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Research on the Relationship Between Exchange Rate and International Tourism

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Abstract. This study conducts an empirical research on the dynamic relationship between exchange rate fluctuations and international tourism including expenditure, receipt and arrivals. The study utilized panel datasets from multiple countries and regions from 2018 to 2020 to investigate how currency valuation affects tourism demand under different economic conditions. The research results show that although exchange rate fluctuations can affect tourism flow, their impact is neither isolated nor strictly linear. On the contrary, this relationship is moderated by broader macroeconomic factors, including income levels, airfare costs, and especially the major external shocks such as the COVID-19 pandemic, which caused an unprecedented disruption in global travel independent of currency movements. Furthermore, conventional linear approaches may underestimate the complexity of these interactions. This study underscores the multifaceted nature of tourism economics and emphasizes the necessity of adopting multidimensional and flexible analytical frameworks to better understand and predict tourism behavior in an increasingly volatile global environment.

Keywords: Exchange rate, International tourism, Tourist arrivals, Tourism expenditure, COVID-19 impact

1. Introduction

Tourism is one of the most important socio-economic activities and has a huge potential impact on global economic and future development [1-4]. Exchange rate fluctuations, as a key economic factor influencing international tourism flows, have long attracted the attention of researchers. For decades, in addition to other economic and social determinants, exchange rate variables have generally been regarded as explanatory determinants of international tourism flows [5]. Furthermore, research of Santana-Gallego et al. also found that exchange rate is a major factor in determining the arrival of tourists. They also found that less flexible exchange rates promoted tourism [6]. More research found that the long-term relative price elasticity among countries often varies greatly [7]. Based on the literature review, this study aims to further explore the dynamic relationship between exchange rate fluctuations and international tourism. The study adopted panel data from multiple countries from 2018 to 2020. This study not only examine the tourism indicator among different countries from 2018 to 2020, but also incorporate the pandemic as a structural breakpoint into the analytical framework. The purpose is to reveal the complex nonlinear and regulated relationship between

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exchange rates and the tourism industry under extreme external shocks, thereby supplementing and expanding the existing theories.

2. Data collection and methodology

The data collection for this study was carried out by extracting relevant tourism and exchange rate indicators from the World Bank database. Specifically, four types of key datasets were obtained: official exchange rate (domestic currency/USD, period average), international tourism arrivals, international tourism expenditure (current USD), and international tourism revenue (current USD). To focus the analysis on consistent and relevant samples, data cleaning was carried out, containing countries within the specific regions, including countries from Asia (China, Japan, etc.), Europe (France, Italy, etc.), the Americas (the United States, Canada, etc.), and other major tourist destinations (Australia, South Africa, etc.). The time frame is set from 2018 to 2020, which spanning through the period before and after the pandemic, facilitating the exploration of the differentiated impacts on different countries during this special period. In terms of methodology, the subsequent analysis will utilize these well-organized datasets to explore the relationship between exchange rates and tourism indicators, considering country characteristics and the temporal context.

3. Analysis and results

This study examined the changing characteristics of international tourism economic indicators from 2018 to 2020 via time series analysis, correlation test, and model construction. First, year-on-year analysis of core indicators were conducted to show their temporal patterns. Second, the mutual influence among indicators was explored through correlation analysis. Finally, a measurement model was built, with a focus on the nonlinear correlation between exchange rates and tourism indicators, laying a foundation for further research.

3.1. Characteristics of international tourism indicators

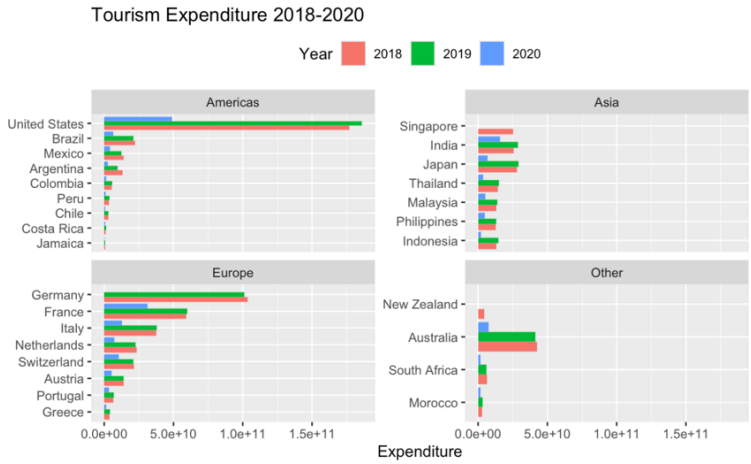

Figure 1. International tourism expenditure from 2018 to 2020

According to Figure 1, international tourism spending from 2018 to 2020 shows significant regional differences and annual fluctuations. The United States dominates in the Americas, with its spending far exceeding that of other countries in the region. In Europe, the main contributors include Germany and France. In Asia, the expenditure mainly comes from Japan and Southeast Asian

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countries. Australia and New Zealand in Oceania also have considerable expenditures. Compared with 2018, tourism spending in most countries increased in 2019, but the COVID-19 pandemic in 2020 led to a sharp decline in global tourism spending. The decline was the largest in the United States and European countries, revealing regional differences in the impact of the epidemic. All expenditure data are expressed ranging from 0.0e+00 to 1.5e+11 US dollars, highlighting the significant differences in tourism spending among various economies.

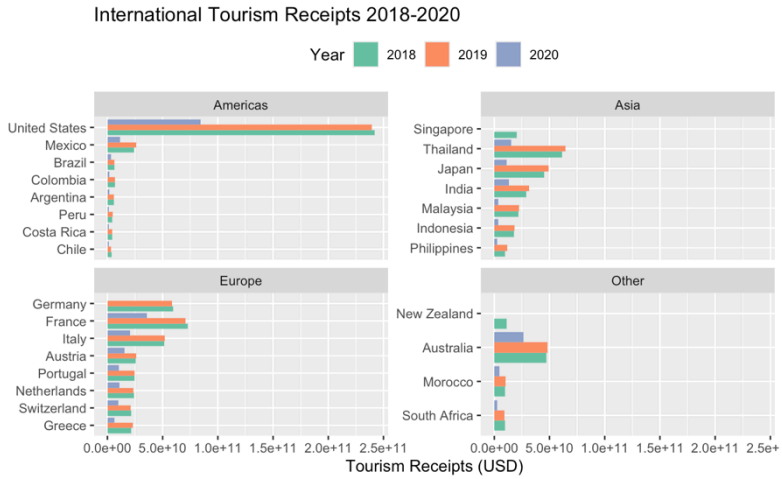

Figure 2. International tourism receipt from 2018 to 2020

From 2018 to 2020, international tourism receipt showed regional distribution characteristics similar to expenditure but was more significantly affected by the epidemic in Figure 2. Developed countries such as the United States, Germany and France also hold a dominant position in terms of receipt. Similar to expenditure, the international tourism receipt of most countries rose slightly in 2019. However, in 2020, due to the impact of the epidemic, the receipt experienced a significant decline. It is worth noting that the impact of the epidemic on tourism receipt is more severe than that on expenditure, reflecting a higher economic vulnerability in destination countries.

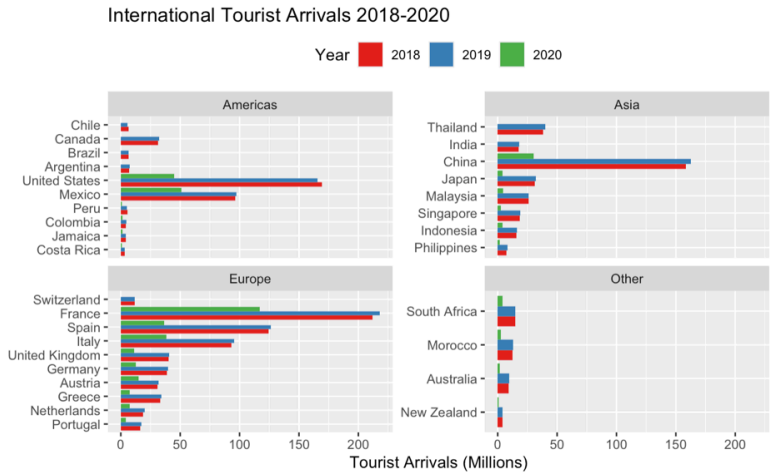

Figure 3. International tourism arrivals from 2018 to 2020

The changes in the number of international tourism arrivals from 2018 to 2020 are highly correlated with tourism revenue and expenditure. In Figure 3, from 2018 to 2019, the number of tourists visiting traditional popular destinations such as France, Spain and Thailand grew steadily, in

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line with the growth trend of tourism revenue during the same period. In 2020, the number of inbound tourists worldwide dropped significantly. The overall decline in the number of inbound tourists is greater than that in tourism expenditure, indicating that even for tourists with the intention to travel, their actual trips are still severely restricted by epidemic prevention restrictions. This imbalance between supply and demand further raise the extent of tourism revenue loss in destination countries.

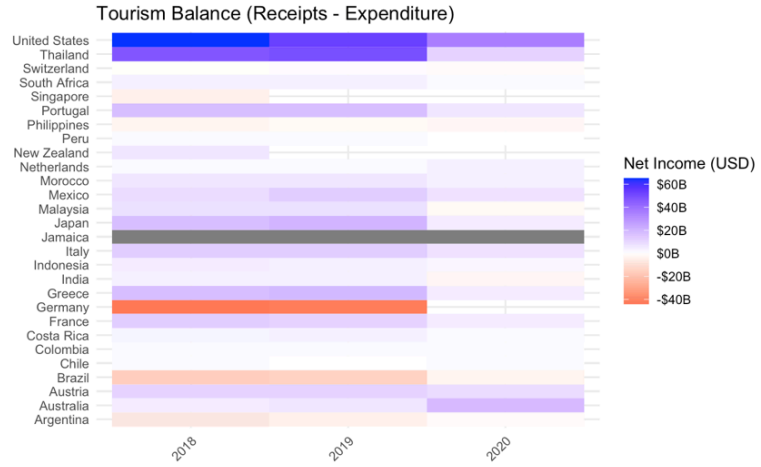

Figure 4. International tourism balance from 2018 to 2020

International tourism balance data from 2018 to 2020 show that there are regional differences in the impact of the epidemic on the tourism economy of various countries. In Figure 4, the United States has maintained a huge deep blue trade surplus. Due to the impact of the COVID-19 pandemic, Germany recorded an orange deficit in 2020. Traditional surplus countries such as Thailand and Switzerland maintained stable surpluses from 2018 to 2019, forming a virtuous cycle with the growth of spending in countries like the United States. The pandemic in 2020 brought about tremendous changes to the global tourism balance of payments pattern. The average trade surplus of surplus countries has shrunk. Countries that are highly dependent on tourism, such as Thailand, have experienced the most severe deterioration in their balance of payments.

To sum up, from 2018 to 2020, due to the impact of the epidemic and other factors, international tourism expenditure, receipt, the tourism arrivals and the balance all showed significant regional differences and annual fluctuations. Moreover, the epidemic had a more prominent impact on tourism revenue and the economy of destination countries.

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3.2. Correlation between exchange rate and tourism indicators



Figure 5. Legend for following figures

The countries represented by the different colors in the legend of Figure 5 will be used in Figures 6 and 7.

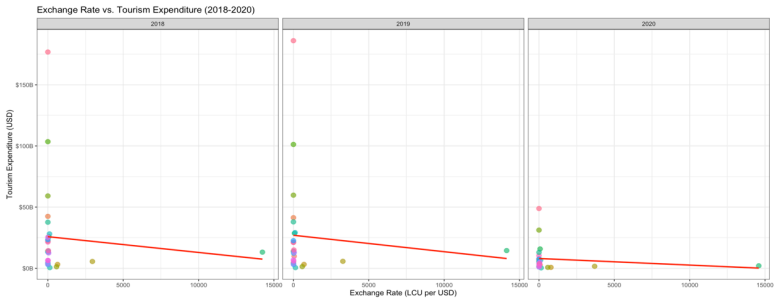

Figure 6. Exchange rate vs international tourism expenditure from 2018 to 2020

In Figure 6, data indicates that there is a negative correlation between exchange rate fluctuations and tourism spending. In 2018-2019, when domestic currencies weakened against the US dollar, tourism spending in many countries rose, which demonstrated the inhibitory effect of domestic currency depreciation on outbound travel. In 2020, under the impact of the epidemic, although the currencies of some countries continued to depreciate, global tourism spending dropped significantly. This indicates that under extreme external shocks, the exchange rate factor was temporarily masked by non-economic variables such as epidemic prevention.

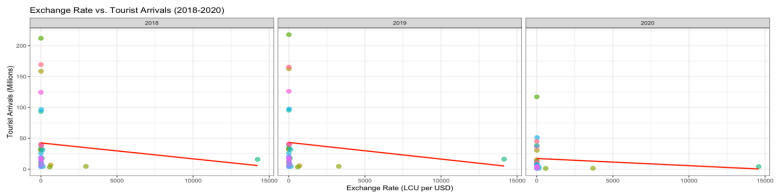

Figure 7. Exchange rate vs international tourism arrivals from 2018 to 2020

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From 2018 to 2022, when the domestic currency weakened against the US dollar, the number of inbound tourists in most countries declined, reflecting the negative impact of the depreciation of the domestic currency on the attractiveness of tourism. According to Figure 7, during the 2020 pandemic, the currencies of some countries depreciated significantly, but the number of inbound tourists still dropped sharply, as health and safety concerns far outweighed exchange rate factors. This echoes the previous tourism revenue and expenditure data, confirming that exchange rates have a significant impact on international tourism flows during normal times, but are temporarily replaced by non-economic factors during crisis periods.

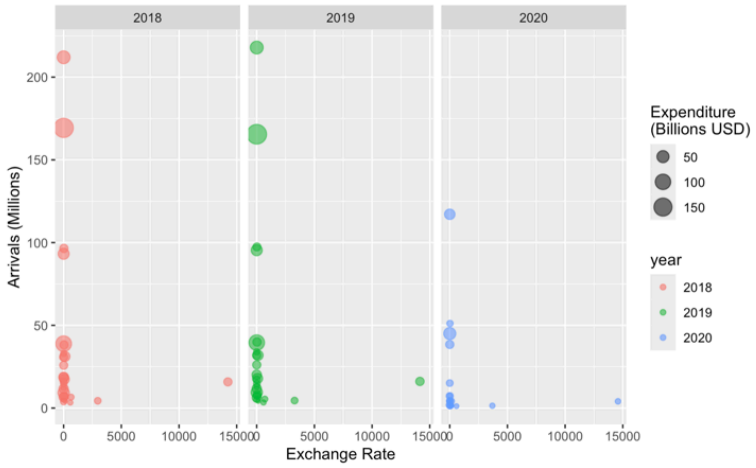

Figure 8. Exchange rate vs international tourism from 2018 to 2020

From 2018 to 2019, when the exchange rate was stable at 5,000 to 10,000 LCU/USD, the number of global inbound tourists reached 150 to 200 million. Moreover, their spending was 100 to 150 billion US dollars, showing a synchronous growth, reflecting the normal development trend of the tourism market in Figure 8. After the pandemic in 2020, the currencies of some countries depreciated significantly, but the number of inbound tourists was less than 50 million and tourism spending was less than 50 billion US dollars, once again confirming the dominant role of non-economic factors in extreme circumstances.

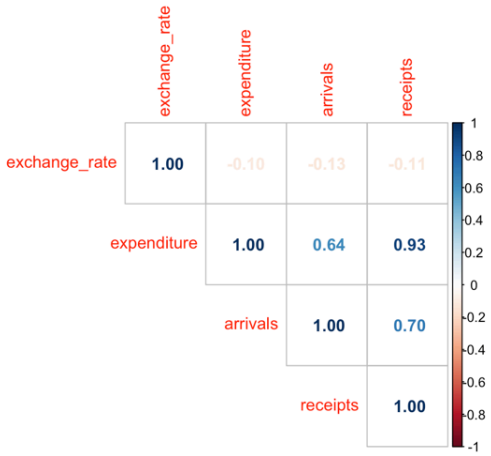

Figure 9. Correlation among indicators

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In Figure 9, the correlation coefficient matrix shows that the exchange rate is negatively correlated with tourism receipt, tourism expenditure and the number of inbound tourists, with correlation coefficients ranging from -0.11, -0.10 and -0.13 respectively. Meanwhile, tourism expenditure is highly positively correlated with income, with a correlation coefficient of 0.93. The number of inbound tourists is strongly positively correlated with their expenditure, with a correlation coefficient of 0.64. However, factors such as the epidemic can interfere with the impact of exchange rates on international tourism. Specifically, in 2020, the currencies of some countries depreciated significantly, but the tourism revenue and expenditure still declined sharply, resulting in a relatively low correlation coefficient value in some cases. Therefore, a nonlinear model will be adopted for further analysis in the future.

3.3. Nonlinear model analysis

$$\text{exchange rate} = 1050 - 1.84 \times 10^{-9} \times receipt - 9.504 \times 10^{-10} \times expenditure - 5.248 \times 10^{-6} \times arrivals + \varepsilon \quad (1)$$

Results show that explaining exchange rate fluctuations with tourism revenue, expenditure, and the number of inbound tourists as independent variables basically fails. In 2019, although not yet affected by the epidemic, the model already had obvious problems. The overall explanatory power is extremely low (R^2=0.01694, adjusted R^2=-0.1235), and the p-value of the F-test is as high as 0.9469, indicating that the explanatory power of the three for exchange rate fluctuations is almost negligible. This suggest that there is no statistically significant linear relationship between tourism economic indicators and exchange rates. This is in line with Irandoust's research conclusion. Irandoust found that there is a long-term relationship between tourism demand and exchange rate fluctuations, which supports the view that tourism demand responds asymmetrically to exchange rate changes [8]. In 2019, when there was no interference from the epidemic, the model was no longer fitting. In 2020, affected by the greater external shock of the epidemic, the relationship among them became even more difficult to capture through a simple linear model. This confirms that the relationship between tourism economic indicators and exchange rates is not a simple linear one. It is necessary to attempt nonlinear modeling such as logarithmic transformation, supplement key economic variables, handle data outliers, or examine the causal relationship of variables in future discovers.

4. Conclusion

The analysis reveals significant variations in international tourism across different regions and over time, reflecting the complex and multifaceted nature of global travel dynamics. While exchange rate fluctuations exhibit a discernible correlation with international tourism, they constitute only one of many influencing economic factors. This is particularly evident in 2020, when the COVID-19 pandemic caused unprecedented disruptions, overshadowing traditional economic indicators and altering travel patterns profoundly. Furthermore, the constructed model indicates that the relationship between exchange rates and international tourism is not purely linear, underscoring the presence of additional underlying factors that collectively shape international tourism demand.

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