	-0.014	52.986	0.000	
16	-0.007	-0.010	53.114	0.000	
17	-0.015	-0.008	53.659	0.000	
18	-0.005	-0.009	53.733	0.000	
19	-0.003	-0.008	53.750	0.000	
20	-0.001	-0.002	53.753	0.000	
21	-0.033	-0.041	56.562	0.000	
22	-0.007	-0.007	56.683	0.000	
23	-0.016	-0.018	57.309	0.000	
24	0.053	0.050	64.386	0.000	
25	-0.003	-0.005	64.409	0.000	
26	0.035	0.030	67.481	0.000	
27	0.048	0.055	73.431	0.000	
28	-0.016	-0.012	74.109	0.000	
29	-0.047	-0.049	79.663	0.000	
30	-0.036	-0.018	82.934	0.000	
31	0.034	0.035	85.967	0.000	
32	0.002	0.009	85.975	0.000	
33	-0.028	-0.039	87.907	0.000	
34	0.001	-0.003	87.909	0.000	
35	0.006	0.009	88.000	0.000	

The ARIMA estimation for the aviation sector indicates weak dependence on past values. The

autoregressive term **AR(1)** is estimated at **0.3364** and is **statistically insignificant** (p = 0.5723), indicating that the current aviation returns are not strongly explained by their immediate past values. This suggests a low level of persistence in the series. The moving average term **MA(1)** is estimated at **-0.3209** and is also **statistically insignificant** (p = 0.5918), implying that past forecast errors do not play a significant role in explaining current aviation returns. The constant term is positive but **statistically insignificant** (p = 0.9485), indicating that the average level of the series during the sample period is not meaningfully different from zero.

Inverse Roots of AR/MA Polynomial(s)

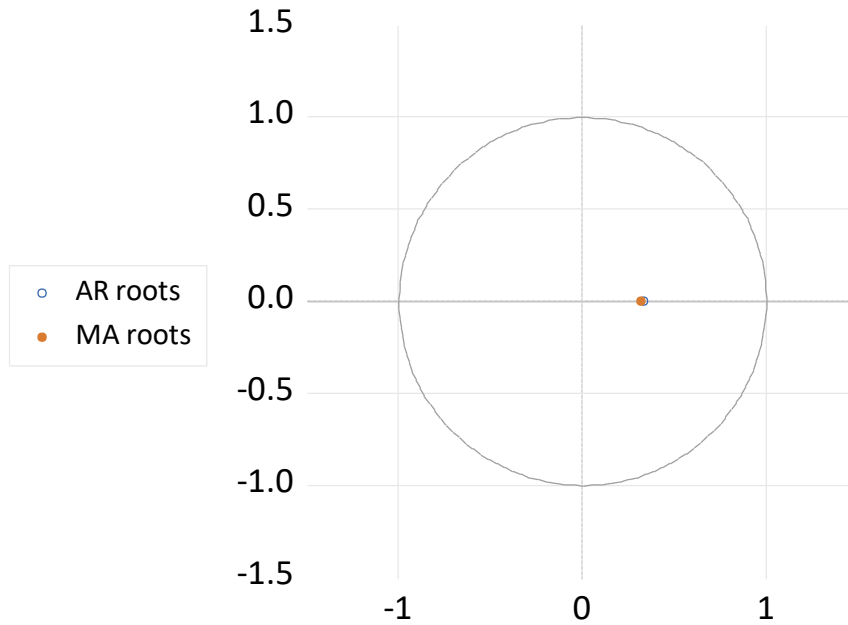
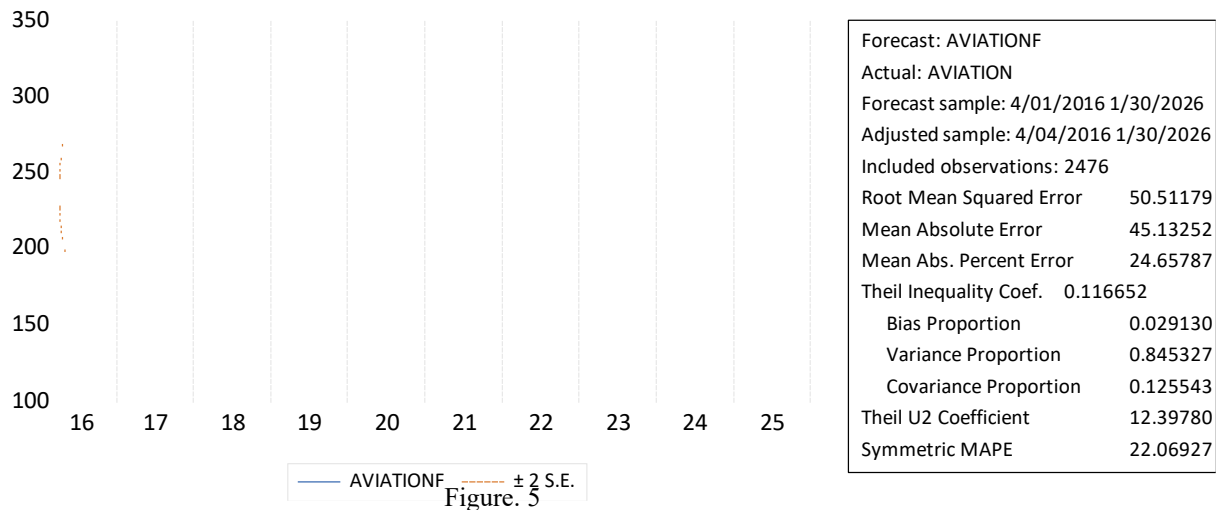


Figure. 4

In the figure. 3 analysis, the inverse root of the AR component lies inside the unit circle, while the inverse root of the MA component also lies well within the unit circle. This placement confirms that the ARIMA model satisfies the stationarity condition for the autoregressive component and the invertibility condition for the moving average component.

As a result, the estimated ARIMA model is stable and well specified for the aviation sector. Therefore, the model can be considered reliable and appropriate for forecasting future movements in aviation sector returns.



This plot in figure 4 shows the forecast for the **aviation sector** for the forecast period using an **ARIMA model**. The blue line represents the predicted aviation returns, which remain fairly stable over time. The orange dashed lines show the expected range within which the actual values are likely to fall, providing an indication of forecast uncertainty. The forecast error measures suggest that the predictions are reasonably accurate, with moderate differences between the forecasted and actual values. Overall, the ARIMA model performs well in capturing future trends in the aviation sector and can be considered reliable for forecasting purposes.

4. Outcomes of the Research

This study shows that the U.S. aviation industry is significantly influenced by key macroeconomic variables. Through multiple regression analysis, it was found that the **travel and tourism sector** had the strongest impact on aviation returns, followed by the **oil and gas sector**. Together, these two variables explained approximately **45%** of the variation in aviation returns. The regression model was statistically valid and successfully passed all major diagnostic tests, indicating that the results obtained are reliable and robust.

The forecasting component of the study was carried out using the **ARIMA model**. The results indicate that the aviation industry shows **weak dependence on its past performance**, as both the autoregressive and moving average terms were statistically insignificant. However, the model satisfied all required conditions of stationarity and invertibility, confirming its stability. The forecast results showed reasonable accuracy, suggesting that aviation returns are expected to remain relatively stable in the future.

Overall, the study confirms that macroeconomic variables such as **oil and gas returns** and **travel and tourism returns** play an important role in influencing the performance of the U.S. aviation industry. The combined use of multiple regression analysis and ARIMA forecasting provides a useful framework for understanding past behaviour and predicting future trends in the aviation sector.

4.1 Investors Implication

The finding of the study states that the performance of the airline sector is effected by the key macroeconomic variables, especially the tourism sector, followed by oil. This means investors should carefully monitor these industries when making investment decisions related to aviation sector. For example, growth in tourism activity can lead to upward movement in airline stocks. On the other hand rising oil prices may increase costs and reduce profitability.

Second, the regression analysis results show that the macroeconomic variables explain about 38% of the variation in the airline industry. This indicates that while these variables are important, there are still other external factors like policy changes, global crises, or management decisions - that can affect returns. Investors should therefore not rely on a single factor but instead adopt a diversified and cautious approach. For example in this research the variables like Russia and Ukraine War, inflation factor and post pandemic event was not taken into consideration.

Conclusion

This study examined how oil price fluctuations and travel & tourism activity influence the performance of the U.S. aviation industry from 2016 to 2026 using regression, ARDL, and ARIMA models. The findings show that both oil & gas returns and travel & tourism returns have a positive and statistically significant impact on aviation returns, together explaining about 45% of the variation. Among the two, travel and tourism has the stronger influence on aviation performance. Diagnostic tests confirmed that the regression model is reliable and well specified.

The ARDL results confirmed a strong long-run and short-run relationship among aviation, oil, and tourism returns, with a significant error correction mechanism indicating quick adjustment toward equilibrium after short-term shocks. The ARIMA forecasting model showed weak dependence on past values but satisfied stability conditions and produced reasonably accurate forecasts.

Overall, the study concludes that aviation sector performance is closely linked to movements in the oil sector and, more importantly, the travel & tourism sector, providing useful insights for investors and policymakers.

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