



VECM Model Analysis of the Causality between Tourism, Foreign Direct Investment and Economic Growth in Tunisia

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ABSTRACT

This paper aims to investigate the causality between tourism, foreign direct investment and economic growth in Tunisia over the period ranging from 1980 to 2018. Time series analysis techniques were used as an econometric tool in this chosen subject, namely, the Augmented Dickey- Fuller (ADF) test for verification of the presence of the root unit, the Engle-Granger test for the existence of cointegration and the Granger causality test for the determination of the causal relationships between the variables of the model. The results of this study have shown a positive relationship between tourism receipts, foreign direct investment and economic growth, and how these three variables are cointegrated of first order. In addition, at the significance level of 5%, there has been: (i) A bidirectional relationship between economic growth and tourism development, that's mean, the economic growth can contribute to tourism development and vice versa; (ii) A unidirectional relationship between economic growth and foreign direct investment; (iii) Finally, a unidirectional relationship between tourism development and foreign direct investment. This study has also suggested that the government should focus on economic policies to further promote international tourism as a potential source of economic growth in Tunisia.

I. INTRODUCTION

Since its independence, Tunisia has implemented several development strategies based on market dynamics on the one hand, and rapid growth on the other hand, partly based upon international tourism and international markets openness. Indeed, international tourism and foreign direct investment are considered as the main crucial vectors of the national economy and as two important sources of foreign exchange. This is due to its exceptional natural and cultural heritage, its pleasant climate, its diversity of landscapes, its diversified accommodation offers and its modern infrastructure. That's why tourism is considered nowadays as a vital sector having a lot of gains such as development in income, employment, foreign exchange, and additional in growth. It is also important to note that tourism industry contributes actively to the generation of income, the export and the creation of national jobs. Furthermore, tourism development plays a vital role in the economic development of the whole country, through the training effects that it exerts on the rest of the upstream and downstream sectors of the economy.

Indeed, the growth of tourist arrivals worldwide induces a growing demand for goods and services such as food, accommodation and transportation. The government, therefore, has an interest in investing and attracting more FDI to develop domestic products and infrastructure to meet growing tourism demand. As Othman and Sallah (2006) point out, the government has tried to encourage local and foreign investors to participate in the tourism industry by offering them various attractive investment incentives.

Foreign direct investment (FDI) has been seen as a key to economic growth given its contribution to productivity growth, job creation, infrastructure expansion and the development of national competitiveness. Samimi, Sadeghi and Sadeghi (2013) examined the causal relationship and cointegration between tourism and FDI for a panel of 20 developing countries. They found a strong bilateral causality between these two variables. In other words, whenever a shock occurs in the system, the variables would be adjusted in the short term to restore the long-term equilibrium.

1. The place of tourism in economic development strategies in Tunisia

Since independence, Tunisia has experienced several development strategies, aimed at ensuring rapid growth to catch up his delay. Indeed, Tunisia is engaged in a process of industrialization. However, following the industry blockade, there is a shift towards tourism, a sector that can play a significant role in the economy through its short-term profitability. The recourse to this sector was intended to bring in foreign exchange to meet the growing needs for imports of consumer goods, intermediate products and equipment necessary for the economic and social development of the country, and guarantee the repayment of the external debt. It should be noted that the development of tourist activity in Tunisia since the beginning of the 1960s has been strongly conditioned by public intervention, in two main forms: On the one hand, investments that the government and local authorities have financed in areas contributing to tourism development and, on the other hand, the benefits that the government offers to local and foreign tourism entrepreneurs (tax exemptions for the first five years, deduction of the production tax, etc.). From the 6th plan (1982-1986), tourism has become one of the concerns of the public authorities. The investment goes from 55.4 million dinars in the 4th plan to 504 million dinars in the 6th plan. The government opens this sector more broadly to private investment. Foreign investors are mainly Arabs (Kuwait and United Arab Emirates) and Europeans (French, German, British, Spanish, Luxembourgish, Swiss, and Italian). Three periods mark the strong presence of foreign direct investment (FDI) in Tunisian tourism, that of 1996 (17.8%), 2001 (14.4%) and 2008 (5.84%). Economic policy makers often see the development of this sector as one of the most efficient and viable solution to reduce unemployment in the regions, and increase foreign exchange reserves. It is worth mentioning that the inflows cover more than two-thirds of the trade deficit. With regard to revenues from exports of goods and services, tourist receipts in 2017 are in second place (34%), after the textile sector (58.45%). In addition, tourism accounts for more than 15.3% of GDP in 2017 (WTTC, 2017). Also, through its training effects, tourism stimulates other vital sectors such as building, trade, crafts, agriculture, etc. Indeed, the number of indirect jobs created by this sector is equal to nearly three times the number of direct jobs created by this sector.

2. The place of foreign direct investment in Tunisian economic development strategies

In order to encourage foreign investors, the government has opted for various policies, in the form of tariff incentives, exchange regulations, and the removal of several restrictions on foreign exchange transactions. In 2008, exports of goods and services (especially tourism) had peaked at 56% of GDP (World Bank, 2014A). The opening to FDI is becoming increasingly important and the inflow of capital has increased significantly until the emergence of recent crises. Indeed, governments in Tunisia are convinced of the contribution of FDI to improving the quality of economic growth, technical progress, and job creation. However, since 2011, investor confidence has declined dramatically. It should be noted that the countries providing FDI are in order of increasing importance, France (38%), Italy (25%) and Germany (8%) (FIPA, 2014). The influx of FDI has also been boosted by the rank of Tunisia in the ease of doing business, according to the World Bank index (World Bank, 2014b). Furthermore, because of its proximity to the European Union, Tunisia is considered to serve well as a platform for export to all countries of the world. The presence of some foreign investment in Tunisia has resulted from the recent privatization of state-owned companies, particularly in terms of infrastructure (such as the acquisition of telecommunications shares, Tunisian an operator by Qatar Telecom), also in other sectors such as banks (for example, the acquisition of BT shares by Crédit Mutuel, France). Significant foreign investments in the energy sector include British Gas, which developed Miskar offshore gas field. Similarly, Turkish TAV built Enfidha International Airport, serving mainly the tourism industry. Alcatel and Siemens in telecommunications, Sanofi Aventis and Pfizer in pharmaceuticals, Nestle in food processing, Toyota and Pirelli in the automotive and Zodiac Aerospace in the aircraft industry (US DoS, 2014).

In this paper we attempt to examine the possible existence of cointegration between tourism, economic growth and FDI, and to test the presence of potential causal links between actual tourism receipts, foreign direct investment and economic growth in volume, using time-series data from 1980 to 2018. We try to find out whether tourism is a cause or an effect of economic growth and to determine the degree of contribution of FDI to tourism development.

The rest of the paper is organized as follows: Section 2 presents a review of the literature. Section 3 describes the data, emphasizes the specification of econometric methods, and discusses the results. Finally, section 4 provides concluding observations.

II. REVIEW OF THE LITERATURE

Empirical studies of the relationship between tourism, foreign direct investment and economic growth constituted divergent results. The first studies of the relationship between economic growth and tourism were conducted by Balaguer and Cantavella-Jorda (2002), using Johansen cointegration method on quarterly data from Spain between 1975 and 1997, these authors found a stable relationship between long-term tourism revenues and economic growth. They showed that external competitiveness (measured by the real effective exchange rate) is a fundamental variable in long-term Spanish economic growth. Dritsakis (2004) analyzed the relationship between GDP, tourism earnings and Greece's effective exchange rate over the quarterly period from 1960 to 2000. He noted the existence of co-integration and a bidirectional relationship between tourism receipts and economic growth. Kim et al. (2006) also observed the balance of a long-term relationship and bidirectional causality between tourism and growth in Taiwan. For example, Sequeira and Campos (2005) examined the relationship between tourism specialization and economic growth for a very large sample of 509 observations, covering the period ranging 1980 to 1999. This sample includes islands, small countries, rich and poor

countries, African countries, Asian countries, Latin American countries and European countries. They concluded that tourism sector alone cannot explain the highest growth rates in countries specializing in tourism. The results were the same for all samples; Tourism-related variables do not have a significant impact on economic growth. Similarly, Oh (2005) disagreed with the existence of a long-term relationship between tourism incomes and economic growth using an Engle and Granger approach based on South Korean data covering period from 1975 to 2001. In a recent book, He and Zheng (2011) used the VAR model, studying the link between tourism development and economic growth in the case of Sichuan over the period (1990-2009). They demonstrated that the role of tourism development in economic growth is not obvious, while the role of economic growth in promoting tourism development is highly important. Zortuk discovered the economic strength of tourism on Turkey's economy by applying a co-integration process using quarterly data over the period 1990-2008, in which research shows the equilibrium relationship in the long run between GDP and tourist arrivals. There is unidirectional causality from tourist arrivals to economic growth (Zortuk, 2009). Samimi, et al. (2011) examines the causality and long-term relationships between economic growth and tourism development in developing countries using the P-VAR approach during 1995-2009. The results reveal that there is a bilateral causality and long-term positive relationship between economic growth and tourism development.

In fact, there have been very few empirical studies that have investigated issues related to the tourism industry in Tunisia (Choyakh, 2008; Belloumi, 2010; Jiminez et al, 2011; Raouf El-Jaziri, 2010 and Jean -Marie Miossec, 2018). Belloumi (2010) concluded that tourism industry has a positive unidirectional impact on gross domestic product growth in the analysis of Tunisian economic growth. Indeed, many studies have been made on the relationship between foreign direct investment and economic growth such as that of Lahimer (2006) who used the simultaneous equations method and that of Alaya (2004) who worked with the method of ordinary least-squares. These two authors have identified the effects of FDI on the growth of the Tunisian economy, exports, human capital and technology transfer. Young and Brewer (2000) show that a significant level of FDI does not promote economic growth because this growth is highly dependent on the degree of complementary and substitution between FDI and domestic investment and also on human capital and trade. Béatrice and Mansur (2010) also recognized that benefits from foreign direct investment to recipient countries can only be realized when these countries have reached a certain level of development. Furthermore, a certain belief of views, the IDE not only that directly promote economic growth, but its interaction with, for example, human capital, technology and infrastructure. For example, the study by (Li and Liu, 2005, Vu and Noy 2009) found that FDI with human capital has a positive effect on economic growth, but FDI with technological gap has a significant negative impact. Soltani Hassen and Ochianis (2012) analyzed the relationship between foreign direct investment and economic growth in Tunisia using a co-integration approach. A time series analysis for the period 1975-2009 is used for analysis using co-integration and error correction model. The research result suggests that FDI could help stimulate the process of long-term economic growth. Hans-Heinrich Bass (2015) analyzed the role of foreign direct investment (FDI) that has played and can play in stimulating economic growth in Tunisia. He argues that foreign direct investment can help overcome some of the constraints in capital accumulation and even contribute to "inclusive growth". Kim and Musau (2011) used a causality test for the case of Kenya. They show a significantly positive relationship between FDI and economic growth. Moreover, their study asserts an important role of other factors, such as inflation and trade within the country, which influence too much the changes between FDI and growth. Therefore, there is a causal relationship between FDI and tourism arrivals, with FDI improving the quantity and quality of service, increasing international tourist arrival numbers (Selvanathan et al., 2012). Empirically, Tang et al. (2007) evaluated the causal relationships between FDI, economic growth and tourism in China using an ECM method from 1978 to 2005. They found a unidirectional causal relationship from FDI to tourism. In other words, the growth of China's tourism industry is due to attracting FDI. Similarly, there is a bidirectional causal relationship between tourism and economic growth. Nitasha Sharma (2018) examined tourism and economic growth in Indian during the period of (1991-2017). She concluded that tourism activities are considered to be a major source for economic growth due to its contribution to the balance of payments, GDP and employment. Also, she noted the existence of a unidirectional causal relationship from tourism to economic growth. Likewise, Tasos Stylianou (2017) estimated the contribution of tourism development to economic growth in the Mediterranean countries and concluded that, like developing countries, the Mediterranean countries give priority to the tourism sector owing to its importance in economic development. This coincides with the results of Dritsakis (2004), Sequeira and Nunes (2008), Pavlic et al. (2014): a positive impact of tourism development on economic growth and the exchange rate, but a negative impact of the inflation rate on GDP. In a study of the relationship between FDI and tourism in Small Island Developing States (SIDS), both Craigwell and Moore (2007) have found a bidirectional relationship. Also, the results indicated that FDI provides additional capacity for (SIDS) and allows these countries to expand their tourism product. So, similar results have been shared in others countries such as Jamaica (Williams and Deslandes, 2008), Vietnam (ISAD and Henderson, 2001), as well as other Asian countries (Salleh, Othman and Sarmidi, 2011).

III. METHODOLOGY

3.1. Data sources

In our study, we use annual time series data for the period 1980 to 2019. Data sources are the World Bank, the annual reports of the Tunisian National Tourist Office (ONTT) and the National Institute of Statistics (INS). The Variables used in this study are the Real

Gross Domestic Product (GDP) per capita, tourism receipts per capita (RET), number of tourist arrivals per capita (ART), Foreign Direct Investment (FDI), Gross Fixed Capital Formation (GFCF) in % of GDP and international trade (TRAD) in % of GDP. These six variables were transformed into natural logarithms (LGDP, LRET, LFDI, LART, LTRAD, and L GFCF).

Data analysis consists of three steps. In the first step, we analyzed the stationarity of each time series by applying the Augmented Dickey-Fuller (ADF) and Phillips- Perron (PP) unit root tests. The co-integration test is carried out in the second step in order to investigate a long-term equilibrium relationship among variables. In the third step, the estimation of an Error Correction Model and the Granger Causality test are carried out to distinguish the short-term impact from the long-run impact of tourism receipts and FDI on GDP.

The following function is used to test the contribution of FDI and Tourism Revenue to GDP in Tunisia:

$$GDP = f (RET, FDI, GFCF, ART, TRAD)$$

3.2. Descriptive analysis

Table1 below presents the descriptive statistics of the variables analyzed: mean, standard deviation, minimum, maximum, skewness, kurtosis and probability of Jarque-Bera.

Table 1: Descriptive statistics

	LNGDP	LNFDI	LNART	LNRET	LNTRAD	LN GFCF
LNGDP	1,000					
LNFDI	0.748	1,000				
LNART	0.623	0.764	1,000			
LNRET	0.812	0.830	0.876	1,000		
LNTRAD	0.231	0.656	0.648	0.591	1,000	
LN GFCF	0.824	0.792	0.649	0.698	0.352	1,000

Source: author`s estimates

The descriptive statistics of the variables used are presented in Table 1. Thus, we note that the highest standard deviation is that of foreign direct investment. Also, all Kurtosis values are less than three (<3) and the Jarque-Bera probability is less than 5%. So, we can conclude that the distribution of variables is normal. In addition, in order to minimize the fluctuation of the data between the variables we refer to a logarithmic transformation. This transformation has the effect of stabilizing the variance and normalizing distributions that have positive asymmetry.

Table 2: Correlation Matrix

	Mean	Maximum	Minimum	Standard deviation	Skewness	Kurtosis	Jarque-Bera Probability
GDP	8.095638	8.863810	6.828448	0.581396	-0.384044	1.799100	0.191
FDI	4.117384	6.078055	2.062182	1.153609	-0.325138	1.939351	0.284
GFCF	2.913076	3.235536	2.519872	0.213955	-0.190944	2.048399	0.425
TRAD	4.487078	4.748404	4.211979	0.121234	-0.115309	2.864915	0.943
ART	6.063277	6.529419	5.327876	0.361769	-0.803263	2.510648	0.101
RET	5.043032	5.823595	3.725827	0.652787	-0.651760	2.142406	0.138

Source: author`s estimates

On the one hand, the analysis of the correlation matrix allowed us to observe that there is a strong positive correlation between the variables namely gross domestic product and foreign direct investment (FDI), the value of tourism receipts (RET), the number of tourist arrivals, and gross fixed capital formation (GFCF) by more than 62%. This means that foreign direct investment and tourism receipts can boost economic growth. On the other hand, we find that there is a weak correlation between trade openness and Real GDP per capita. This can be explained by its indirect impact since there is a strong correlation between the foreign direct investment (FDI) and the number of tourist arrivals.

We can also note a strong correlation between tourism receipts and the number of arrivals, which describes Tunisian as a mass destination. Thus, the estimation procedures and the analysis of the results go through visually distinguishable stages: first, we carry out the unit root tests and then we use the Johansen procedure of co-integration to estimate the long-run stationary relationships between the variables in the model, subsequently the Granger causality tests, present the estimation results of the model parameters and finally the decomposition of the variance of the forecast errors.

3.3. Unit Root tests

In order to determine the order of integration or the degree of stationary of the variables we use the augmented Dickey Fuller (ADF) (1978) and Phillips-Perron (PP) (1988) tests. The results of these two tests are shown in Table 3:

Table 3: Unit root tests

Variables	Augmented Dickey_Fuller (ADF)			Phillips-Perron (PP)		
	Model (1)	Model (2)	Model (3)	Model (1)	Model (2)	Model (3)
Level						
LNGDP	-1.937 (0.312)	-3.210* (0.097)	2.556 (0.996)	-2.279 (0.183)	-3.210* (0.097)	3.443 (0.999)
LNFDI	-1.915 (0.322)	-3.261* (0.088)	0.441 (0.797)	-1.827 (0.361)	-3.451* (0.059)	1.385 (0.956)
LNART	-1.848 (0.352)	-1.074 (0.919)	0.408 (0.796)	-1.682 (0.431)	-1.827 (0.671)	0.944 (0.905)
LNRET	-2.260 (0.190)	-0.466 (0.980)	2.319 (0.994)	-2.071 (0.256)	-2.189 (0.481)	2.310 (0.994)
LNTRAD	-2.340 (0.165)	-2.386 (0.379)	-0.037 (0.663)	-2.237 (0.197)	-2.108 (0.524)	0.318 (0.772)
LNGFCF	-0.960 (0.756)	-1.417 (0.838)	4.200 (1.000)	-2.174 (0.218)	-2.115 (0.521)	4.316 (1.000)
1st Différence						
LNPGDP	-6.811***	-6.740***	-5.986***	-9.692***	-12.798***	-5.986***
LNFDI	-8.520***	-8.372***	-8.558***	-9.405***	-9.207***	-8.830***
LNART	-8.269***	-8.220***	-8.358***	-8.167***	-8.620***	-8.235***
LNRET	-6.151***	-6.856***	-2.995***	-6.893***	-8.856***	-6.097***
LNTRAD	-5.309***	-4.790***	-5.379***	-5.659***	-6.186***	-5.712***
LNGFCF	-5.492***	-5.492***	-3.820***	-5.230***	-5.855***	-3.791***

Source: author`s estimates

Model 1: model with constant; Model 2: model with trend and with constant; Model 3: model without trend and without constant; () : The P-values; * Significant at the 10% level; ** Significant at the 5% level; *** Significant at the 1% level

Up to now, all variables are non-stationary at the level, and stationary at the first difference. Both tests show that all variables are affected by the presence of unit roots. Especially, they are all integrated of the same order I (1) for the three models. Consequently, there can exist a relation of cointegration. Next, the analysis of this relationship leads us to identify the real relation linking these variables. If it is validated, it can be expressed by an error correction model (ECM), which allows capturing the dynamic structure of the evolution of these series.

3.4. Determine lag intervals for endogenous with lag length criteria

To make our estimate, we need to determine the lag length that minimizes AIC and SIC for the VAR model to introduce it. In fact, there are several information criteria namely Akaike Info Criterion (AC), Schwarz Criterion (SC) and Hannan -Quin (HQ).

Table 4: Var lag order selection criteria

LAG	LOGL	LR	FPE	AIC	SC	HQ
0	-8.634178	NA	9.08e-08	0.813010	1.076930	0.905125
1	137.7502	235.8415	2.03e-10	-5.319455	-3.472016*	-4.674649
2	186.1251	61.81236	1.22e-10	-6.006949	-2.575991	-4.809452
3	241.4727	61.81236	6.89e-11*	-7.081814*	-2.067338	-5.331628*

Source: author`s estimates

* Indicates 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

Therefore, we retain the minimum values for estimating our model by including three lags.

3.5. Cointegration and causality

The co-integration study allows us to identify the long-term relationships between two variables in a model. In our case where the variables are integrated of the same order I (1), there may be one or more co-integrating vectors. So, before proceeding with the estimation, all series must be stationary. Blow, the use of the Johansen test allows us to determine the number of co-integrating vectors in the 6-variable system whose results are summarized in the following table:

Table 5: trace tests

H ₀ : there is more than r co-integrating relationship				
	Eigenvalue	Statistic	Critical Value	Prob.**
None *	0.934757	95.53737	40.07757	0.0000
At most 1 *	0.918529	87.76265	87.76265	0.0000
At most 2 *	0.764468	50.60681	27.58434	0.0000
At most 3	0.451502	21.02002	21.13162	0.0518
At most 4	0.284217	11.70324	14.26460	0.1223
At most 5	0.066225	2.398189	3.841466	0.1215

Source: author`s estimates

However, the first step of Johansen's test is to stationarize the series which are all integrated of the same order. According to these results we note that at the significance level of 5%, the probability rate is higher than the critical value. It is proved that the variables do have co-integration relationship. Thus, the rows verify the null hypothesis “whether there at most exist three co-integration vectors”. The equation can be summarized as follows:

$$\begin{aligned}
 LNGDP_t = & 0.089 + 0.070 LNFDI_t - 0.778 LNART_t + 0.973 LNRET_t - \\
 & (0.020) \quad (0.062) \quad (0.050) \\
 & 0.110 LNGFCF_t - 1.185 LNTRAD_t + Z_t \\
 & (0.076) \quad (0.149)
 \end{aligned}$$

Indeed Z_t is the Error Term and the P-values are presented in parentheses.

The sign of the coefficient of the variables are theoretically expected. We find that indicators describing foreign direct investment and tourism in Tunisia have significant positive effects on economic growth. Indeed, the 1% increase in tourism receipts will increase GDP by 0.97%. For FDI, the results indicate that a 1% increase in FDI will increase GDP by 0.07%. But, the number coefficient of the arrivals is negative and significant. While reflecting the international mass tourism in Tunisia and its negative impact. Regarding the other variables, we find that the gross fixed capital formation variable has an effect that is also significantly negative, statistically while the international trade variable has a negative but not significant effect. Therefore, it can be concluded that foreign direct investment and tourism are one of the main driving factors of the Tunisian economy. Consequently, VECM is as follows:

$$\begin{aligned}
 \begin{pmatrix} \Delta LGDP_t \\ \Delta LRET_t \\ \Delta LARR_t \\ \Delta LFDI_t \\ \Delta LGFCF_t \\ \Delta LTRAD_t \end{pmatrix} = & \begin{pmatrix} 0.222 & 0.240 & 0.908 & -1.458 & -0.173 & -0.000 \\ 0.585 & 1.138 & 0.536 & -5.213 & 0.208 & -0.469 \\ 0.274 & 3.11 & 1.299 & 1.925 & 0.229 & 0.135 \\ -0.638 & -0.94 & -0.643 & 5.446 & -0.143 & 0.620 \\ -0.026 & -0.127 & -0.075 & 0.194 & 0.056 & 0.023 \\ -0.615 & -2.451 & -1.205 & -0.571 & -0.552 & -0.245 \end{pmatrix} \begin{pmatrix} \Delta LGDP_{t-1} \\ \Delta LRET_{t-1} \\ \Delta LARR_{t-1} \\ \Delta LFDI_{t-1} \\ \Delta LGFCF_{t-1} \\ \Delta LTRAD_{t-1} \end{pmatrix} \\
 + & \begin{pmatrix} 0.281 & 0.623 & 0.618 & -0.764 & -0.038 & -0.156 \\ 0.245 & 0.393 & -0.001 & 1.343 & 0.015 & -0.325 \\ -0.052 & 1.517 & 1.007 & 2.844 & -0.002 & -0.320 \\ -0.023 & -0.11 & -0.063 & -0.154 & 0.094 & 0.010 \\ -0.869 & -1.048 & -0.655 & 3.403 & -0.07 & 0.569 \end{pmatrix} \begin{pmatrix} \Delta LGDP_{t-2} \\ \Delta LRET_{t-2} \\ \Delta LARR_{t-2} \\ \Delta LFDI_{t-2} \\ \Delta LGFCF_{t-2} \\ \Delta LTRAD_{t-2} \end{pmatrix} \\
 + & \begin{pmatrix} -0.212 & -0.717 & 0.14 & -0.581 & -0.392 & -0.192 \\ -0.303 & -0.865 & -0.447 & 1.974 & 0.028 & 0.331 \\ 0.005 & -0.254 & -0.173 & -0.339 & -0.024 & -0.081 \\ -0.237 & 0.331 & 0.201 & 0.072 & -0.224 & 0.028 \\ 0.082 & 0.578 & 0.376 & 1.53 & 0.133 & 0.332 \\ 0.429 & 0.557 & 0.199 & -0.570 & 0.064 & -0.005 \end{pmatrix} \begin{pmatrix} \Delta LGDP_{t-3} \\ \Delta LRET_{t-3} \\ \Delta LARR_{t-3} \\ \Delta LFDI_{t-3} \\ \Delta LGFCF_{t-3} \\ \Delta LTRAD_{t-3} \end{pmatrix}
 \end{aligned}$$

In fact, knowing that causal relation is as important as highlighting a link between economic variables. So, a correlation between two variables does not imply causation. On the other hand, if there is a causal relationship between two variables, they must be

correlated. Subsequently, the results show bidirectional causality between the number of arrivals and real GDP per capita, and a unidirectional relationship of tourism receipts to real GDP per capita. In addition, economic growth causes foreign direct investment in the sense of Granger. It is obviously that the result of Granger testing may be resumed as follows.

Table 6: Granger Causality tests

<i>Null Hypothesis:</i>	<i>Obs</i>	<i>F-Statistic</i>	<i>Prob.</i>
<i>RET does not Granger Cause GDP</i>	36	3.25112	0.036
<i>GDP does not Granger Cause RET</i>		1.56431	0.219
<i>ARR does not Granger Cause GDP</i>	36	3.48359	0.028
<i>GDP does not Granger Cause ARR</i>		3.25458	0.035
<i>FDI does not Granger Cause GDP</i>	36	1.00483	0.404
<i>GDP does not Granger Cause FDI</i>		10.0253	0.000
<i>FDI does not Granger Cause RET</i>	36	0.60116	0.619
<i>RET does not Granger Cause FDI</i>		4.96265	0.006
<i>FDI does not Granger Cause ARR</i>	36	0.40338	0.751
<i>ARR does not Granger Cause FDI</i>		6.93928	0.001
<i>GFCF does not Granger Cause ARR</i>	36	1.70647	0.187
<i>ARR does not Granger Cause GFCF</i>		3.39333	0.031
<i>TRAD does not Granger Cause ARR</i>	36	2.96793	0.048
<i>ARR does not Granger Cause TRAD</i>		2.52761	0.076

Source: author's estimates

3.6. Error correction and variance decomposition model

The acceptance of the hypothesis of the presence of cointegration between the variables indicates that there is a steady state relation between the sets of variables that have a common tendency. In this case the Granger representation theorem is checked and our attention is directed to the mechanisms of adjustment of the relations between the variables. Our attention is now directed towards the adjustment mechanisms of the long-term relationship across variables. Engle and Granger (1987) have shown that behind co-integration lies a corresponding Vector Error Correction (VECM) representation. Such representation helps us unravel the dynamics of tourism, FDI and economic growth in Tunisia. In this representation, the dependent variable is a function of (1) the degree of imbalance in the co-integration relationship (captured by the correction error), and (2) changes in the other explanatory variables. It should be noted that even if co-integration implies the presence of Granger causality, it does not specify the meaning of the causality between the variables. However, Granger causality can be captured by the vector model of error correction (Granger, 1986, 1988). VECM estimates also help us to characterize the observed short-run fluctuations in a manner compatible with long-term equilibrium. The estimation of the adjustment degree of the error correction terms, which measures the speed of convergence of short-term imbalance in relation to balance, verified that these terms were equal to -0.908. Respectively, being negative and significant at a level of 5%. In the other words, the value of (0.908) provides that approximately 90.8% of the discrepancy between the actual value and the long-term or balance value are adjusted each year between the variables. Also, the negative sign indicates that LNGDP is moving down toward a balance path. It implies that 90.8% of the imbalance is corrected each year. This shows the downward adjustment of GDP towards equilibrium path adjustment rather strong. So, 90.8% of GDP from equilibrium is adjusted within one year. Yet, in the short term, the impact of the multiplier effect of the given variables (LRET, LFDI, and LART) is statistically insignificant and has an expected sign. This may be due to civil facts such as conflict and other politically motivated violent events influencing tourist arrivals in Tunisia in the short run period. From the error correction vector tables, one might observe that the error correction term corresponds to the long-term co-integration estimate is highly significant for all three models the equilibrium adjustment is done at one speed 90.8%. At this point, we have to interpret the long-term relationship under the assumption that this model reflects the dominant causality direction between variables allowing us to broaden our study by examining the transmission of stochastic structural shocks of exogenous variables on Tunisian economic growth (real GDP per capita) by analyzing the decomposition of the variance of the impulse response function (IRF). Impulse response functions (IRF) allow us to determine the variation of a variable following an impact (impulse) of another system variable. What interests us is to trace the dynamic response of GDP per capita to an unforeseen shock of each of its determinants. The results of the estimation of the (IRF) function that are considered relevant are given by the table7.

Table 7: Results of the estimation of the (IRF) function

<i>Variance Decomposition of LNGDP</i>							
Period	S.E.	LNGDP	LNRET	LNART	LNFDI	LNTRAD	LNGFCF
1	0.089	100.000	0.000	0.000	0.000	0.000	0.000
2	0.112	70.380	6.259	7.138	1.812	10.059	4.349
3	0.128	54.127	5.021	5.547	1.534	29.694	4.074
4	0.133	50.948	5.106	9.157	1.784	27.957	5.045
5	0.138	47.198	7.184	11.676	1.691	26.014	6.233
6	0.150	39.945	15.571	10.297	1.432	25.313	7.440
7	0.161	36.268	17.029	9.490	2.250	26.871	8.089
8	0.166	34.331	16.490	12.844	2.986	25.433	7.915
9	0.172	31.871	17.254	15.291	2.901	25.135	7.545
10	0.180	29.068	21.484	16.365	2.829	22.921	7.330

Source: author's estimates

So far, analysis of the variance decomposition has allowed us to deepen the analysis of the IRF function and to determine the proportion of the variation of a variable of the model explained by another variable of this one for a given period any based on Cholesky's decomposition. The results achieved are shown in (FIGURE1) while keeping the horizon of the variance of the forecast error (h = 10 years).

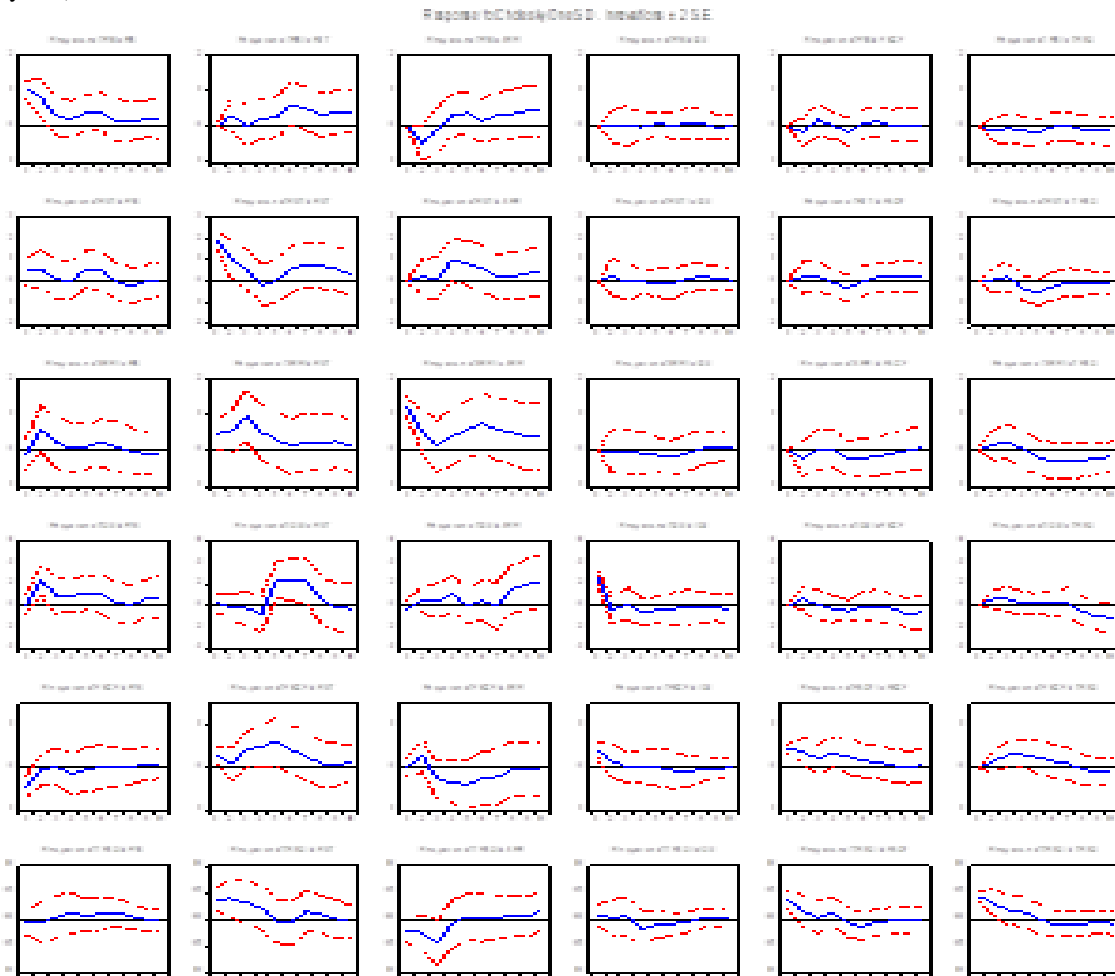


Figure1: The horizon of the variance of the forecast error

Source: author's estimates

More specifically, we note that 54.12% of the variance of GDP error is due to its own innovations. Though, we find that the relationship between Tourism variables, gross fixed capital formation and FDI with GDP is much larger in the long term than in the

short term. Indeed, the proportion of GDP change is relatively constant following the shocks of trade opening. The dynamic repetition path of GDP follows the shocks of one unit of the standard deviation of Tourism variables:

- Concerning tourism receipts is characterized by an increase then a decrease in the first three years and the phenomenon is repeated in the next three years and then slowly increase. But always remains positive. As a result, the effect of shocks from the positive effect of tourism revenue is sustainable.
- As well as for the shocks of many of the arrivals have negative effects during the first three years then positive effects but with an increase then a decrease during the next three years. Also, after the sixth year

Variance Decomposition of LNGDP:

- we notice a slight increase until stabilization.
- As much as for the FDI shocks have almost no effect during the first four years, and then there is a moderately significant increase in the variance in GDP variance.

IV. CONCLUSION

The main objective of this study is to highlight the effect of tourism and foreign direct investment on economic growth in Tunisia. In doing so, three tests were used: the stationary test, the Johansen test, and the Granger causality tests. The results showed that variable series: tourism development, foreign direct investment and economic growth are stationary in first difference. Also, the three variables are co-integrated; they evolve together and therefore display a long-term relationship at least in one direction. Thus, the relationship between economic growth and tourism development is rather bidirectional. In other words, the sense of growing economic growth causes tourism development and the tourism sector has a significant impact on economic development. This confirming the hypothesis of growth led by tourism in Tunisia. Also, the relationship between foreign direct investment and economic growth is unidirectional (economic growth causes foreign direct investment). Likewise, the relationship between tourism development and foreign direct investment (tourism development causes foreign direct investment). Thanks to the strong positive relationship between economic growth, tourism and FDI, the Tunisian government must make great efforts to attract more investors and tourists. The Tunisian authorities would also benefit from taking adequate measures directed towards a better allocation of resources, with the establishment of safety nets. Indeed, the tourism sector can be a positive force with benefits for Tunisia, provided that the basic socio-economic infrastructure, essential and prerequisite for any development strategy is achieved, that political stability and security is restored. In Tunisia, this sector, could in the short term; causes a construction boom, triggering in turn the expansion of infrastructure, especially in the hotel sector. Let us add that tourism is also strongly linked to the sector of crafts and cultural industries, areas in which, Tunisia has a comparative advantage. In fact, there are conditions in Tunisia to develop the tourist sector both high-end and intermediate standing. In a nutshell, it is worth noting that Tunisia has many wonderful tourist attractions that make it one of the most visited cities in the world. This is due to the fact that it is widely characterized by its natural beauty, culture, history, sites and monuments... But these distinguished features have so far been poorly exploited by reason of the political instability, insecurity and constraints of foreign direct investment which have marked the history of the country.

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