Correlation Analysis between Tourism Industry and Exchange Rate: A Comparative Study of Korea and the UK during the COVID-19 Era

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Abstract: Purpose: This study aims to investigate the correlation analysis between the aviation industry and the exchange rate of South Korea and the UK during the COVID-19 pandemic Era by applying the Vector Autoregression (VAR) model.
Theoretical Framework: Research examined the correlation between the aviation industry and exchange rates in South Korea and the UK. Vector Autoregression (VAR) model was developed and daily data from January 01, 2020, to July 05, 2023, were collected from the official website for the research.
Design/Methodology/Approach: The paper analyzes relationships among time-series variables using the VAR model. This analysis consisted of four steps, step 1, collecting data; step 2, data preprocessing; step 3, developing VAR model; and step 4, investigation.
Findings: The analysis revealed a significant positive correlation between exchange rate fluctuations and the Korean aviation industry. In contrast, the UK aviation industry exhibited a significant negative correlation with exchange rate fluctuations.
Research, Practical & Social Implications: This study contributes to existing literature on tourism and exchange rates during the COVID-19 pandemic, emphasizing the need for comparative analysis. According to the results, this study suggests Airlines can partner with financial institutions to offer financial products for passengers to book at desirable rates.
Originality/Value: This paper successfully filled in the gaps in the research by providing a scientific and critical investigation of correlation analysis between the aviation industry and the exchange rate of South Korea and the UK during the COVID-19 pandemic Era.

Keywords: Correlation analysis, Tourism industry, Exchange rate, Covid-19 pandemic.

1. INTRODUCTION

Tourism can be considered one of the most remarkable socio-economic phenomena of the 20th century [1]. The tourism industry is widely acknowledged as a crucial driver of economic growth, and many countries have developed tourism as a critical industry and an essential source of revenue [2]. The United Nations World Tourism Organization (UNWTO, 2022) and World Travel and Tourism Council (WTTC, 2022) report that the tourism sector generated approximately 11% of the global gross domestic product [3].

It is well known that tourism is an activity that contributes to the development of many countries. Still, despite its economic strength, tourism remains one of the most sensitive and vulnerable sectors to internal and external crises [4]. In contrast to previous outbreaks like SARS, Ebola, and H1N1, the COVID-19 pandemic stands out as the most severe global health crisis to date. It has brought about a far-reaching worldwide healthcare emergency, financial instability, and economic decline, commonly referred to as the COVID-19 recession [5].

Most countries responded with various nonpharmaceutical interventions (NPI), including lockdowns, social distancing, closure of schools and workplaces, canceling or postponing events, and bans on gatherings of people over specific numbers [6]. International, regional, and local travel restrictions immediately affected national economies, including

tourism systems, international travel, domestic tourism, and segments as diverse as air transport, cruises, accommodation, cafés and restaurants, conventions, festivals, meetings, or sports events [7].

Consequently, the majority of international tourism-related businesses have come to a halt. International tourist arrivals were down by 20% for the first quarter of 2020, March 2020

arrivals were down by over 50%, and a further 58% − 78% fall in international tourist arrivals is expected over the current calendar year [8]. The impacts of the COVID-19 pandemic are expected to be especially harsh on the economies of nations and industries that rely heavily on international tourism [9]. For instance, World Tourism Organization has estimated that destinations have already lost USD 80 billion in receipts and that over 100 million jobs directly related to the tourism industry are at risk [10].

This research investigates the correlation analysis between the Korean aviation industry and the UK aviation industry and the exchange rate during the COVID-19 pandemic era by applying the Vector Autoregression (VAR) model. This research contributes to the existing body of knowledge by providing insights into the correlation between the aviation industry and the exchange rates. By emphasizing the comparative aspect between South Korea and the UK, this research will highlight the comparative analysis, allowing a deeper understanding of how these two countries' aviation industries have been affected by exchange rate fluctuations during the COVID-19 pandemic.

This study contributes to the growing body of literature on the correlation analysis between the tourism industry and the exchange rate during the COVID-19 pandemic, which stresses the need for an approach focused on comparative study. The remainder of the paper is organized as follows. Section 2 discusses the literature on the aviation industry and exchange rate during the Covid-19 pandemic. Section 3 describes the data and methods. Section 4 presents the results. Section 5 concludes with conclusions and implications.

2. LITERATURE REVIEW

A. Tourism industry during the Covid-19 Era

The tourism industry plays a significant role in the development of the world, and it positively correlates with the economic growth of the global economy [11]. Epidemics pose a dual threat to both tourism and the well-being of tourists, local communities in tourist destinations, and residents of these areas. Furthermore, outbreaks can lead to the cancellation of tours, temporary shutdowns of facilities, alterations in air and cruise itineraries, and restricted entry to tourism destinations, all of which contribute to the disruption of the tourism sector [12].

Since the World Health Organization declared a coronavirus pandemic in March 2020, national governments across the globe have been closing non-essential businesses and restricting movement [13]. To reduce the spread of this pandemic, all countries have imposed lockdowns, restricted domestic and international travel [14].

For an event as significant as a pandemic, like SARS and COVID-19, tourism suffers extensively worldwide [15]. Some past studies [16, 17, 18] suggest that the effects of the Coronavirus pandemic on the tourism and hospitality sectors are unparalleled. As a result, a significant volume of descriptive research is currently underway to examine the immediate and short-term repercussions of the pandemic. Frequently, this research merely reaffirms existing knowledge: that the pandemic is causing widespread devastation to the global tourism industry.

However, there is a noticeable gap in the existing body of research concerning the specific impact of the COVID-19 pandemic on the tourism industry. This gap becomes particularly pronounced when comparing the extent to which studies have addressed the effects of the pandemic on tourism industries as opposed to the broader scope of research on its overall impact on tourism. As indicated by [19], examining the tourism industries in the pandemic context is paramount. This research endeavor is dedicated to a comprehensive investigation of the nuanced impacts of the COVID-19 pandemic on the tourism industry. Regrettably, the current body of scholarly contributions in this domain remains constrained, thereby underscoring the need for further in-depth exploration.

B. Aviation Industry and Exchange Rate with Covid-19

The aviation industry is crucial because it is essential for the global economy and plays a significant role in transporting people and goods worldwide [20]. The aviation industry experienced sustained and unprecedented growth. The air travel market took 50 years to reach the milestone of one billion passengers in 1987 and then experienced exponential

growth within less than two decades, surpassing two billion by 2005, and three billion by 2013, and reaching the milestone of 4.5 billion passengers by 2019 as evidenced by the fact that the market share of air travel surged to 58% by 2019 14% more than the number 20 years ago [21].

Suddenly in early 2020, the aviation industry encountered a critical point induced by the rapid outbreak and spread of COVID-19 [22]. In South Korea, airlines successfully navigated through challenges such as the THAAD issue with China and the Korean travelers' boycott of Japan by innovating alternative flight routes, leading to a notable upswing in overall air passenger demand. However, the COVID-19 pandemic is more difficult to overcome, as it can only be mitigated with the development of vaccines and treatments to curb its spread. The member countries of the International Air Transport Association (IATA) lose $230 million on average per day and halve annual revenues from $838 million to $419 in 2020 - the largest decline in recent history. [23].

As the COVID-19 pandemic persists, a substantial body of scholarly research has emerged, aiming to investigate its implications on the broader economic landscape. These investigations encompass various key aspects, such as its effects on industrial production, the trajectory of GDP growth, shifts in household consumption patterns, alterations in employment dynamics, perturbations within global supply chains, and alterations in the capacity for innovation across industries [24]. With an unprecedented crisis in the form of the COVID-19 pandemic, exchange rate fundamentals may become stronger or weaker, given that the pandemic shock dominates [25].

The extant scholarly literature has undertaken comprehensive investigations into the ramifications engendered by the COVID-19 pandemic on exchange rate dynamics [26, 27, 28]. Existing research has established a discernible impact of COVID-19 on exchange rates. However, our study diverges from merely examining the unilateral influence of COVID-19 on exchange rates. Instead, our research endeavors to elucidate the multifaceted interplay between the aviation industry and exchange rate dynamics during the course of the COVID-19 pandemic.

C. Tourism and Exchange Rate (300)

Tourism generates foreign currency inflows that enable the accumulation of foreign reserves and facilitate access to capital goods [29]. Although research has shed light on the potentially determinant variables that might influence tourism (Foreign Direct Investment, GDP, the volume of international trade, transportation costs, and political instability), academics who have developed models for analyzing tourism inflows frequently emphasized the pivotal role of exchange rates within their frameworks. Their research revealed that exchange rates exerted substantial influence as a key catalyst for tourism dynamics. Fluctuations in exchange rates, whether upward or downward, holds the potential to significantly sway the decisions of international tourists, ultimately impacting their deliberations regarding engagement in tourism activities [30].

Over the last few decades, scholars have investigated the effect of exchange rate volatility on tourism demand [31]. Recent work has stressed the importance of exchange rates to tourism inflows [32]. A stream of research has validated that travelers select destinations based on exchange rates. Fluctuations influence stay duration and spending; depreciation attracts inbound tourists, while appreciation reduces flows. Consequently, tourism researchers have concluded that the majority of tourists use exchange rates as a proxy to decide on their country of destination.

It is pertinent to acknowledge that most previous work has focused on tourism instead of tourism industries during the COVID-19 pandemic. This paper holds significance and relevance in addressing a conspicuous research gap: the need for a comprehensive correlation analysis between the tourism industry and exchange rate dynamics, specifically within the context of the COVID-19 pandemic.

3. DATA AND METHODOLOGY

Daily data of Korean Airlines stock price (KASP), exchange rate of dollar to Korean Won (ERDKW), British Airway stock price (BASP), and exchange rate of Dollar to Pound (ERDP) from January 01, 2020 to July 05, 2023, was obtained from Wall Street Journal and Forbes. The return for the empirical analysis was calculated using the (1) below.

$$R_t = In\left(\frac{S_t}{S_{t-1}}\right) * 100 \quad (1)$$

Table (1) demonstrates the descriptive statistics of the variables from 1st January 2020 to 5th July 2023 (approx. 1,270 days). EViews and RStudio packages were used for econometric and statistical analyses.

Table 1. Descriptive statistics of the variables

	ERDP	BASP	ERDKW	KASP
Mean	0.0000764	-0.151518	-0.022167	0.015696
Median	-0.0001	-0.190655	0.000000	0.019365
Maximum	0.0378	22.69971	14.55423	2.021487
Minimum	-0.0303	-36.84402	-42.19221	-3.498781
Std. Dev.	0.006349	4.076028	2.943408	0.578043
Skewness	0.372547	-1.089644	-4.063173	-0.467294
Jarque-Bera	6.927888	6772.386	128329.6	376.0632

The vector autoregression (VAR) is one way to forecast several variables with a single model. It extends univariate autoregression to multiple time-series variables, a vector of time-series variables. Although the primary purpose of VAR is forecasting, a VAR model could be applied to analyze relationships among economic time-series variables [33].

The VAR (Vector Autoregressive) model proposed by Sims is an alternative to large-scale macro-econometric models and does not rely on incredible identifying assumptions. It takes the form of multiple simultaneous equations, and the endogenous variables in each equation form a regression with the lagged values of all endogenous variables to estimate the dynamic relationships between all the endogenous variables [34] and become one of the critical macroeconomic models for policymakers and forecasters [35]. The models are built as follows:

$$KASP_t = \alpha_1 + \sum_{i=1}^{m} \beta_{1i}\, KASP_{t-i} + \sum_{i=1}^{m} \gamma_{1i}\, ERDKW_{t-i} + \mu_{1t} \quad (2)$$

$$ERDKW_t = \alpha_1 + \sum_{i=1}^{m} \beta_{1i}\, KASP_{t-i} + \sum_{i=1}^{m} \gamma_{1i}\, ERDKW_{t-i} + \mu_{1t} \quad (3)$$

$$BASP_t = \alpha_1 + \sum_{i=1}^{m} \beta_{1i}\, BASP_{t-i} + \sum_{i=1}^{m} \gamma_{1i}\, ERDP_{t-i} + \mu_{1t} \quad (4)$$

$$ERDP_t = \alpha_1 + \sum_{i=1}^{m} \beta_{1i}\, BASP_{t-i} + \sum_{i=1}^{m} \gamma_{1i}\, ERDP_{t-i} + \mu_{1t} \quad (5)$$

KASP: Korean Airline Stock Price;

ERDKW: Exchange Rate of Dollar to Korean Won;

BASP: British Airway Stock Price;

ERDP: Exchange Rate of Dollar to Pound;

t: time.

Where α and β are parameters to be estimated and γ represent the serial error terms, $KASP_t,\ ERDWK_t,\ BASP_t,\ and\ ERDP_t$ are defined observation for the t time periods; m refers to the number of lags; α, β and γ all are the parameters of the estimation.

4. RESULTS

A. Unit root test

Before conducting a study on the correlation between variables using a VAR model, a unit root test was conducted to check the stability of the statistical data [36]. The following Table (2) shows the results of the unit root test for the four variables during the COVID-19 periods, and the results of the ADF confirm that the time series is stable as the critical values are within the range of significance levels for all variables. As such, this investigation endeavors to assess the interdependence among the variables via the employment of the vector autoregressive (VAR) model, utilizing the aforementioned data.

Table 2. Descriptive statistics of the variables

	ERDP	BASP	ERDKW	KASP
ADF	-26.979***	-27.414***	-28.912***	-32.49***

Notes. ***, ** significant at 1% and 5% levels, respectively.

B. VAR model analysis

This research endeavor aims to examine the correlation during the COVID-19 pandemic. To achieve this goal, this study employs the vector autoregression (VAR) model to analyze the return on each variable. A comprehensive summary of the findings is presented in Table (3) and Table (4).

Table 3. Analysis results of KASP with ERDKW

	ERDKW	KASP
ERDKW(-1)	0.019306	0.011010
	(0.03311)	(0.00662)
	[0.58312]	[1.66249]
ERDKW(-2)	0.050964	-0.010494
	(0.03314)	(0.00663)
	[1.53777]	[-1.58298]
KASP(-1)	0.100175	-0.090463
	(0.16577)	(0.03316)
	[0.60431]	[-2.72814]
KASP(-2)	0.033559	0.022191
	(0.16569)	(0.03314)
	[0.20253]	[0.66952]
C	[-0.05821]	[0.81109]

Table 4. Analysis results of KASP with ERDKW

	ERDP	BASP
ERDP(-1)	0.081284	0.451669
	(0.03330)	(21.2721)
	[2.44096]	[0.02123]
ERDP(-2)	-0.029103	-26.08261
	(0.03324)	(21.2310)
	[-0.87567]	[-1.22851]
BASP(-1)	-7.21E-05	0.062513
	(5.2E-05)	(0.03349)
	[-1.37538]	[1.86661]
BASP(-2)	-0.000122	0.055217
	(5.3E-05)	(0.03354)
	[-2.32496]	[1.64622]
C	[0.17520]	[-0.90792]

According to Table (3), a statistically significant positive relationship was observed between the return on the exchange rate of dollar to Korean Won (ERDKW) had on Korean Airlines stock price (KASP) at the -1st point. However, no significant correlation could be detected from the return on Korean Airlines stock price (KASP) to the return on the exchange rate of the dollar to Korean Won (ERDKW). Table (4) shows that the return on British Airways stock price (BASP) had a negative and statistically significant effect on the return on the exchange rate of Dollar to Pound (ERDP) at the -1st point. But there was no notable correlation observed from the return on the exchange rate of Dollar to Pound (ERDP) to the return on the British Airways stock price (BASP).

C. Impulse response function results

Upon recognizing the correlation, this study will proceed to employ generalized impulse response analysis. Impulse response analysis constitutes a statistical methodology essential for comprehending the intricate dynamics that underlie the relationships between variables within a time series dataset. Its application spans diverse domains, encompassing economics, engineering, and ecology, where it serves as a foundational tool for unraveling temporal intricacies and dependencies. The resulting estimation outcomes are graphically presented in Fig. 1 and Fig. 2.

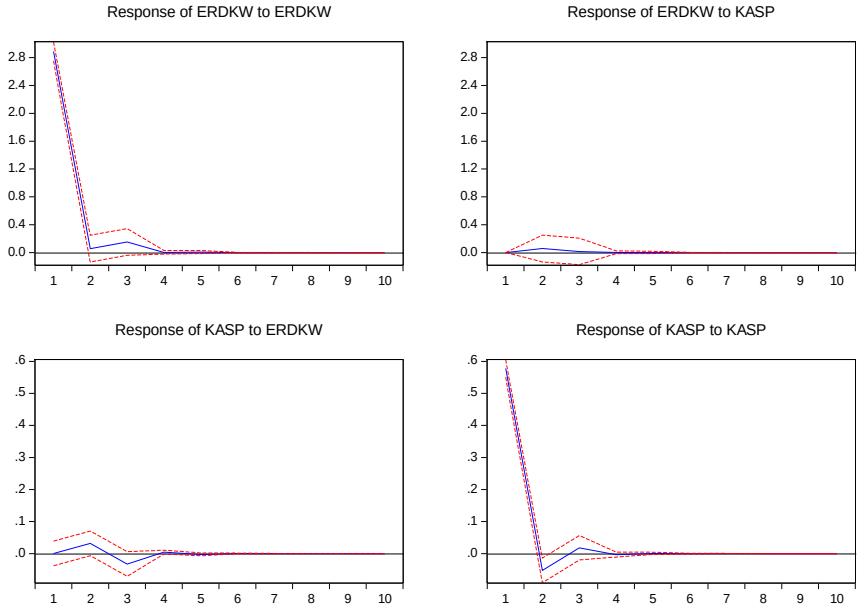

Figure 1 Impact response function results

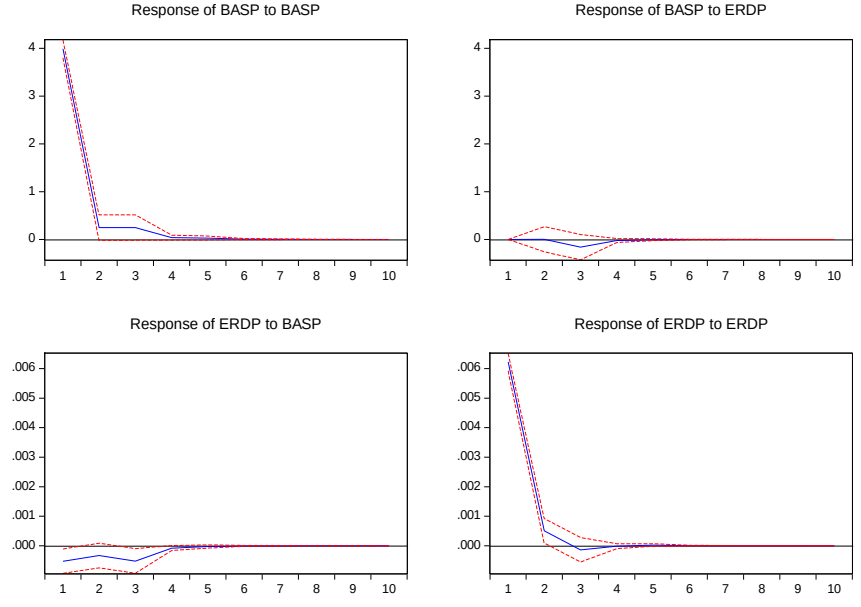

Figure 2 Impact response function results

Fig. 1 illustrates that the return on the exchange rate of the dollar to Korean Won (ERDKW) exhibited a positive impact on the return on Korean Airlines stock price (KASP). Fig. 2 shows that the return on British Airways stock price (BASP) exhibited a negative impact on the return on the exchange rate of Dollar to Pound (ERDP).

5. CONCLUSIONS

This paper studied the correlation between the aviation industry and the exchange rate for Korea and the UK during the COVID-19 pandemic using a Vector Autoregression model and relying on a database of daily data for each variable during the COVID-19 pandemic.

The analysis findings of the research revealed a noteworthy and statistically significant positive correlation between fluctuations in the exchange rate and the Korean aviation industry. Specifically, it means that when the dollar exchange rate to the Korean Won increases, it tends to lead to an increase in the stock price of the Korean airline. In contrast, a distinct and statistically significant negative correlation was observed between variations in the exchange rate and the UK aviation industry. Precisely, it means that when the stock price of British Airways decreases, it tends to lead to a dollar depreciation relative to the pound. These findings underscore the distinct impacts of exchange rate movements on the aviation sectors of South Korea and the United Kingdom.

The most prominent theoretical contribution of this study is contributing to the literature providing empirical evidence of the correlation between the aviation industry and the exchange rate during the COVID-19 pandemic. Highlighted the importance of examining the relationships between aviation industries and exchange rates during the COVID-19 era. Moreover, most previous work has focused on tourism and exchange rate; therefore, this study enriches the knowledge in tourism industry literature by advancing the understanding of the correlation between the aviation industry and the exchange rate. Overall, this research's theoretical implications underscore the dynamic and multifaceted nature of the relationship between the aviation industry and exchange rates during the COVID-19 pandemic. By situating these findings within existing theoretical frameworks, this research contributes to the advancement of knowledge in tourism and related fields, fostering a deeper understanding of the complex interactions shaping industry dynamics.

This study provides valuable practical implications. Firstly, the correlation between the aviation industry and exchange rate fluctuations implies that stakeholders within this sector should actively monitor currency movements especially those involving the Korean Won, Pound and the US Dollar. Secondly, the positive correlation observed between fluctuations in the exchange rate and the Korean aviation industry highlights the industry’s sensitivity to currency movements. This sensitivity suggests that changes may influence the competitiveness of the Korean aviation sector in the exchange rate. Airlines could explore collaborations with financial institutions to develop financial products that provide passengers with options to lock in ticket prices at favorable exchange rates. This could enhance customer loyalty and increase booking certainty for international travelers. Lastly, governments of countries with significant tourism and aviation sectors might consider policies that provide stability and support during periods of exchange rate volatility. This could include targeted incentives for airlines, facilitating favorable exchange rate arrangements, or promoting tourism through strategic marketing efforts during periods of good exchange rates.

This research study exhibits limitations in its exclusive concentration on the aviation industry. Consequently, there is an evident necessity to extend the investigation by exploring and comparing the performance of other sectors within the tourism industry, such as hospitality, accommodation, travel agencies, attractions, and events, for future research.

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