

THE RELATION BETWEEN TOURISM AND ECONOMIC GROWTH: A CASE OF SAUDI ARABIA AS AN EMERGING TOURISM DESTINATION

Lamia Jamel

Abstract. This paper examines empirically the relation between tourism and economic growth in Saudi Arabia. The author tries to justify how tourism contributes to the economic growth of Saudi Arabia. There are applied descriptive statistics, unit root test, VAR model and Granger Causality test as an econometric methodology to examine the connection between tourism and economic growth in Saudi Arabia for the annual data in the period from 1990 to 2018. The main empirical results of the study find out that tourism affects positively the economic growth in Saudi Arabia. Also, there is found a positive nexus among tourism and economic growth. Furthermore, CO₂ emissions and financial development impact positively the tourism sector, while trade openness predicts a negative effect on tourism. Additionally, CO₂ emissions, financial development, and trade openness have a positive impact on economic growth in Saudi Arabia. Finally, the Granger causality test provides evidence of bidirectional nexus between tourism and economic growth in Saudi Arabia. This paper contributes to the current research by explaining the causal nexus among tourism and economic growth in Saudi Arabia during the period from 1990 to 2018, applying a vector autoregressive model and Granger Causality.

Keywords: tourism, economic growth, time series, vector autoregressive, granger causality

JEL Classification: F43, Z32

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1. Introduction

For several decades, international tourism has experienced dynamic growth and sustained expansion. Cross-border travel for recreation, leisure or business has become one of the most dynamic economic activities in the world. The international tourism is an important part of economic growth in developing countries, particularly for the least developed ones and other small, structurally weak and vulnerable countries which, without this sector, would have faced enormous challenges in a trading system. Now highly competitive and rapidly evolving, tourism is "like an iceberg: the visible part consists of travel, accommodation and tourist services, below the surface, there are multiple possibilities for households, micro and small businesses". Many countries are endowed with often unique resources of a historical, natural or cultural nature capable of being transformed into travel destinations. Tourism is thus a universal activity with a significant local impact.

Tourism stimulates the local economy in destination countries thanks to the links existing in the value chain with other economic sectors, notably with agriculture. It also promotes entrepreneurship and the growth of local SMEs; it allows better diversification of the local economy while generating income linked to exports. Goods and services from this industry create new jobs, especially for young people and women, contributing to poverty reduction. In poor and remote rural areas, tourism can help generate income for the population of these areas while reducing urban migration flows. In some countries, tourism revenues have created funds to finance biodiversity conservation and natural resource protection programs behind this tourism. Finally, tourism can help to make a country's external image positive.

Tourism is mainly an activity handled by the private sector. However, without the existence and application of coherent policies and actions coordinated by the government, in the tourism sector but also in other related sectors, tourism cannot be fully integrated into an objective of inclusive and sustainable growth and development. Worse, without political will, financial leakage (the loss of tourism revenue linked to the acquisition of goods and services outside the country) can significantly erode the economic benefits of tourism and weaken the country's environmental, social, cultural and economic development.

Tourism is a sector made up of different branches (transport, accommodation, catering, cultural and sporting activities, etc.) which also concern non-tourists. It occupies an increasing place in service activities, and it has considerable effects on the economies, societies, cultures of the countries and territories concerned.

Saudi Arabia is an important cultural and historical destination both religiously and economically. The state-sponsored modern tourism concept promote multiple benefits of tourism in the economic, cultural, heritage, social and environmental aspects. The Saudi museums contain artifacts found in modern archaeological excavations of the Umayyad and Abbasid period, the medieval and late Islamic era, and finally the reunification period of Saudi Arabia. There are also more than 10,000 heritage and cultural sites in the country, including 500 mentioned in the ancient Arabic poetry, and about 400 others mentioned in the biography

of the Prophet, but Mecca remains the most attractive city for visitors, followed by Medina. Along the coast of the Red Sea there are beaches that qualify to be an attractive place for tourists: approximately 1800 km from the west and 700 km on the coast of the Arabian Gulf from the east. Saudi Arabia plans to attract 100 million visitors a year in 2030, and to increase tourism contribution to the economy from five to 18 percent.

In the literature, there are some current research papers investigating the correlation between tourism and economic growth in various countries across the world (Manzoor et al., 2019; Mishra et al., 2011; Ridderstaat et al., 2014; Letunovska et al., 2020; Kharazishvili et al., 2020). Nevertheless, none of them concentrate on evaluating the link between tourism and the economic growth in Saudi Arabia. So, our purpose is to resolve the following questions: What is the connection between tourism and economic growth in Saudi Arabia? How do these indicators associate in the short run and long run?

To do so, the main task of this research is to investigate empirically the link between tourism and economic growth in Saudi Arabia. There are applied a vector autoregressive (VAR) model and Causality Granger test as an appropriate econometric methodology for the annual data for Saudi Arabia in the period from 1990 to 2018. The main empirical findings of the study show that tourism positively affects the economic growth in Saudi Arabia. Also, it was found that GDP has a positive impact on tourism. Furthermore, CO₂ emissions and financial development have a positive impact on the tourism sector, while trade openness predicts a negative effect on tourism. However,, CO₂ emissions, financial development, and trade openness have a positive impact on economic growth in Saudi Arabia. Additionally, the main conclusions of the Granger causality test provide evidence of bidirectional link between tourism and economic growth. Furthermore, our results indicate the existence of unidirectional link between tourism and trade openness in Granger's sense.

The rest of this study is organized as follows: section 2 presents a literature review for the link between tourism and economic growth. Section 3 explains the econometric methodology used in this paper. The data is analysed in section 4. The main empirical findings are presented in section 6. Finally, section 7 makes conclusions.

2. Literature Review

For the reason that tourism potentially contributes to economic growth, efforts have been made to assess the economic effects of various modes of tourism. The current investigations comprise papers in sports tourism (Daniels et al., 2004; Li & Jago, 2013), rural tourism (Fleischer & Tchetchik, 2005; Park et al., 2014), ethnic tourism (Theerapappisit, 2009), park tourism (Ma et al., 2009; Mayer, 2014; Saayman & Saayman, 2006), conference, convention, and exhibition tourism (Hanly, 2012), religious tourism (Saayman et al., 2014), festival tourism (Clarke & Hoas, 2007; Saayman & Rossouw, 2011), casino gaming tourism (Benar & Jenkins, 2008; Wan, 2012), and heritage tourism (Dredge, 2004).

It is generally believed that tourism has contributed positively to economic growth as exports have strongly triggered economic development. The worldwide trade theories are supportive of a positive nexus among export and economic growth (Thornton, 1997; Xu, 1996; Ahmed & Kwan, 1991; Jin, 1995). Several papers including that by Marin (1992) suggest that a unidirectional exports growth influences economic expansion in developed countries such as United States, Japan, United Kingdom and Germany.

Furthermore, export support and economic growth have significantly strengthened each other in South America and Africa (Jin, 1995; Bahmani-Oskooee & Alse, 1993). Moreover, Kulendran & Wilson (2000) and Shan & Wilson (2001) show a great reciprocal nexus among international trade and international travel in Australia and China.

Theoretical models that consider a causal connection among non-traded goods, such as tourism and economic growth, are recent phenomenon (Kim et al., 2006). In a recent study of economic growth some academics maintain that tourism has a long-run economic growth influence (Lanza et al., 2003; Balaguer & Cantavella-Jorda, 2002; Tang & Jang, 2009; Katircioglu, 2009; Oh, 2005; Ridderstaat et al., 2014), and several of them suggest that there is a reciprocal causality nexus among tourism development and economic growth (Kim et al., 2006; Dritsakis, 2004; Durbarry, 2004; Kumar & Kumar, 2012; Lee & Chang, 2008).

The tourism-led growth literature argues that tourism specialization stimulates economic development (Algieri, 2006; Perez-Dacal et al., 2014; Ridderstaat et al., 2014). The possibility of tourism growth is revealed through augmented terms of trade (ToT). The empirical investigations confirm these theoretical proposals because despite the pessimistic predictions of the endogenous growth theory, small islands were able to develop (Brau et al., 2007; Croes, 2013; Holzner, 2011).

A various number of papers have employed many methods to investigate the nexus between tourism and economic growth, such as the econometric models, the tourism satellite account (TSA), computable general equilibrium (CGE) models and Dynamic Stochastic General Equilibrium (DSGE) models. This section briefly reviews the related papers and summarizes the research objectives of this paper. In the econometric models, cointegration and the Granger causality are commonly employed to study the nexus between tourism and economic growth (Brida et al., 2016; Song et al., 2012).

For instance, Chiu & Yeh (2017) apply cross-sectional data models to detect a correlation link between tourism and economic growth. Several papers such as Belloumi (2010), Croes & Vanegas (2008) and Shahzad et al. (2017) employ time series models. Other papers use panel data models (Bilen et al., 2017; Liu & Song, 2018; Salifou and Haq, 2017), which give a larger degree of freedom in the model estimation and are particularly useful when the time series are brief (Song et al., 2019; Wu et al., 2017).

Po & Huang (2008) use a cross-sectional study of 88 nations during the period from 1995 to 2005. They find a nonlinear correlation between the expansion of tourism and economic

growth, divided all the data collected into three regimes for their investigation. The empirical results of the threshold regression when (q_i) is below 4.048% (regime 1.57 nations) or above 4.73% (regime 2.23 nations) show a confident nexus between tourism and economic growth.

Karimi (2018) examines the connection between leisure industry and economic growth in Malaysia. Karimi (2018) shows a positive impact of the leisure industry on the economic growth. He demonstrates a significant and considerable long-term impact on variables such as exchange rate, trade, and inflation, which were essential for the Malaysian economic growth. Karimi (2018) reports that tourism can stimulate economic growth, but for it to have an impact the policymaking requires successful promotion of inbound tourism.

As Brida et al. (2016) found, although various empirical investigations employing Granger causality and cointegration tests support a Granger causality connection between tourism and economic growth, they can only study the sequence of occurrence between tourism and economic growth, rather than a real cause-effect connection (Song et al., 2012).

3. Methods

In this part there are presented the model and all variables used in this paper. Compared to simultaneous equations (a basis of macro-econometrics until the 1970s), the VAR model has the advantage of capturing the variation of the model's parameters (system of equations) over time, and thus makes it possible to better restore the system dynamics, which gives credibility to the economic policy (macroeconomic forecasts) which adjusts and adapts to variations or shocks (innovations) experienced by the socioeconomic environment. Then, there is used a Vector Autoregressive (VAR) to estimate the dynamic relationship between tourism and economic growth in Saudi Arabia during the period of study from 1990 to 2018. Let a vector process $\{y_t\}_{t \in \mathbb{Z}}$ of dimension $(k,1)$ admit a representation VAR(p):

$$y_t = c_0 + A_1 y_{t-1} + \dots + A_p y_{t-p} + v_t \quad (1)$$

$$A(L)y_t = c_0 + v_t \quad (2)$$

With, $A_0 = I_k$, $A_p \neq 0_k$ and $A_i = A_0$ if $i = 0$ as mentioned in Equation 7.

Where, y_t represents the dependent variable, y_{t-i} (i periods back) is called the i -th lag of y , A_i is a time-invariant $(k \times k)$ -matrix, c_0 is a k -vector of constants, p indicates the order of the VAR model which is obtained by the VAR Lag Order Selection Criteria Test, t indicates the time period ($t = 1, \dots, 29$), v_t is a k -vector of error terms $L^i = y_{t-i}$ and indicates the endogenous variables.

The matrices $A_i, \forall i \in [1, p]$ are of dimension (k, k) . The innovation vector v_t is $I.I.D(0_k, \Omega)$ and where Ω is a positive definite symmetric square order matrix (k) . The innovation vector must satisfy the following requirements:

$$E(v_t) = 0_k \quad (3)$$

$$E(v_t v_t') = \begin{cases} \Omega, & j = 0 \\ 0, & j \neq 0 \end{cases} 0_k \quad (4)$$

The model VAR(p) is following:

$$\begin{aligned} y_{1t} = & a_1^0 + a_{11}^1 y_{1,t-1} + a_{12}^1 y_{2,t-1} + \dots + a_{1k}^1 y_{k,t-1} \\ & + a_{11}^2 y_{1,t-2} + a_{12}^2 y_{2,t-2} + \dots + a_{1k}^2 y_{k,t-2} \\ & \vdots \\ & + a_{11}^p y_{1,t-p} + a_{12}^p y_{2,t-p} + \dots + a_{1k}^p y_{k,t-p} + v_{1t} \end{aligned} \quad (5)$$

$$\begin{aligned} y_{2t} = & a_2^0 + a_{21}^1 y_{1,t-1} + a_{22}^1 y_{2,t-1} + \dots + a_{2k}^1 y_{k,t-1} \\ & + a_{21}^2 y_{1,t-2} + a_{22}^2 y_{2,t-2} + \dots + a_{2k}^2 y_{k,t-2} \\ & \vdots \\ & + a_{21}^p y_{1,t-p} + a_{22}^p y_{2,t-p} + \dots + a_{2k}^p y_{k,t-p} + v_{2t} \end{aligned} \quad (6)$$

Where, a_{ij}^s indicates the coefficients of endogenous variables with s indicating shift, i differentiates the coefficients of variables between equations and j differentiates the coefficients among variables in the same equation.

Again, the matrix form can be found while complying with the following scriptures:

$$y_t = \begin{pmatrix} y_{1t} \\ y_{2t} \\ \vdots \\ y_{jt} \\ \vdots \\ y_{kt} \end{pmatrix} c_0 = \begin{pmatrix} a_1^0 \\ a_2^0 \\ \vdots \\ a_j^0 \\ \vdots \\ a_k^0 \end{pmatrix} A_i = \begin{pmatrix} a_{11}^i & a_{12}^i & \dots & a_{1k}^i \\ a_{21}^i & a_{22}^i & \dots & a_{2k}^i \\ \vdots & \vdots & \vdots & \vdots \\ a_{j1}^i & a_{j2}^i & \dots & a_{jk}^i \\ \vdots & \vdots & \vdots & \vdots \\ a_{k1}^i & a_{k2}^i & \dots & a_{kk}^i \end{pmatrix}_{i \in [1, p]} \quad (7)$$

$$y_{t-i} = \begin{pmatrix} y_{1,t-i} \\ y_{2,t-i} \\ \vdots \\ y_{j,t-i} \\ \vdots \\ y_{k,t-i} \end{pmatrix}_{i \in [1, p]} \quad v_t = \begin{pmatrix} v_{1t} \\ v_{2t} \\ \vdots \\ v_{jt} \\ \vdots \\ v_{kt} \end{pmatrix}$$

Thus, we arrive at joining the general matrix writing of a multivariate VAR (p) which is represented in its reduced form.

$$y_t = c_0 + \sum_{i=1}^p A_i y_{t-i} + v_t = c_0 + \sum_{i=1}^p A_i L^i y_t + v_t \quad (8)$$

To estimate our model and to test the impact of tourism on economic growth in Saudi Arabia, we use tourism and economic growth as endogenous variables, and we use CO₂ emissions, financial development, and trade openness as exogenous variables. The definition of all variables used is presented in *Table 1*.

Table 1. Variables' definitions

Indicator Name	Code	Extended definition	Source
GDP growth (annual %)	GDP	Annual percentage growth rate of GDP in market prices based on constant local currency. Aggregates are based on constant 2010 U.S. dollars.	World Bank National accounts data, and OECD National Accounts data files.
International tourism, number of arrivals	NTA	International inbound tourists (overnight visitors) are the number of tourists who travel to a country other than their permanent residence, outside their usual environment, for a period not exceeding 12 months and whose main purpose in visiting is other than an activity remunerated from within the country visited.	World Tourism Organization, Yearbook of Tourism Statistics, Compendium of Tourism Statistics and data files.
Stocks traded, total value (% of GDP)	TO	The value of shares traded is the total number of shares traded, both domestic and foreign, multiplied by their respective matching prices.	World Federation of Exchanges database.
Domestic credit to private sector (% of GDP)	FD	Domestic credit to private sector refers to financial resources provided to the private sector by financial corporations, such as through loans, purchases of nonequity securities, and trade credits and other accounts receivable, that establish a claim for repayment. For some countries these claims include credit to public enterprises.	International Monetary Fund, International Financial Statistics and data files, and World Bank and OECD GDP estimates.
CO ₂ emissions (metric tons per capita)	CO ₂	Carbon dioxide emissions are those stemming from burning fossil fuels and the manufacture of cement. They include carbon dioxide produced during consumption of solid, liquid, and gas fuels and gas flaring.	Carbon Dioxide Information Analysis Centre, Environmental Sciences Division, Oak Ridge National Laboratory, Tennessee, United States.

Source: developed by the author.

4. Data

4.1. Descriptive Analysis

This study aims to examine the causal link between tourism and economic growth in Saudi Arabia during the period of study from 1990 to 2018. There were used the annual data obtained from the World Bank databases. *Table 2* summarizes the descriptive statistics of the indicators used in this study. This table demonstrates that in average the higher value is for the number of arrivals in international tourism (9,207,963) followed, respectively, by total value of stocks traded (65.91166), financial development (32.99158), CO₂ emissions (16.15351) and GDP growth (3.645280).

For the two statistics of skewness (asymmetry) and kurtosis (leptokurtic), it can be remarked that the two variables used in this study are characterized by non-normal distribution. The negative sign of the skewness coefficients indicates that the CO₂ variable is skewed to the left and it is far from being symmetrical for all variables. However, the skewness coefficients indicate that the variables GDP, NTA, TO and FD are skewed to the right, and all variables are far from being symmetrical. Also, the Kurtosis coefficients confirm that the leptokurtic for all variables employed in this paper show the existence of high peak or fat-tailed volatilities.

Based on the estimate coefficients of Jarque-Bera, there can be rejected the null hypothesis of normal distribution of the variables used in our study. Then, the high value of Jarque-Bera coefficients reflects that the series is not normally distributed at the level of 1%. Finally, and based on the three statistics – skewness, kurtosis and Jarque-Bera – it can be concluded that all variables employed in this paper are not normally distributed at the level of 1%.

Table 2. Descriptive statistics

	TO	GDP	CO2	FD	NTA
Mean	65.91166	3.645280	16.15351	32.99158	9207963.
Median	31.71435	2.788402	16.69630	32.35426	8037000.
Maximum	372.2599	15.19343	19.71427	58.11449	18260000
Minimum	10.48277	-3.763285	10.49777	14.82210	3114422.
Std. Dev.	91.42413	4.766838	2.842125	12.34316	5565735.
Skewness	2.322804	0.849053	-0.533751	0.497256	0.336534
Kurtosis	7.689675	3.404697	2.192900	2.391514	1.616944
Jarque-Bera	52.65280	36.82207	21.64091	46.42498	28.58754
Probability	0.000000*	0.000000*	0.000000*	0.000000*	0.000000*
Observations	29	29	29	29	29

Note: This table reports the descriptive statistics of all indicators used in this paper. There was employed the annual data for Saudi Arabia during the period from 1990 to 2018. Statistical implication at the threshold level of 1 percent is denoted by *.

Source: developed by the author.

4.2. A Correlation Matrix

This section analyses the correlation among all variables used. Moreover, *Table 3* summarises the estimation coefficients of the Pearson correlation matrix among all indicators employed in this paper. The empirical results presented in this table show that all estimating coefficients are inferior to the tolerance limit of Pearson (0.7), which does not cause problems in estimating the four equations. Since there is no correlation problem in this case, the analysis can be continued based on a set of econometric tests and estimates.

Table 3. A Correlation Matrix

	TO	GDP	CO2	FD	NTA
TO	1	0.09719	0.25163	0.21857	0.18646
GDP	0.09719	1	-0.01440	-0.24915	-0.02403
CO2	0.25163	-0.01440	1	0.39781	0.27419
FD	0.21857	-0.24915	0.39781	1	0.29766
NTA	0.18646	-0.02403	0.27419	0.29766	1

Note: This table recapitulates the estimated coefficients of correlation among all indicators. There are used the annual data for Saudi Arabia during the period of study from 1990 to 2018.

Source: developed by the author.

4.3. A Unit Root Test

A study of the causal relationship between economic growth and tourism in Saudi Arabia first requires stationarity tests to determine the order of integration of each series. The results of the Augmented Dickey-Fuller test applied to the series are shown in *Table 4* for the case of Saudi Arabia.

Thus, the acceptance or rejection of the null hypothesis of the test is based on the value of probabilities and statistics relating to the indicated test. These probabilities are compared to a 10% threshold. If these probabilities are less than 10%, then the null hypothesis is rejected and if these probabilities are greater than 10%, then the null hypothesis is accepted.

For the case of Saudi Arabia and according to *Table 4*, it can be observed that only the variable GDP is stationary in the level according to the Augmented Dickey-Fuller test but all the variables are stationary in first difference according to this test. Then, all the variables are stationary in first difference based on the unit root test. So, all the variables are integrated of order 1. The unit root test confirms the stability of the VAR model which will be used in our study.

Table 4. A Unit Root Test

Variables	Augmented Dickey-Fuller test statistic			
	Level		First Difference	
	t-statistic	p-value	t-statistic	p-value
NTA	-0.607050	0.8537	-5.091188	0.0004*
TO	-2.870534	0.0621	-7.317033	0.0000*
GDP	-4.366631	0.0019*	-5.665164	0.0001*
CO2	-1.897034	0.3288	-4.711808	0.0013*
FD	-0.602136	0.8548	-4.897344	0.0005*

Note: This table recapitulates the results of a stationary test. In this test the calculate p-value is compared to 10%. If the calculate p-value <10% therefore, the hypothesis H0 is refused and if the calculate p-value > 10% then the hypothesis H0 is accepted. With the hypothesis H0: all variables are non-stationary. Statistical meaning at 1% is presented by (*).

Source: developed by the author.

5. Results and Discussion

5.1. VAR Estimation

After having the stationary variables, there is built a VAR (Vector Auto Regressive) model. Such models allow, on the one hand, analysing the effects of one variable on the other through random shock simulations and, on the other hand, conducting an analysis in terms of causality. In the case of a VAR process, each of the variables is modelled according to its own delays and the delays of the other variables.

To determine the optimal delay number for the VAR representation, there are estimated several models for an order ranging from 1 to h (h being the maximum delay admissible by economic theory or by the available data).

The delay P which will minimize the criteria LR (sequential modified LR test statistic (each test at 5% level)), FPE (Final prediction error), AIC (Akaike information criterion), SC (Schwarz information criterion) and HQ (Hannan-Quinn information criterion) will be retained. According to the criteria used in *Table 5*, it can be noticed that the optimal number of delays is equal to 4 for the four models to be estimated. In this case, a VAR model of order 4 is estimated.

Table 5. A VAR Lag Order Selection Criteria Test

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-201.0897	NA	127346.2	17.42414	17.81683	17.52832
1	-181.9726	28.67564	36690.76	16.16438	16.75341	16.32065
2	-177.0315	6.588147	35002.13	16.08596	16.87133	16.29432
3	-172.7422	5.004114	36099.69	16.06185	17.04357	16.32230
4	-162.0020	10.74029*	22508.18*	15.50016*	16.67822*	15.81270*
5	-160.6854	1.097161	32360.55	15.72378	17.09818	16.08841

Note: * indicates a lag order selected by the criterion, LR: sequential modified LR test statistic (each test at 5% level), FPE: Final prediction error, AIC: Akaike information criterion, SC: Schwarz information criterion, HQ: Hannan-Quinn information criterion.

Source: developed by the author.

The VAR model of order 4 is applied to study the dynamic relationship between economic growth and tourism for the case of Saudi Arabia during the period from 1990 to 2018. *Table 6* summarizes the estimation of the VAR model. This Table shows that the coefficients of determination for the two estimates are greater than 0.6, therefore, the two estimates are characterized by a good linear fit.

For the estimation of the variable NTA which measures the number of arrivals of international tourism, it can be noticed that there are six significant variables, but with different signs.

It is shown that the variable NTA on date (t-1) which measures tourism expressed by the number of international tourists arriving in Saudi Arabia has a positive impact on tourism on the date t at a threshold of 5%. So, if the number of international tourists arriving in Saudi Arabia on date (t-1) increases by five units, then, the number of international tourists arriving in Saudi Arabia on date t increases by 0.650799 units.

For the second endogenous variable GDP, which measures the economic growth rate in Saudi Arabia, it is found out that the variable GDP at date (t-1) has a positive impact on tourism at date t at a threshold of 1%. Then, if economic growth in Saudi Arabia on date (t-1) increases by one, then the number of international tourists arriving on date t increases by 6.320594 units.

Also, it is found that the variable GDP at date (t-4) has a negative impact on tourism at date t at a threshold of 5%. So, if economic growth in Saudi Arabia on date (t-1) increases by five units, then the number of international tourists arriving on date t decreases by 5.135529 units.

For the exogenous variables, it is remarked that CO₂ emissions have a positive impact on tourism at a threshold of 1%. This means that if the CO₂ variable increases by one unit then the number of international tourists arriving in Saudi Arabia increases by 24.122230 units.

The variable FD which measures the level of financial development in Saudi Arabia has a positive impact on tourism at a threshold of 10%. This means that if financial development increases by ten units then the number of international tourists arriving in Saudi Arabia increases by 0.063256 units. This result reflects the importance of credits granted to the private sectors for financing tourism projects.

The TO variable which measures trade openness in Saudi Arabia has a negative impact on tourism at a threshold of 5%. This means that if the trade openness increases by five units then the number of international tourists arriving in Saudi Arabia decreases by 1.19E-056 units.

For the second endogenous variable GDP which measures the growth rate of GDP in Saudi Arabia, it is noticed that there are six significant variables.

We find that the variable NTA on date (t-1) which measures tourism expressed by the number of international tourists arriving in Saudi Arabia has a positive impact on economic growth on date t at a threshold of 1%. Then, if the number of international tourists arriving in Saudi Arabia on date (t-1) increases by one, then economic growth in Saudi Arabia on date t increases by 0.011089 units.

Also, it is shown that tourism at date (t-2) measured has a positive impact on economic growth at date t at a threshold of 1%. So, if the number of international tourists arriving on date (t-2) increases by one, then economic growth in Saudi Arabia on date t increases by 0.010192 units.

The variable GDP at date (t-4) has a negative impact on economic growth in Saudi Arabia at date t at a threshold of 1%. So, if economic growth in Saudi Arabia on date (t-1) increases by one unit, then economic growth in Saudi Arabia on date t decreases by 0.190905 units.

For the exogenous variables, it was found out that CO₂ emissions have a positive impact on economic growth in Saudi Arabia at a threshold of 1%. This means that if the CO₂ variable increases by one unit then economic growth in Saudi Arabia increases by 0.709785 units.

The variable FD which measures the level of financial development in Saudi Arabia has a positive impact on economic growth in Saudi Arabia at a threshold of 1%. This means that, if financial development increases by one unit then economic growth in Saudi Arabia increases by 0.306281 units. This result confirms the importance of credits granted to the private sectors for the financing of the economy.

The variable TO which measures trade openness in Saudi Arabia has a positive impact on economic growth in Saudi Arabia at a threshold of 5%. This means that if the trade openness increases by five units then economic growth in Saudi Arabia increases by 5.06E-07 units.

Table 6. VAR estimations

Variables	NTA	GDP
NTA(-1)	0.650799 [2.14147]**	0.011089 [5.41437]*
NTA(-2)	0.058536 [0.13208]	0.010192 [3.26119]*
NTA(-3)	0.107259 [0.29664]	-0.018737 [-0.58849]
NTA(-4)	-0.310363 [-1.48686]	0.009102 [0.49521]
GDP(-1)	6.320594 [1.88945]***	-0.160076 [-0.54345]
GDP(-2)	0.912583 [0.28915]	-0.441427 [-1.58840]
GDP(-3)	-1.668374 [-0.65700]	-0.127812 [-0.57161]
GDP(-4)	-5.135529 [-2.43354]**	-0.190905 [-3.02736]*
C	-231.7766 [-2.36522]**	-0.791857 [-0.09177]
CO2	24.12230 [2.90869]*	0.709785 [2.97199]*
FD	0.063256 [1.93659]***	0.306281 [4.17052]*
TO	-1.19E-05 [-2.02362]**	5.06E-07 [1.97816]**
R-squared	0.888411	0.832525
Adj. R-squared	0.793989	0.747646
Sum sq. resids	24536.92	190.2444
S.E. equation	43.44485	3.825465
F-statistic	9.408961	0.900774
Log likelihood	-121.5867	-60.84138
Akaike AIC	10.68694	5.827311
Schwarz SC	11.27200	6.412371
Mean dependent	74.74685	2.915520
S.D. dependent	95.71787	3.737464

Note: This table recapitulates the estimated coefficients from the VAR model. To examine empirically this model, there are used the annual data for Saudi Arabia in the period from 1990 to 2018. Statistical significance at 1%, 5%, and 10% level are presented by (*), (**), and (***), respectively.

Source: developed by the author.

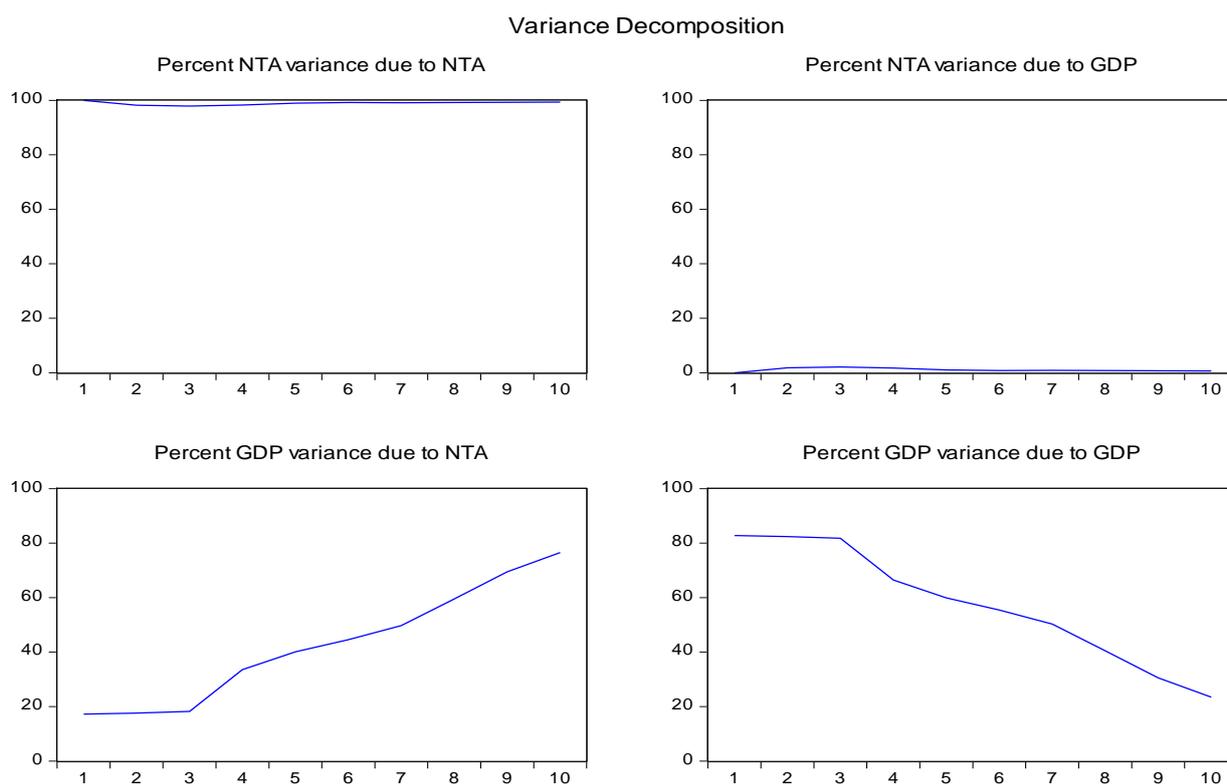


Figure 1. The Variance Decomposition Test

Source: developed by the author.

In addition, the variance decomposition test was used to confirm the results received by means of the VAR model. However, the variance decomposition separates the volatility in an endogenous variable into the component shocks to the VAR model. Thus, the variance decomposition provides information about the relative significance of each random innovation in affecting the variables in the VAR. *Figure 1* presents the variance decomposition test. This figure shows the impact of tourism on economic growth in Saudi Arabia after a period of two years. This result provides the same findings to the VAR estimation.

Also, there was employed the Impulse Response Function test to continue the justification of our empirical findings (*Figure 2*). Nevertheless, the impulse response functions trace the impacts of a shock of one endogenous variable on to the other variables in the VAR model. Based on this figure, it can be observed that tourism in Saudi Arabia has an important and positive impact on economic growth.

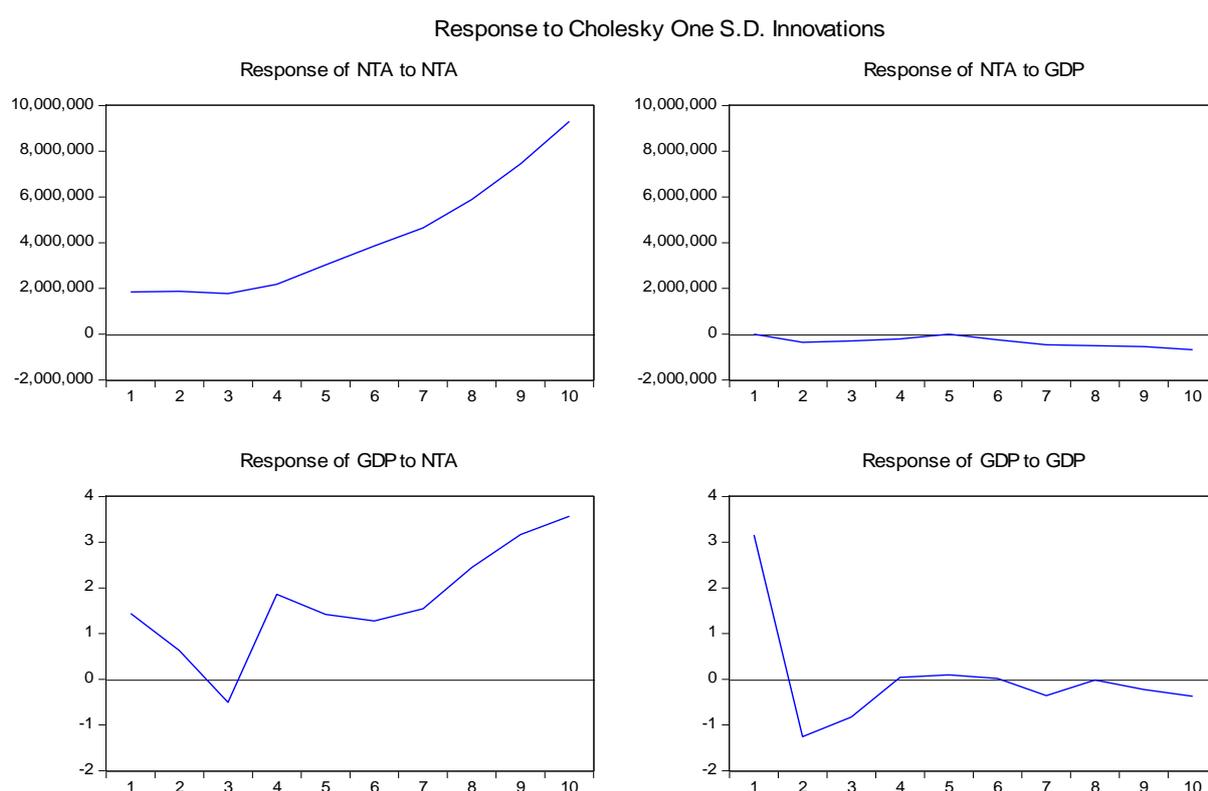


Figure 2. The Impulse Response Function Test

Source: developed by the author.

5.2. A Causality Test

It is necessary to check whether tourism causes economic growth or whether economic growth causes tourism in Saudi Arabia. The causal relationship between tourism and economic growth in Saudi Arabia is determined by using the Granger Causality test. The acceptance or rejection of the null hypothesis of the Granger causality test is based on a 5% threshold. If the probability of the test is less than 5%, in this case we reject the null hypothesis and if this probability is more than 5% then we accept the null hypothesis of no causal link.

Table 7 summarizes all results of the Granger causality test between tourism and economic growth for the case of Saudi Arabia during the period from 1990 to 2018.

Table 7 shows that there is a two-way relationship between tourism and economic growth in the sense of Granger. This result confirms that tourism can cause economic growth in the Granger's sense. Thus, economic growth can cause tourism in the sense of the Granger's causality.

In addition, it has been noticed that there is a one-way relationship between tourism and trade openness. That is to say that only tourism in Saudi Arabia can cause trade openness in the Granger's sense.

Table 7. A Causality Granger's Test

Null Hypothesis:	Obs	F-Statistic	Prob.
GDP does not Granger Cause NTA	27	18.6017	0.0000*
NTA does not Granger Cause GDP		21.9395	0.0000*
CO2 does not Granger Cause NTA	27	0.07314	0.9297
NTA does not Granger Cause CO2		0.02863	0.9718
FDI does not Granger Cause NTA	27	0.06853	0.9340
NTA does not Granger Cause FDI		0.10641	0.8995
TO does not Granger Cause NTA	27	0.39716	0.6770
NTA does not Granger Cause TO		17.7532	0.0000*

Note: The * is significant at 5 percent.

Source: developed by the author.

6. Conclusions

This paper examines the causal nexus between tourism and economic growth in Saudi Arabia. For that goal, there are used a VAR model and a Granger Causality test as an econometric methodology for the annual data of Saudi Arabia in the period from 1990 to 2018. There are employed a descriptive analysis, a Person correlation test, a unit root test, a VAR model and a Granger Causality test as an empirical methodology to examine the impact of tourism on economic growth in Saudi Arabia.

The main empirical results of our study find out that tourism affects positively economic growth in Saudi Arabia. It is concluded that GDP at (t-1) has a positive impact on tourism. The GDP per capita at (t-4) predicts a negative link with tourism in Saudi Arabia. Furthermore, CO₂ emissions and financial development impact positively the tourism sector in Saudi Arabia. However, trade openness is predicted to have a negative influence on tourism.

There is also found a positive connection between tourism at (t-1) and at (t-2) and economic growth. The GDP per capita at (t-4) predicts a negative link with GDP at t in Saudi Arabia. Then, CO₂ emissions, financial development, and trade openness impact positively the tourism sector in Saudi Arabia. Also, the main empirical conclusions of the causality test prove an evidence of a bidirectional connection between tourism and economic growth. Also, there is found a unidirectional link between tourism and trade openness in the Granger's sense.

Finally, these are macroeconomic aggregates that describe the size and economic importance of tourism, such as Value-Added Tourism (VAT), financial development, trade openness and Tourism GDP consistent with the same aggregates established for the national economy. In this context, Saudi Arabia is obliged to establish a link between monetary data and other non-monetary information on tourism. Thus, there is needed the measurement of the economic impacts of tourism in the same way as it is done for other productive activities within the framework of the National Accounts.

Based on the empirical conclusions of this study, it is proposed, firstly, that the Saudi government must implement a modern policy and strategy of economic growth based on the tourism industry. Second, public infrastructure among Saudi cities and increasing their connectivity should be implemented. Lastly, more social protection strategies should be established, which would increase the nation's sustainability under conditions of its regional challenges.

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