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Analyzing the causal relationship between exchange rate and international tourism in Vietnam

Le Nu Minh Phuong[1]

University of Economics, Hue University, Hue, Vietnam

Tran Doan Thanh Thanh

University of Economics, Hue University, Hue, Vietnam

Abstract

The impact of tourism on exchange rates, and vice versa, varies from country to country. This study empirically explores the causal relationship between exchange rates and international tourism in Vietnam. To examine this relationship, data on real exchange rates, foreign tourist arrivals, and real tourism revenue were extracted from the general statistical yearbook from 2000 to 2019. This paper explicitly highlights how exchange rates impact tourism under a government-controlled exchange rate regime. The results indicate a weak unidirectional causal relationship between foreign tourist arrival and real exchange rates. An increase in the real exchange rate increases short-term income but has a negative impact on long-term tourism revenue, while an increase in real tourism revenue reduces the real exchange rate in the short run but is stable in the long run. The research supports the perspective that maintaining a stable exchange rate attracts international tourists in the long term. Based on these findings, the Vietnamese government should adopt a cautious approach to price stabilization policies and encourage export-oriented industries to attract international tourists and promote tourism.

Keywords: Tourism, Exchange rate, Vector autoregression, Granger causality, Impulse response function

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[1] Corresponding author: lenuminhphuong@hueuni.edu.vn

1. Introduction

International tourist flows and financial flows are causally related. Tourism has become one of the fastest-growing industries worldwide, contributing to the growth of many economies globally. According to the World Tourism Organization, there were a record 1.5 billion foreign arrivals in 2019, an increase of 4% (UNWTO, 2020). Tourism-related income, including foreign visitor spending, has become a major source of foreign exchange earnings for many nations. In 2019, international tourism revenue accounted for 7% of all goods and service exports globally (UNWTO, 2019). The growth of the tourism industry generates foreign currency earnings that support a nation's overall economic growth. Capital flows can boost economic growth, create jobs, and boost investment in the tourism industry, leading to increased tourism flows (Alalawneh *et al.*, 2021). However, financial volatility and exchange rate fluctuations can have a detrimental effect on foreign tourist arrivals (FTA) because they increase the cost of travel for foreign visitors.

The competition among destination countries in attracting tourists is influenced by various factors, with the stability of the economic, political, and social environments being the most crucial determinant (Kayar and Kozak, 2010). The stability that tourists seek is primarily related to the stability of the exchange rate, which is a product of the economic policies enforced by the destination country. Any conflicting or disturbing fluctuations in the destination country will be reflected in exchange rate instability, which, in turn, will negatively affect tourism numbers and revenue (Nunkoo and Ramkissoon, 2011). Hence, it is imperative to institute consistent economic policies to promote the growth and sustainability of the tourism industry in the destination country (Munar and Jacobsen, 2014). By considering these factors and enforcing appropriate policies, the tourism industry can be better prepared to manage challenges stemming from the instability of destination countries.

International tourism is a major contributor to the global economy, significantly impacting exchange rate fluctuations. Several studies have examined the causal relationship between tourism and exchange rates, and their findings suggest that the impact of tourism on exchange rates is significant and varies across countries. Lee (2012) concludes that the relationship between tourism price and destination competitiveness has shifted, moderating the elasticity of tourism demand to price in Korea. Similarly, a study by Choi and Kim (2021) found non-linear dependence structures between tourist flows into South Korea from five major source countries. These dependence structures are identified through copula estimations, which show significant dependencies among all market pairs, with the strongest dependence between China and Taiwan. The exchange rate has had an increasing impact on inbound tourism since 2009, indicating that inbound tourists are becoming more concerned about the exchange rate, and China's government should consider this in the development of the tourism industry and marketization of the exchange rate (Gao *et al.*, 2018).

Vietnam demonstrates a significantly higher growth rate in international tourism than its developing Southeast Asian counterparts, particularly evidenced by its tourist-to-population ratio, suggesting ample potential for further expansion relative to Malaysia and Thailand (Dinh

et al., 2019). With the increasing number of international tourists visiting Vietnam every year, it is crucial to understand the relationship between international tourism and exchange rates. However, limited research has been conducted on this topic in Vietnam. Puah *et al.* (2019) found that origin country income, destination prices, and travel costs are important determinants of tourism demand in Vietnam. Specifically, origin country income and destination prices have a positive relationship with demand, while travel costs have a negative impact. This research contributes to the existing literature by offering a more comprehensive examination of the reciprocal relationship between exchange rates and tourism. The study employs variables associated with exchange rates and tourism from 2000 to 2019. The vector autoregression model (VAR) and Granger causality tests were utilized to comprehensively investigate the causal association between pairs of variables, subsequently analyzing impulse response function (IRF). The amalgamation of these methodologies not only elucidates the association between variable pairs but also discerns the lag of each variable within the relationships in both the VAR and IRF methodologies.

The remainder of this paper is organized as follows. The second section comprehensively reviews the relevant literature on the interplay between exchange rates and international tourism in Asian economies. The third section presents an exposition of the utilized dataset and the adopted research methodology. The fourth section constitutes the empirical findings of the causal linkage between exchange rates and international tourism in Vietnam. The final section provides conclusions and highlights the policy implications derived of research.

2. Theoretical background and empirical evidence

2.1 Theoretical background

Global integration amplifies the dependency on international tourism from foreign flows. International tourists are foreign residents visiting a country for stays lasting at least 24 hours but not exceeding one year. Tourists' departure is propelled by various motivations: entertainment, education, medical exigencies, sports, and religious pursuits. The variety of travel objectives and motivations among tourists significantly influences the structure of the tourism industry, yielding positive impacts not just for the industry itself but also for local communities. Disparate expenditure levels by tourists within a particular destination have repercussions on the tourism industry's performance and exert implications for local labor resources. When a country's tourist influx heavily relies on international visitors, it becomes clear that the tourism economy is significantly dependent on foreign markets. Without viable solutions to attract or manage this dependence, there is a likelihood that opportunities may transform into challenges. The assessment of international tourism frequently involves the examination of international tourist arrivals, accompanied by the analysis of tourist expenditure or tourism revenue (Ding and Timmer, 2022; Gao *et al.*, 2018; Kuncoro, 2016; Lee, 2012). Revenue derived from the spending of international tourists bolsters the GDP, generates employment opportunities, and stimulates the economics of tourism destinations.

International tourist arrivals are the most frequently used measure of tourism demand (Sheldon, 1993; Harrison, 2007; Morley *et al.*, 2014). As Sheldon (1993) noted, gauging tourism demand through the volume of international tourists is the foundation for tourism product providers to guide their investments and adapt their service capabilities based on visitor numbers. Furthermore, assessing international tourist expenditures is a parameter for gauging tourism demand. However, determining the extent of tourism spending is challenging and not as accurate as quantifying the number of international tourists (Song *et al.*, 2019). Additionally, the length of stay at a destination, often recorded by accommodations, serves as a metric for measuring tourism demand (Song *et al.*, 2019; Borrego-Domínguez *et al.*, 2022). When evaluating criteria to assess tourism demand, the criteria of international tourist arrivals and tourism expenditures are frequently employed to quantify both the volume and value of tourism. Attractive destinations are places with diverse and quality resources, and amenities designed to satisfy visitors' feelings and needs (Huzeima and Salia, 2020). Conversely, travelers select a destination based on various factors, the most significant being the cost of tourism services. Price affects the attractiveness of a travel experience and reflects tourist demand. The impact of price is more complex than income; travel services with integrated travel packages or personalized services increase competition. Changes in exchange rates, inflation, and destination pricing are crucial determinants in the tourism market. Nevertheless, the effect of price on tourism demand is not solely determined by the destination's price but rather by the relative prices between destinations and those in the origin country. The relative price index is determined by dividing the consumer price index (CPI) of the destination country by the CPI of the origin country, derived from a study on tourism demand conducted by Rosselló Nadal and Santana Gallego (2022) with this proportion observed in 46% of cases. This study reports that up to 85% of studies indicate that a rise in relative prices leads to a decrease in international tourists. Additionally, the exchange rate regime applied plays a role in determining destination prices, reflecting the tourism trends between the two countries (Gao *et al.*, 2018). Depreciating the source country's currency exchange rate diminishes the demand for international tourism in the destination country and vice versa. Peng *et al.* (2015) discovered that tourists are more responsive to changes in exchange rates than to fluctuations in the CPI at the destination. Apart from bilateral exchange rates, the exchange rate relative to the US dollar is also a crucial factor influencing tourism flows (Ding and Timmer, 2022).

2.2 Literature review

Numerous studies have examined how exchange rates affect international tourism, but their findings have been inconsistent. This literature review seeks to consolidate the current research on the relationship between exchange rates and international tourism in developing countries, focusing on selected Asian countries.

Exchange rate fluctuations have significant implications for the tourism industry, particularly in countries where tourism is a major source of income. A country's exchange rate can influence the cost of travel, accommodation, and other expenses for foreign tourists, affecting their decision to visit. Using the VAR model, Kuncoro's (2016) study in Indonesia

found that foreign tourist arrivals and exchange rates are co-integrated and have a bi-directional Granger causality relationship. This means that an increase in the number of tourists visiting a destination will lead to an increase in the currency price of that destination. The total number of foreign visitors to India has a positive influence on the local currency, which means that the number of visitors is positively (negatively) impacted by the appreciation (depreciation) of the local currency (Jena and Dash, 2020). Additionally, it has been discovered that the effect of exchange rate volatility and change is asymmetric at various stages of tourist arrival from the top ten countries. Similarly, Gao *et al.* (2018) concluded that only since 2009 in China has the exchange rate had a growing effect on the number of domestic tourists. Alternatively, a relatively stable exchange rate system facilitates international tourism flows (De Vita, 2014).

Exchange rate elasticity affects international travel, particularly the role of the exchange rate against the US dollar for a country that is a tourist destination and a higher dollar loan. The dominant country-specific currency is not very important to the average country but is important to a tourism-dependent country or a country with a high concentration of tourists. The rising exchange rate boosts the number of tourists to the country (Tung and Thang, 2022; Choi and Kim, 2021). When controlling for the US dollar's exchange rate, the elasticity of bilateral tourism flows decreases to 0.7% in response to a 10% devaluation (Ding and Timmer, 2022). However, other studies suggest that tourism can also lead to a depreciation of the exchange rate. For example, Zardad *et al.* (2013) found that an increase in foreign tourist arrivals in Pakistan led to a depreciation of the Pakistani rupee. They argued that this was because tourism increases the demand for foreign currencies, leading to a decrease in the value of the domestic currency.

Furthermore, some studies have examined the impact of tourism on exchange rates during different economic conditions. The reduction in tourism due to the COVID-19 pandemic in Thailand, which is the country's primary industry, may have an impact on foreign direct investment, interest rates, inflation rates, and the current account, all of which can affect the exchange rate (He, 2023). Although the recent depreciation of the baht is related to the decrease in tourism, the government has implemented policies to combat the recession. As a result, the value of the Thai baht is expected to increase and return to pre-outbreak levels gradually.

Several studies have been conducted in Vietnam on the relationship between international tourism and exchange rates. Hung and Hieu (2022) investigate the interplay between tourism revenue (TOV), the real exchange rate (RER), and economic growth in Vietnam over the period from 1995 to 2019. The relationship between RER and TOV is mainly negative and weak in the long run. In a congruent vein, Phan and Le (2021) asserted a bidirectional short-term causal relationship between RER and TOV, and an absence of a long-term relationship from 1990 to 2017. Additionally, with one-year and two-year lags, RER affects TOV, ranging from negative to positive, yet has limited statistical significance. In addition, Puah *et al.* (2019) assert that tourism demand in Vietnam is positively correlated with the income of both the destination and origin countries, as well as the price of tourism. Conversely, the

cost of travel has a negative effect on tourism demand in Vietnam. Nguyen *et al.* (2018) investigate the impact of exchange rates on the trade balance between Vietnam and Japan. Otherwise, Thanh and Kalirajan (2005) evaluate the significance of the exchange rate strategy in fostering Vietnamese exports.

De Vita (2014), Peng *et al.* (2015), Alalawneh *et al.* (2021), Rosselló Nadal and Santana Gallego (2022) employed panel data encompassing multiple countries to assess the correlation between exchange rates and international tourism. Nonetheless, the findings from these studies indicate a pattern observed across groups of countries analyzed or in relationships between pairs of two countries. Tourism policymakers in a specific nation cannot depend solely on a group of countries for policy-making. So, they necessitate thorough research to understand the cause-and-effect dynamics between exchange rates and foreign tourist arrivals, as well as between exchange rates and tourism revenue. This study scrutinizes the relationship more extensively compared to the studies of Hung and Hieu (2022) and Phan and Le (2021). It delves into the correlation of price index pairs to elucidate the relationship between nominal and real exchange rates. Furthermore, how the Vietnamese government manages the exchange rate regime also contributes to explaining the causal relationship and impulse response from the shock to the causal relationship of these variables.

3. Research methods

3.1 Data

The study uses annual data from the Vietnam Statistical Yearbook. First, the exchange rate between the Vietnamese dong and the US dollar is used as a benchmark to evaluate the causal-and-effect relationship because the US dollar is the most common currency in the world for international transactions. The study employs the US dollar price index and the Vietnamese dong price index to calculate the real exchange rate to eliminate bias in identifying the causal relationship. The real exchange rate is determined by the following formula:

$$RER = NER \times \frac{PIUS}{PIVN} ,$$

where PIUS represents the US dollar price index; PIVN represents the Vietnam dong price index; NER is the nominal exchange rate.

Second, the tourism variable includes foreign tourist arrivals (FTA) and real tourism revenue (RTR). FTA is a commonly accepted indicator of international tourism (Harrison, 2007; Morley *et al.*, 2014), which signifies the inclination of foreign visitors to travel to Vietnam. Otherwise, real tourism revenue represents economic benefits, such as tourism's impact on GDP. However, the COVID-19 pandemic has caused a sudden shift in travel demand, which has impacted the association between FTA and related travel services (Vu *et al.*, 2022).

3.2 Estimation methods

The study utilizes the vector autoregression (VAR) model to analyze the Granger causality between the real exchange rate and international tourism. It is essential for the variables integrated into the VAR model to comprise stationary series; particularly, a blend of stationary and non-stationary variables is not allowed in the VAR model.

Stationary test

This study employed the Augmented Dickey-Fuller (ADF) unit root test (Dickey and Fuller, 1979) to examine the stationarity of the data series, thereby mitigating the presence of spurious regression issues within the model.

VAR model

The VAR model describes the progression of a group of k variables, designated as endogenous variables, during a given period. Determining the optimal lags for the VAR model's time series is crucial. The optimal lags are selected based on the criteria AIC, SC, FPE, LR, and HQ for selection. The two-way VAR model with lagged variables is represented by the following equations:

$$FTA_t = a_0 + a_1 FTA_{t-1} + ... + a_k FTA_{t-k} + b_1 RER_{t-1} + ... + b_k RER_{t-k} + u_t, \qquad (1.1)$$

$$RER_t = c_0 + c_1 RER_{t-1} + ... + c_k RER_{t-k} + d_1 FTA_{t-1} + ... + d_k FTA_{t-k} + v_t, \qquad (1.2)$$

$$RTR_t = e_0 + e_1 RTR_{t-1} + ... + e_k RTR_{t-k} + f_1 RER_{t-1} + ... + f_k RER_{t-k} + \varepsilon_t, \qquad (2.1)$$

$$RER_t = m_0 + m_1 RER_{t-1} + ... + m_k RER_{t-k} + n_1 RTR_{t-1} + ... + n_k RTR_{t-k} + \delta_t, \qquad (2.2)$$

where u_t, v_t, ε_t, and δ_t are the stochastic error terms or impulse or shocks.

Reliability test

The study executed a sequence of tests to ascertain the model's reliability. The autocorrelation was determined by examining the p-value, whereby a value greater than 0.05 indicates a lack of autocorrelation. Subsequently, a variance test was conducted to evaluate the consistency of the error variance. A p-value exceeding 0.05 is indicative of the model not altering the variance of the error. Ultimately, the stability of the model was assessed to ensure its stability.

Granger test

The VAR model is adaptable and offers the foundation for performing this causal analysis. The Granger causality test was performed to estimate the relationship between each pair of variables and the direction of this relationship (Granger, 1969). In equation (1.1), RER and FTA are optimized for optimal lag. If the Granger causality test yields statistically significant results, then it can be argued that RER is causal for the FTA; that is, the lagged values of RER are helpful to forecast the FTA or the inverse relationship shown in equation (1.2).

Impulse response analysis

Impulse response analysis is a widely used method for understanding the dynamic relationship between variables prior to a shock or transient impulse in another variable. Specifically, impulse response functions (IRFs) show how one variable responds to a particular shock in another, usually measured by standard deviation. The resulting IRFs apply an orthogonalization scheme to describe dynamic interactions between variables and can be used to predict future behavior.

4. Result of the causal relationship between exchange rate and international tourism

4.1 Vietnam price index and exchange rate

The Vietnam Statistical Yearbook reports a price index of 100 in the base year 2000. Due to the impact of the global economy, the price indices in Vietnam and the US frequently experience simultaneous increases and decreases. During 2007 and 2008, Vietnam witnessed a significant influx of investment funds, leading to an almost 200% surge in the price index and a sharp depreciation of the local currency, as reported by CIEM in 2010 and 2013. The global financial crisis also contributed to a decline in global growth during this period. The decrease in aggregate demand within the economy prompts businesses and households to adopt a mindset of reducing expenditures on both consumption and investment to mitigate risks. Consequently, the price index in 2010 recorded a substantial decline to 118.6%, marking a sharp contrast to the figures observed in 2009. Simultaneously, to stabilize the economy, the government has adopted a policy of adjusting inflation and preventing economic recession. While the price index was managed in 2011, inflation resurfaced in 2012 at 138% and continued to rise steadily each year from 2014 to 2019, ranging from 144.6% to 163.6% (CIEM, 2010; CIEM, 2013). In the aggregate, an escalation of the price index raises consumer prices and the overall cost of goods and services, making travel more expensive for foreign tourists in Vietnam.
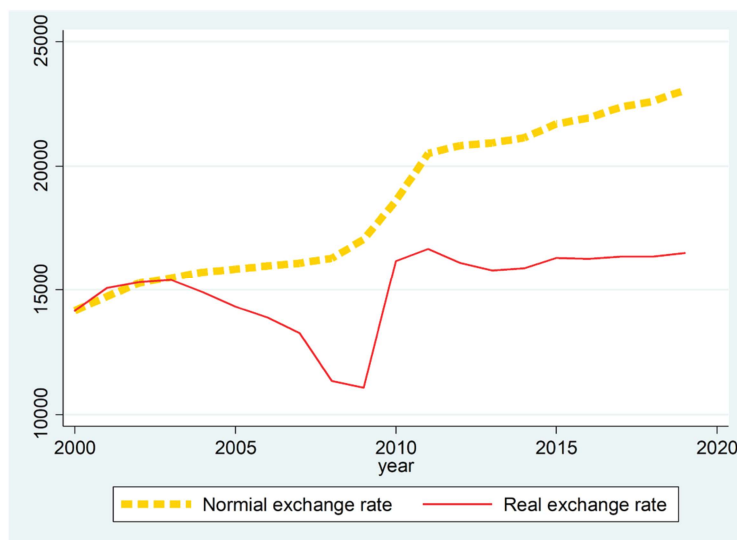
Figure 1. Nominal and real exchange rate from 2000 to 2019

Source: Authors' compilation

The NER time series for the years 2000 to 2019 is depicted in Figure 1 and exhibits an annual upward tendency. During the early 2000s, the USD/VND exchange rate tended to fluctuate within the range of 15,000, eventually rising to 16,000 VND/USD by 2008. The foreign exchange market is intricate and experiences periods of sudden fluctuations. Consequently, the State Bank regularly monitors and updates capital flows to implement suitable policies for managing exchange rates (Nguyen, 2009). The State Bank widened the range of the USD/VND exchange rate from ±1% to ±2% and ±3% in relation to the nominal exchange rate, as stated in Decision No. 2635/QD-NHNN dated 06 November 2008. According to Circular 15/2015/TT-NHNN, commercial banks have been incentivized to utilize forward derivatives and reduce foreign currency deposit interest rates to 0%. From 2013 to 2019, there was an upward trend in the NER, characterized by a slower and steadier increase. By contrast, the time series of real exchange rates between the Vietnamese dong and the US dollar has been unstable and rising according to the purchasing power parity technique.

Due to the devaluation of the Vietnamese dong against the US dollar, the real exchange rate from 2003-2010 was lower than the RER in 2000. Specifically, Vietnam experienced a significant rise in its price index during 2007, 2008, and 2009, leading to a pronounced decline in the real exchange rate. The disparity between the nominal and real exchange rates has been growing from 2013 to 2019, indicating a continuous decline in the value of the Vietnamese dong compared to the US dollar. The depreciation of the Vietnamese dong inevitably enhances the competitiveness of products and services, making destinations more appealing to attract international tourists.

4.2 Determine the stationarity of the observed time series

Table 1. ADF test results

Variables	Level/First difference	Trend	Prob	Intercept & Trend	Prob	Results
LnREX	Level	-2.043	0.578	-1.761	0.400	
	First difference	-3.546	0.035	-3.630	0.005	I(1)
LnFTA	Level	-1.792	0.709	0.869	0.993	
	First difference	-4.170	0.005	-3.750	0.004	I(1)
LnRTR	Level	-2.177	0.503	-1.419	0.573	
	First difference	-4.983	0.000	-4.891	0.000	I(1)

Source: Authors' calculation

Any time series included in the VAR model analysis must be stationary. Therefore, the first step in estimating the VAR model is to check if the data series is stationary. The study applies Augmented Dickey-Fuller (ADF) test criteria. All time series are transformed in the logarithmic transformation to make the data more symmetrically distributed and closer to normal. The stationarity analysis of the data series for FTA and RTR from 2000 to 2020 demonstrates that they were non-stationary at level 1 or 2. Consequently, assessing this relationship may not

be appropriate. To address this issue, the year 2020 has been excluded from the study period. The empirical findings in Table 1 indicate that these variables LnREX, LnFTA, and LnRTR from 2000 to 2019 demonstrate non-stationarity at a certain level and stationary at 1 level at the 1% significant level.

4.3 The causal relationship between exchange rate and international tourism

The likelihood ratio (LR), final prediction error (FPE), Akaike's information criterion (AIC), Hannan-Quinn information criterion (HQIC), and Schwarz Bayesian information criterion (SBIC) criteria were employed to assess the optimal lag. The investigation ascertained that a lag of 2 represents the most favorable choice for incorporating the variables into these models. After identifying the optimal lags, the analysis proceeds to execute the VAR model, utilizing the coefficients of influence of the variables as determined by the following equations in Table 2.

Table 2. The results of the VAR model

Equations	(1.1')	(1.2')	(2.1')	(2.2')
Dep. Variables	$LnRER_t$	$LnFTA_t$	$LnRTR_t$	$LnRER_t$
Cons	3.729**	-0.635	8.086****	5.807****
	[1.724]	[2.329]	[2.335]	[1.598]
$LnRER_{t-1}$	1.098***	0.608**	1.573***	1.671*****
	[0.223]	[0.302]	[0.538]	[0.368]
$LnRER_{t-2}$	-0.548***	-0.583**	-2.340****	-1.270****
	[0.199]	[0.269]	[0.533]	[0.365]
$LnFTA_{t-1}$	-0.409**	0.684***		
	[0.186]	[0.251]		
$LnFTA_{t-2}$	-0.485**	0.380		
	[0.191]	[0.258]		
$LnRTR_{t-1}$			-0.382	1.671****
			[0.335]	[0.368]
$LnRTR_{t-2}$			1.307****	-1.270****
			[0.317]	[0.365]
R-squared	0.655	0.974	0.983	0.682
Log likelihood		40.500		48.229

Notes: Standard errors are in brackets. *, **, and *** indicate statistical significance at 10%, 5%, and 1%, respectively.

Source: Authors' calculation

The reliability of these models is assessed through three tests: autocorrelation, variable variance, and model stability are all satisfactory. To investigate the causal relationship between the variables, Granger causality tests are conducted, and the results are presented in Table 3. Furthermore, following the assessment of residual white noise, an impulse response function is utilized to explain the effect of shocks on the remaining variable.

Table 3. The results of the Granger relationship

No.	Equation	Excluded	Chi-squared	Df	P-value	Conclusion
1	LnRER	LnFTA	3.202	2	0.074	LnRER→ LnFTA
	LnFTA	LnRER	1.980	2	1.178	
2	LnRER	LnRTR	11.08	2	0.004	LnRER ↔ LnRTR
	LnRTR	LnRER	23.90	2	0.000	

Source: Authors' calculation

4.4 The causal relationship between RER and FTA

The results in Table 3 show no causal relationship between FTA and RER. However, in the VAR equation (1.1'), an increase in FTA with a two-year lag increases the RER, but an increase in the FTA with a one-year lag causes a downward adjustment in the exchange rate. Additionally, the current RER is impacted similarly and oppositely compared to the past RER shock, with a one-year and two-year lag, respectively. Notably, the influence coefficient of international tourists is considerably lower than that of the RER variable when considering a lag. This indicates that variations in past RER have a more pronounced effect on current RER than FTA. Further, IRF analysis reveals that the shock caused by an increase in FTA affects RER depreciating in the first year, increasing in the second year, and stabilizing over the long term. The central bank's dynamic approach to control has played a pivotal role in preserving long-term exchange rate stability. By contrast to the research by Zardad *et al.* (2013), which found that the Pakistani rupee depreciates due to increased tourist arrivals, this study demonstrates an appreciation and depreciation in the exchange rate.
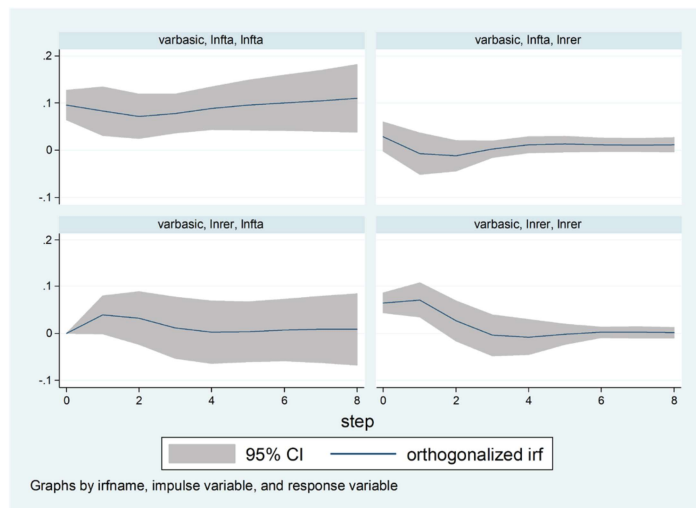
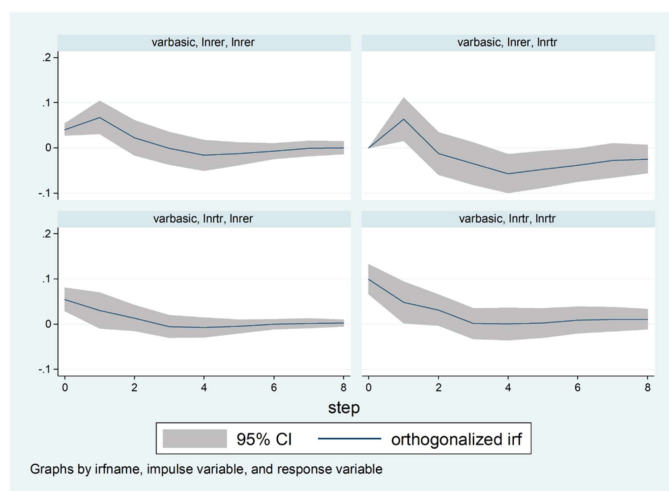**Figure 2.** Impulse response between RER and FTA

Source: Authors' calculation

In the opposite direction, a causal relationship exists between RER and attracting FTA to Vietnam, but at a 10% significance level. Based on equation (1.2'), increasing RER with a

one-year lag increases FTA, but RER with a two-year lag has a negative relationship with FTA. In comparing the influence correlation between equations (1.1') and (1.2'), past shocks in FTA have a weaker self-influence than past shocks in RER. Similarly, the impulse response analysis shows that the shock from increasing RER only reacts and pushes FTA up in the next period, but this increase is only maintained for one period and then adjusted down in the next period. Figure 2 also shows the time to overcome the shock in the short term limited to four years, and then there is no volatility and stability in the long term. Government intervention affects RER, leading to a quicker adjustment to long-term equilibrium compared to the time required for achieving equilibrium in FTA fluctuations. The trend of causality running from RER to FTA in this study is different from studies like Kuncoro (2016), Jena and Dash (2020), but volatile as the conclusion of Gao *et al.* (2018). The loose causal relationship between the FTA and the RER is weak because the exchange rate is controlled, and the Vietnamese dong in 2010-2019 almost depreciated against the US dollar. In addition, RER was almost flat during 2010-2019 (Figure 2).

4.5 The causal relationship between RER and real tourism revenue

Unlike the weak causal relationship between RER and FTA, the strong causal relationship between RER and RTR (at a 1% significance level) is shown in Table 3. Exchange rate fluctuations affect the purchasing power of tourists, making the destination more expensive and resulting in fewer international tourist arrivals. The volatility of RER with a one-year lag has a positive effect on RTR. The following year, tourists responded with an increase in RER, reducing tourism demand and then reducing RTR. Similar to Figure 2, the RER shock to RTR was positive in the first period, then negative in the following three periods, and the correction trend increased slightly over the eight years and remained below the equilibrium standard. The coefficient magnitude of RER at one-year and two-year lags in equation (2.1), coupled with the information presented in Figure 3, indicates that an augmentation in RER corresponds to a decrease in RTR.

Figure 3. Result of impulse response between RER and RTR

Source: Authors' calculation

By contrast, an increase in tourism revenue comes partly from the income from international tourism, an increase in the amount of foreign currency, the effect of a downward adjustment in the exchange rate, and an increase in the exchange rate, but increasing the RTR with the two-year delay increases the RER. According to the impulse response depicted in Figure 3, a rise in RTR has a short-term, slightly negative impact on RER over the following four years before maintaining a steady state over the long term. The negative relationship between RER and tourism revenue is also confirmed in the study of Hung and Hieu (2022). However, the relationship between RER and real tourism revenue is not entirely negative; real tourism revenue reacts more slowly than tourism revenue, especially since the Vietnam price index fluctuated greatly between 2000 and 2019.

5. Conclusions

The price indexes of the Vietnam dong and the US dollar tend to fluctuate in response to global economic crises. Before 2010, the time series of the real exchange rate between the Vietnamese dong and the US dollar demonstrated instability, whereas afterward, the RER exhibited minimal fluctuations. From 2013 to 2019, the State Bank effectively administered exchange rate fluctuations by expanding the exchange rate range through the utilization of financial and monetary instruments. The continuous depreciation of the Vietnamese dong relative to the US dollar offers an opportunity to enhance the competitiveness of goods and services, thereby creating a favorable environment for attracting international tourists. The correlation between the Vietnamese dong price index and the US dollar explains the link between nominal and real exchange rates. This insight enables a clearer understanding of how the Vietnamese government can manage a stable exchange rate regime to support the export of goods and services.

Ignoring the conventional linear relationship, the study utilizes VAR and IRF techniques to discern lagged associations and adjustment durations following shocks for returning to equilibrium. The study shows a weak one-way causality running from FTA to RER. The volatility of FTA/RER reacts with a slight adjustment to RER/FTA in the short term within four years but then stabilizes in the long term. The VAR and impulse response model results show that RER self-adjusts to equilibrium faster than FTA, partly due to the government's ability to adjust the exchange rate flexibly. By contrast, a two-way causal relationship between RER and RTR was shown to be close at a 1% significance level. The appreciation of the real exchange rate leads to an initial period of increased income, followed by an immediate response from FTA due to the elevated costliness of the destination, thereby negatively impacting tourism revenue in the long run. Conversely, an increase in real tourism revenue in the short term leads to a rise in foreign currency, resulting in a reduction of the real exchange rate, which then stabilizes in the long run. Hence, the increase in real tourism revenue contributes to a greater amount of foreign currency in the short term, thereby causing a reduction in the real exchange rate that subsequently stabilizes over the long term.

The General Statistics Office should collaborate with the Vietnam National Authority of Tourism in collecting and publishing nationality-specific international tourist expenditure statistics. This will enable the quantification of foreign currency inflows, aiding in the monitoring and assessing potential impacts on exchange rates. Such data will further support efforts to maintain stability and formulate monetary policies that facilitate equilibrium in the foreign exchange market. International tourist expenditure data can be utilized to guide investments in areas showing potential and substantial demand among international tourists. This entails developing valuable supplementary tourism products and high-value services, establishing interconnected tour packages to extend the duration of stays, and encouraging tourist spending.

Vietnam's economy has deeply integrated into the global economy, resulting in continuous fluctuations in foreign currency movements and susceptibility to international macroeconomic factors. Consequently, the State Bank must exercise careful management of price stabilization policies to uphold the stability of the national economy and the real exchange rate. Furthermore, the government should strive to enhance the competitiveness of Vietnamese products and services in the global market by implementing policies that foster the development of export-oriented industries. Additionally, the devaluation of the domestic currency is a significant determinant of attracting international tourists. Alongside these initiatives, the government may pursue tourism promotion policies and strategic infrastructure investments to attract visitors and augment tourism revenue.

This study thoroughly examines the causal relationship and the influence of shocks pertaining to real exchange rates on international tourist arrivals and tourism revenue, as well as the inverse relationship. Nevertheless, the modeling and prediction of international tourism demand should be conducted using either macro or micro variables. Several prevailing research models on tourism demand include gravity, ideal demand system, and push-pull models. In particular, these models have not been extensively applied for Vietnam. Hence, one potential direction for future research involves delving into the nonlinear connections inherent in the models above, suggesting the formulation of more comprehensive policies for tourism development. The State Bank's effective management of exchange rates from 2013 to 2019 suggests new research directions on in-depth analysis of financial and monetary policies that exhibit flexible interventions in the foreign exchange market.

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