UNIVERSITY OF MACEDONIA

MASTER IN ECONOMICS

THE RELATIONSHIP BETWEEN TOURISM AND ECONOMIC GROWTH: A VAR ANALYSIS

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Abstract

Tourism industry has been characterized as one of the most important engines of the economy. The purpose of this study is to test the relationship between tourism and economic development in 5 European countries with different economic background and compare the results. In order to test the aforementioned relationship a VAR model was constructed using real gdp as the dependent variable and real effective exchange rate - tourism arrivals as the independent ones. In order τo enrich the research, uncertainty was also added to the model. The data used was quarterly, covering a 20-year time period (Q1:2000-Q4:2019) for five top tourist destinations (France, Germany, Greece, Italy and Spain). Granger Causality, Impulse Response Function and Variance Decomposition tests were performed, as well. The empirical results showed that in all the under study countries there is a linkage among tourism industry and economic development. The difference between them lies in the magnitude of the influence. France has the weakest linkage between tourism and economic development. Germany, Greece, Italy and Spain appear to have stronger linkage, which is why they are more vulnerable to shocks and changes as the global financial crisis or the pandemic covid-19.

Keywords: Tourism, Economic Growth, VAR, Granger Causality, Impulse Response Function, Variance Decomposition, France, Germany, Greece, Italy, Spain

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1.Introduction

Nowadays, tourism industry has been characterized as one of the most important engines of the economy. It is recognized as a catalyst not only for the developing countries but also for the developed ones. First of all, it boosts the economy as it is a source of foreign capital inflows. Secondly, it promotes regional development because it constantly creates the need for new businesses and services so as to meet the tourists' needs. As a consequence, it provides employment for both skilled and unskilled labor force and improves the income and standards of living of the host country. Moreover, governments have the ability to assert funds via international tourism programs invest them and increase their total revenues.

The modern notion of tourism can be traced back to the early 17th century. Back then, it was very common among young aristocrats to embark on the "Grand Tour", a famous educational trip around Europe. Particularly, it included countries with huge historical importance, distinctive art and unique archaeological sites such as Greece, Italy, France etc. The main objective of the "Grand Tour" was learning through traveling, the most effective approach of education. Theretofore, only the wealthier economic classes had the ability to realize such journeys.

By the time Industrial Revolution began, the scene totally altered. Significant economic, political, social and technological changes arose. The expeditious development of the industrial sector provoked an enormous need of workforce to the emerging economies of big cities, derived from the rural regions. As a result, new social-economic classes appeared. People from poverty could now afford a new lifestyle with better financial rewards. At the same time, progress in public transportation promoted travelling all around the word.

"Cox and Kings" is one of the first travel agencies in the world, based in India. It was founded in 1758, has its headquarters in Mumbai, subsidiaries in United States, United Arab Emirates, Australia, Japan etc and serves more than 22 countries and 4 continents. "Cox and Kings" owns undeniably the title of the agency with the longest history as it operates until now. Travel agencies started massively to appear in the 19th century. Thomas Cook has been characterized as the father of modern travelling since his agency “Thomas Cook and Son” introduced trips for groups, including in price low-cost transport and accommodation. That was the moment when travel became business.

The extensive manufacturing of cars and buses as well as technological advances in air transport encouraged the expansion of tourism sector throughout 20th century. At the same time, the rise in social welfare and improvements in labor law contributed to the tourism development. The decades followed are considered to have been conclusive as too many travel agencies opened, increasing competition and leading prices at lower levels. Mass tourism was an indisputable fact. New hotels, travel agencies and airlines gave the opportunity for a wide range of unique services and products.

Currently, globalization and internet has made much easier and simpler the procedure of traveling. Tourists can check online destinations, hotel availability, transport options and customize their trip based on their budget and preferences. Tourism sector suffered a recession during the second decade of 21st century due to COVID-19 pandemic. Lockdowns and strict restrictions affected travel industry negatively causing loss of billions. Governments supported tourism businesses via packages of financial assistance so as to help the survival of one of the most major economic engine worldwide.

According to “Global Travel Statistics for 2016” report, Europe has been placed first in the list of the most-visited continent with 58%, followed by Asia (19,5%), North America (16%), South America (2,6%), Africa (2,3%) and Oceania (1,6%) (HotelsPro, 2017). Europe is a world leader in tourism, attracting nearly 2/3 of international tourist visits globally (Statista Research Department, 2022). In accordance with the World Bank latest data release, European Union welcomed 968,873,375 tourists and gained almost 432,15 billion dollars in 2019 (World Bank, 2023). Having recognized the importance of tourism, European Union has focused on this industry as a way to assure economic prosperity for its member countries.

Nevertheless, there is no consensus whether tourism leads to economic growth or economic growth promotes tourism. Taking into consideration the above, the purpose of this study is to test the relationship between tourism and economic development in 5 European countries (Greece, Italy, Spain, France and Germany) with different economic background and compare the results. In order τo enrich the research, real effective exchange rate, number of arrivals and uncertainty will be added in the main model.

The rest of the paper is organized as follows: Section 2 analyses the existing literature and relevant empirical studies. Section 3 describes the methodology and data sets used. Section 4 presents the empirical results for each sample country, Section 5 discusses the results and Section 6 summarizes the main conclusions of the study.

2. Literature review

In recent years, the relationship between tourism and economic growth has been widely examined. A plethora of researchers has studied the causality between the two variables in different countries and time spans, using various methodologies in order to come to a conclusion. The results are mixed and sometimes contradictory. Some studies showed that tourism leads to economic growth, while others that economic development drives tourism expansion. At the same time, some authors supported that there is a bi-directional causality between tourism sector and economic development, while others that there is no relation of causality between the two. This section presents an in-depth literature review of the four main hypotheses, as mentioned above.

Isik et al. (2017) examined the nexus between tourism demand and economic growth for USA, France, Spain, China, Italy, Turkey and Germany covering the time period 1995-2012. The Granger causality test results showed that "tourism development and economic growth are interdependent in Germany; whereas tourism development induces economic growth in China and Turkey; the reverse is true in Spain. France, Italy and USA showed no causality" (Isik et al., 2017). Dineri (2020) studied the linkage between tourist arrivals and economic prosperity in selected Mediterranean countries for the period 1995-2017. Using the Augmented Mean Group (AMG) estimator, the findings revealed that tourism boosts economic growth in France, Malta, Spain, Cyprus, Morocco and Tunisia. Most importantly, Dineri (2020) noted the significance of applying the right tourism policies as the climate and historical/cultural background of such countries favor tourism industry.

Antonakakis et al. (2015) studied the relationship among tourism and economic development for 10 European countries (Cyprus, Greece, Italy, Portugal, Spain, Austria, Germany, Netherlands, Sweden and United Kingdom) during the period 1995-2012. The results were quite interesting. Firstly, the nexus between the two variables was found to be unstable over time not only in terms of magnitude but also in direction. Secondly, important economic events such as the Great Recession of 2007 have found to affect the dynamic relationship of the variables, there is strong interdependence. The results of such effects were quite evident in Cyprus, Greece, Portugal and Spain rather the other countries. Similarly, Shahbaz et al. (2017) examined the nexus between tourism and economic growth for ten of the most visited tourist destinations (France, Germany, Italy, Spain, China, Mexico, Russia, UK, USA and Turkey) for the time span 1990-2015. As in the paper of Antonakakis et al. (2015), they concluded that the relation between the two variables differs over time and across countries in both direction and magnitude. Specifically, UK, Italy and Mexico was found to have the strongest relationship between tourism industry and economic prosperity while Germany, France and China the weakest.

Khan (2020) investigated the nexus between tourist arrivals, tourism growth, tourism expenditures and economic growth in Italy using an annual time series data from 1995 to 2018. Findings revealed bi-directional causality among economic development ↔ tourism growth and economic development ↔ tourist arrivals, while one-way causality between economic growth → tourism expenditure, tourism growth → tourism expenditure and no linkage at all in between tourist arrivals and tourism expenditures. Equally, Belke et al., (2021) tested the asymmetric relationship between economic development and tourism by using a panel cointegration test in 14 Mediterranean countries (Albania, Algeria, Croatia, Cyprus, Egypt, France, Greece, Italy, Malta, Morocco, Slovenia, Spain, Tunisia and Turkey) for the time period 1995-2017. The results showed 3 main things. Firstly, economic prosperity was highly affected by a rise in tourism revenues compared to an equivalent decline. Secondly, the elasticity of economic growth was higher in positive changes of tourism income rather than the elasticity in negative. Thirdly, the null hypothesis of no causality was rejected for positive components and accepted for negative ones.

Samini et al. (2011) applied a P-VAR analysis in order to examine the causality and long-run relationships between tourism and economic development in 20 developing countries during the period 1995-2009. The results showed a bi-directional causality and positive long-run relationship. Škrinjarić, (2019) in her paper focused on Central Eastern European and South Eastern European countries such as Bulgaria, Croatia, Czech Republic, Hungary, Poland, Slovenia and Slovakia for the time period 2000-2017. Using a spillover index approach, the research concluded that “Croatia, Czech Republic, Hungary and Slovenia should focus more on achieving greater overall economic development so the spillovers to the tourism industry be greater, while Bulgaria had bi-directional spillovers for both variables, which means that the country found a good balance between investing into tourism development which spills over to the economy and vice versa" (Škrinjarić, 2019).

Hatemi-J et al. (2014) investigated the nexus between economic performance and tourism industry for the G-7 countries (Italy, Canada, Japan, France, UK, USA and Germany) during the period 1995-2012. The findings showed that GDP actively influenced tourism sector for Italy, Germany France, Canada and Japan. However, only in Canada and Germany was detected a symmetric causal relation. In addition, tourism causes economic growth in Italy, Germany, France and US. Surprisingly, Germany, France and USA were the only countries with a symmetric causal relationship. As a result, the paper concluded that tourism do not lead to economic growth as positive shocks in tourism do not lead to positive economic output shocks for any of the countries aforementioned. Additionally, Cortes-Jimenez & Pulina, (2006) used a cointegration framework and multivariate Granger causality test so as to check if tourism and exports have boosted economical growth in Spain and Italy covering a time span of 1964-2000 and 1954-2000, respectively. The results revealed that exports helped the expansion of economy for both countries in the long term horizon, while tourism sector influenced positively only the economy of Spain.

Santamaria & Filis (2019) applied a DCC-GARCH model so as to test the dynamic relation of tourism and economic growth in Spain during the period 1998-2017. Empirical results showed that the relationship between the two variables is time varying not only in sign but also in magnitude. Specifically, correlations are positive when the economy enters a recession or boom phase and negative when the economy is in a stable condition. These findings suggest that changes in economic policy affect the tourism industry. Botti et al. (2007) examined the tourist demand of France during the period 1975-2003. Via the econometric analysis was found a positive relationship between tourist spending and GDP, while a negative one between tourist spending and relative prices. Bayramoglu & Ari (2015) analyzed the relationship between the expenditures of tourists and economic development in Greece for the period 1980-2013. Granger causality test revealed that there was strong unidirectional causality.

3. Data and methodology

3.1 Data

The data used is quarterly, covering a 20-year time period (Q1:2000-Q4:2019) for five top tourist destinations in Europe (Greece, France, Italy, Spain, Germany). Statistics for real gdp and tourism arrivals of each country are extracted from World Bank, real effective exchange rate from Federal Reserve Economic Data of St. Louis (FRED) and uncertainty from Economic Policy Uncertainty database. All data sets are transformed into logarithmic (L) form so as to obtain mean-reverting connections and ensure the validity of the econometric testing techniques.

3.2 Methodology

In time series forecasting, stationarity is a key notion. Three requirements must be met in order to characterize a time series as stationary: constant mean, constant variance and constant covariance. Practically, this means that the main statistical characteristics of a series do not change over time. Thus, a time series containing trends or seasonality is non-stationary. Financial models that use non-stationary time series data generate inaccurate and unreliable findings. Fortunately, issues such as the above can be solved by transforming time series data. During this procedure, it is obvious that stationarity tests are essential because they serve as the starting point for the creation of a trustworthy forecasting model.

For the purpose of this study, we will examine four types of stationarity tests. An often-used statistical test to determine whether a time series is stationary or not, is the Dickey Fuller test (DF). It is a classical unit root test, in which the presence of unit root in time series defines the null hypothesis (H_0), when the alternative hypothesis (H_1) defines time series as stationary. Practically, in a simple model:

$$y_t = \alpha + \rho y_{t-1} + \varphi \Delta y_{t-1} + u_t,$$

where y is the main variable of interest, α is a constant, t is the time index, ρ is the coefficient of the first lag on y, φ is the coefficient of the first difference of the series at t-1 and u the error term, we say that there is a unit root if α=1. In this case, we characterize the model as non-stationary. Due to the fact that our model handles a large-sized and more complex set of time series, we will use an extended version of DF test called Augmented Dickey Fuller test (ADF). The difference between the two models is that ADF includes p-lags of the dependent variable. The model becomes as follows:

$$y_t=\alpha+\rho y_{t-1}+\varphi_1\Delta y_{t-1}+\varphi_2\Delta y_{t-2}+\ldots..\varphi_p\Delta y_{t-p}+u_t,$$

where the main equation remains the same as DF test. The expansion contains more differencing terms that increase the test's thoroughness.

Another unit root test examined is Augmented Dickey Fuller - Generalized Least Squares test (ADF-GLS). It is a modification of ADF test, in which the time series is transformed via a generalized least squares regression before conducting the test. For time series including deterministic components, it helps to detect unit root. Basically, in a simple time series model:

$$y_t=d_t+u_t, \text{ with } u_t=\rho y_{t-1}+\varepsilon_t,$$

d_t is the deterministic part and u_t is the stochastic part of y_t. ADF-GLS test is performed in two stages. In the first stage, intercept and trend are calculated using GLS. In the second stage, ADF test is used on the modified de-trending data of time series in order to effectively calculate the deterministic parameters of the series. The number of lags is set either by user knowledge or by information criteria such as Akaike Information Criterion (AIC) or Bayesian Information Criterion (BIC). The whole procedure aids in the removal of means and linear trends that are close to the non-stationary area, and also enhances the capacity to reject the null hypothesis (H_0).

An alternative way to detect the presence of a unit root is to perform Phillips-Perron test (PP). It is similar to ADF test, with the exception that it corrects for autocorrelation and heteroscedasticity in the error terms. Moreover, it is a non-parametric test, which means that there is no need to define a lag length. As at DF, ADF and ADF-GLS test, null (H_0) and alternative (H_1) hypothesis remain the same. If the p-value is above a critical size then the null hypothesis (H_0) cannot be rejected and the series appears to have a unit root. The last test that will be examined in this study is Kwiatkowski-Phillips-Schmidt-Shin (KPSS), which checks if a time series is stationary around a deterministic trend. This is an essential point since a time series can be non-stationary, have no unit root, and still be trend stationary. Contrary to previous unit root tests, the presence of a unit root is the alternative (H_1) rather than the null hypothesis (H_0).

After confirming the stationarity of our time series data, next step is to construct the Vector Autoregression (VAR) model for the countries examined. VAR will encapsulate the dynamic relationship between the variables and their evolution over time. The main form of the VAR used is:

$$LRGDP_{xt}=a_0+a_1LREER_{xt}+a_2LNA_{xt}+a_3LU_{xt}+e_{xt},$$

where RGDP represents real gdp, REER real effective exchange rate, NA number of arrivals, and U the factor of uncertainty of country x at year t. All data sets are transformed into logarithmic (L) form so as to obtain mean-reverting connections and ensure the validity of the econometric testing techniques.

An important role in this procedure is to determine the appropriate lag length. Generally, adding too many lags causes the rise of the standard errors of coefficient estimates, while skipping lags can result to estimation bias. Economic theory can serve as guidance for choosing lag lengths. Nevertheless, there are available statistical approaches for deciding the right number of lags included. Some of the most common information criteria are Akaike Information Criterion (AIC), Bayesian Information Criterion (BIC). Both of them evaluate the quality of a model taking into account its complexity and the way it fits the data. The main difference between AIC and BIC is that the first one is best for prediction, whereas the second one for explanation.

After choosing the variables of the model, ensuring the stationarity of times series and selecting the appropriate lag length, we continue with the main and most important part of this study. It consists of Granger causality test, Impulse Response Function (IRF) and Forecast Error Variance Decomposition (FEVD). Particularly, Granger causality is a statistical test for assessing whether a time series can be used to predict another time series. For instance, if a time series X is said to Granger-cause time series Y, it means that X contains information that helps predict Y (and the opposite). Contrary to other hypothesis tests, Granger-causality constitutes of two null hypotheses. H_0^1 is that X does not Granger-cause Y (or lagged X-values do not explain Y-values), and H_0^2 that Y does not Granger-cause X (or lagged Y-values do not explain X-values).

A probability-value (p-value) lower than the selected significance level interprets as ability to reject the null hypothesis (H_0).

Impulse Response Functions (IRFs) depict the evolution of a variable over a particular time period following a shock at exogenous variables at a given point. IRFs are helpful for comprehending the dynamic behavior of the variables in a system and a useful tool for forecasting the consequences of impulses/shocks. In other words, they serve as a representation of how the variables respond when the system is shocked. Last but not least, we will examine Forecast Error Variance Decomposition (FEVD). FEVD "decomposes" the variance of the forecast error into the contribution from different exogenous shocks. Most of times, IRFs and FEVD are used in combination as a useful tool for analyzing the effects of shocks to the economic variables of a system. All the aforementioned techniques explained will give a detailed and complete picture of the relationship between tourism and economic growth for the five countries selected.

4. Empirical results

4.1 Unit Root Tests

Table 1: Augmented Dickey - Fuller Test Results for Real Gdp

ADF TEST					
REAL GDP	LEVEL		1ST DIFFERENCE		DECISION
	INTERCEPT	TREND & INTERCEPT	INTERCEPT	TREND & INTERCEPT	STATIONARY/NON STATIONARY
FRANCE	-0,787184 (0,8170)	-2,272146 (0,4436)	-5,930576 * (0,0000)	-5,902434 * (0,0000)	STATIONARY AT 1ST DIFFERENCE
GERMANY	-1,092680 (0,7152)	-4,671221 * (0,0016)	-9,805071 * (0,0000)	-9,767479 * (0,0000)	STATIONARY AT LEVEL
GREECE	-0,682790 (0,8444)	-2,080236 (0,5483)	-3,399869 * (0,0139)	-3,464459 * (0,0506)	STATIONARY AT 1ST DIFFERENCE
ITALY	-2,304497 (0,1732)	-2,391275- (0,3812)	-12,41673 * (0,0001)	-12,32740 * (0,0001)	STATIONARY AT 1ST DIFFERENCE
SPAIN	-1,576256 (0,4896)	-2,407948 (0,3726)	-2,204402 (0,2065)	-2,180982 (0,4927)	NON STATIONARY

Note: (1) The optimal lag length for the unit root tests were based on the SIC criterion, (2) Numbers in parentheses represent the p-values, (3) * implies significance at the 5% level

Table 2: Augmented Dickey - Fuller Test Results for Real Effective Exchange Rate

ADF TEST					
REAL EFFECTIVE EXCHANGE RATE	LEVEL		1ST DIFFERENCE		DECISION
	INTERCEPT	TREND & INTERCEPT	INTERCEPT	TREND & INTERCEPT	STATIONARY/NON STATIONARY
FRANCE	-1,116216 (0,7058)	-2,356364 (0,39920)	-6,802797 * (0,0000)	-6,890716 * (0,0000)	STATIONARY AT 1ST DIFFERENCE
GERMANY	-1,179396 (0,6798)	-1,936439 (0,6261)	-7,576475 * (0,0000)	-7,569460 * (0,0000)	STATIONARY AT 1ST DIFFERENCE
GREECE	-1,207972 (0,6674)	-1,108479 (0,9297)	4,889626 * (0,0001)	-5,722343 * (0,0000)	STATIONARY AT 1ST DIFFERENCE
ITALY	-1,163182 (0,6866)	-1,713985 (0,7359)	-7,332735 * (0,0000)	-7,588143 * (0,0000)	STATIONARY AT 1ST DIFFERENCE
SPAIN	-2,851146 (0,0560)	-2,415602 (0,3688)	-5,436093 * (0,0000)	-6,127523 * (0,0000)	STATIONARY AT 1ST DIFFERENCE

Note: (1) The optimal lag length for the unit root tests were based on the SIC criterion, (2) Numbers in parentheses represent the p-values, (3) * implies significance at the 5% le

Table 3: Augmented Dickey - Fuller Test Results for Arrivals

ADF TEST					
ARRIVALS	LEVEL		1ST DIFFERENCE		DECISION
	INTERCEPT	TREND & INTERCEPT	INTERCEPT	TREND & INTERCEPT	STATIONARY/NON STATIONARY
FRANCE	0,276806 (0,9756)	-2,137984 (0,5167)	-4,985518 * (0,0001)	-5,159818 * (0,0003)	STATIONARY AT 1ST DIFFERENCE
GERMANY	-0,494824 (0,8858)	-3,424871 (0,0554)	-4,368618 * (0,0007)	-4,240968 * (0,0063)	STATIONARY AT 1ST DIFFERENCE
GREECE	-0,031006 (0,9523)	-1,692470 (0,7454)	-4,317317 * (0,0008)	-4,409814 * (0,0037)	STATIONARY AT 1ST DIFFERENCE
ITALY	-0,390066 (0,9049)	-2,964664 (0,1488)	-3,782518 * (0,0046)	-3,735093 * (0,0257)	STATIONARY AT 1ST DIFFERENCE
SPAIN	-1,040937 (0,7349)	-2,360161 (0,3972)	-4,046943 * (0,0020)	-4,025367 * (0,0117)	STATIONARY AT 1ST DIFFERENCE

Note: (1) The optimal lag length for the unit root tests were based on the SIC criterion, (2) Numbers in parentheses represent the p-values, (3) * implies significance at the 5% level

Table 4: Augmented Dickey - Fuller Test Results for Uncertainty

ADF TEST					
UNCERTAINTY	LEVEL		1ST DIFFERENCE		DECISION
	INTERCEPT	TREND & INTERCEPT	INTERCEPT	TREND & INTERCEPT	STATIONARY/NON STATIONARY
FRANCE	-2,636150 (0,0902)	-4,350132 * (0,0045)	-11,85022 * (0,0001)	-11,87011 * (0,0001)	STATIONARY AT LEVEL
GERMANY	-3,900057 * (0,0032)	-5,454511 * (0,0001)	-9,595209 * (0,0000)	9,528656 * (0,0000)	STATIONARY AT LEVEL
GREECE	-4,171171 * (0,0013)	-4,265866 * (0,0058)	-8,815338 * (0,0000)	-8,808588 * (0,0000)	STATIONARY AT LEVEL
ITALY	-3,776763 * (0,0046)	-3,801632 * (0,0215)	-10,74546 * (0,0001)	-10,68431 * (0,0000)	STATIONARY AT LEVEL
SPAIN	-1,866194 (0,3464)	-2,716918 (0,2330)	-13,49243 * (0,0001)	-13,40271 * (0,0001)	STATIONARY AT 1ST DIFFERENCE

Note: (1) The optimal lag length for the unit root tests were based on the SIC criterion, (2) Numbers in parentheses represent the p-values, (3) * implies significance at the 5% level

Table 5: Augmented Dickey Fuller - Generalized Least Squares Test Results for Real Gdp

ADF-GLS TEST					
REAL GDP	LEVEL		1ST DIFFERENCE		DECISION
	INTERCEPT	TREND & INTERCEPT	INTERCEPT	TREND & INTERCEPT	STATIONARY/NON STATIONARY
FRANCE	1,452684 (-1,945024)	-1,893246 (-3,100400)	-2,539559 * (-1,945081)	-3,319033 * (-3,103600)	STATIONARY AT 1ST DIFFERENCE
GERMANY	-0,026406 (-1,944969)	-4,717545 * (-3,097200)	-8,272775 * (-1,945081)	-9,240409 * (-3,103600)	STATIONARY AT LEVEL
GREECE	-0,688371 (-1,945024)	-0,915781 (-3,100400)	-3,090267 * (-1,945081)	-3,497184 * (-3,103600)	STATIONARY AT 1ST DIFFERENCE
ITALY	-0,885124 (-1,945024)	-1,598091 (-3,100400)	-2,298209 * (-1,945081)	-4,152491 * (-3,103600)	STATIONARY AT 1ST DIFFERENCE
SPAIN	0,105410 (-1,945260)	-1,719442 (-3,113200)	-0,264893 (-1,945260)	1,471778 (-3,113200)	NON STATIONARY

Note: (1) The optimal lag length for the unit root tests were based on the SIC criterion, (2) Numbers in parentheses represent the 5% critical value, (3) * implies significance at the 5% level

Table 6: Augmented Dickey Fuller - Generalized Least Squares Test Results for Real Effective Exchange Rate

ADF-GLS TEST					
REAL EFFECTIVE EXCHANGE RATE	LEVEL		1ST DIFFERENCE		DECISION
	INTERCEPT	TREND & INTERCEPT	INTERCEPT	TREND & INTERCEPT	STATIONARY/NON STATIONARY
FRANCE	-1.138115 (-1,945024)	-1,854626 (-3,100400)	-4,594162 * (-1,945024)	-5,797148 * (-3,100400)	STATIONARY AT 1ST DIFFERENCE
GERMANY	-1,025927 (-1,944969)	-1,810752 (-3,097200)	-3,011835 * (-1,945081)	-6,080141 * (-3,100400)	STATIONARY AT 1ST DIFFERENCE
GREECE	-0,751031 (-1,945024)	-0,558888 (-3,100400)	-3,816811 * (-1,945081)	-4,259500 * (-3,103600)	STATIONARY AT 1ST DIFFERENCE
ITALY	-1,076486 (-1,944969)	-1,181876 (-3,097200)	-3,257500 * (-1,945081)	-6,355565 * (-3,100400)	STATIONARY AT 1ST DIFFERENCE
SPAIN	-0,750640 (-1,945139)	-1,035012 (-3,106800)	-1,970303 * (-1,945324)	-3,240800 * (-3,110000)	STATIONARY AT 1ST DIFFERENCE

Note: (1) The optimal lag length for the unit root tests were based on the SIC criterion, (2) Numbers in parentheses represent the 5% critical value, (3) * implies significance at the 5% level

Table 7: Augmented Dickey Fuller - Generalized Least Squares Test Results for Arrivals

ADF-GLS TEST					
ARRIVALS	LEVEL		1ST DIFFERENCE		DECISION
	INTERCEPT	TREND & INTERCEPT	INTERCEPT	TREND & INTERCEPT	STATIONARY/NON STATIONARY
FRANCE	0,878444 (-1,945024)	-2,121493 (-3,100400)	-5,007459 * (-1,945024)	-5,160271 * (-3,100400)	STATIONARY AT 1ST DIFFERENCE
GERMANY	0,466386 (-1,945024)	-2,009372 (-3,100400)	-1,439427 (-1,945081)	-2,993769 (-3,100400)	NON STATIONARY
GREECE	0,650013 (-1,945024)	-1,634530 (-3,100400)	-3,860578 * (-1,945024)	-4,092344 * (-3,100400)	STATIONARY AT 1ST DIFFERENCE
ITALY	0,056894 (-1,945024)	-2,193691 (-3,100400)	-2,050518 * (-1,945024)	-3,122015 * (-3,100400)	STATIONARY AT 1ST DIFFERENCE
SPAIN	0,580029 (-1,945024)	-2,312551 (-3,100400)	-3,262863 * (-1,945024)	-3,750374 * (-3,100400)	STATIONARY AT 1ST DIFFERENCE

Note: (1) The optimal lag length for the unit root tests were based on the SIC criterion, (2) Numbers in parentheses represent the 5% critical value, (3) * implies significance at the 5% level

Table 8: Augmented Dickey Fuller - Generalized Least Squares Test Results for Uncertainty

ADF-GLS TEST					
UNCERTAINTY	LEVEL		1ST DIFFERENCE		DECISION
	INTERCEPT	TREND & INTERCEPT	INTERCEPT	TREND & INTERCEPT	STATIONARY/NON STATIONARY
FRANCE	-0,527694 (-1,945024)	-3,339665 * (-3,097200)	-11,41577 * (-1,945024)	-11,93302 * (-3,100400)	STATIONARY AT LEVEL
GERMANY	-3,407820 * (-1,944969)	-5,495418 * (-3,097200)	-9,447686 * (-1,945081)	-9,489060 * (-3,103600)	STATIONARY AT LEVEL
GREECE	-3,725928 * (-1,944969)	-4,268674 * (-3,097200)	-8,526057 * (-1,945081)	-7,803957 * (-3.100400)	STATIONARY AT LEVEL
ITALY	-2,818839 * (-1,944969)	-3,625474 * (-3,097200)	-10,31010 * (-1,945024)	-10,73346 * (-3,100400)	STATIONARY AT LEVEL
SPAIN	-0,977283 (-1,945024)	-2,724160 (-3,100400)	-13,34454 * (-1,945024)	-13,49902 * (-3,100400)	STATIONARY AT 1ST DIFFERENCE

Note: (1) The optimal lag length for the unit root tests were based on the SIC criterion, (2) Numbers in parentheses represent the 5% critical value, (3) * implies significance at the 5% level

Table 9: Phillips – Perron Test Results for Real Gdp

PP TEST					
REAL GDP	LEVEL		1ST DIFFERENCE		DECISION
	INTERCEPT	TREND & INTERCEPT	INTERCEPT	TREND & INTERCEPT	STATIONARY/NON STATIONARY
FRANCE	-0,998437 (0,7504)	-2,402404 (0,3755)	-6,041645 * (0,0000)	-6,021164 * (0,0000)	STATIONARY AT 1ST DIFFERENCE
GERMANY	-0,566014 (0,8713)	-4,861926 * (0,0009)	-18,48067 * (0,0001)	-20,26884 * (0,0001)	STATIONARY AT LEVEL
GREECE	-1,005434 (0,7479)	-2,056980 (0,5612)	-7,012991 * (0,0000)	-7,289330 * (0,0000)	STATIONARY AT 1ST DIFFERENCE
ITALY	-7.087276 * (0,0000)	-7,151049 * (0,0000)	-32,18070 * (0,0001)	-32,32976 * (0,0001)	STATIONARY AT LEVEL
SPAIN	-2,918720 * (0,0477)	-4,861163 * (0,0009)	-33,71487 * (0,0001)	-34,11868 * (0,0001)	STATIONARY AT LEVEL

Note: (1) The optimal lag length for the unit root tests were based on the SIC criterion, (2) Numbers in parentheses represent the 5% critical value, (3) * implies significance at the 5% level

Table 10: Phillips – Perron Test Results for Real Effective Exchange Rate

PP TEST					
REAL EFFECTIVE EXCHANGE RATE	LEVEL		1ST DIFFERENCE		DECISION
	INTERCEPT	TREND & INTERCEPT	INTERCEPT	TREND & INTERCEPT	STATIONARY/NON STATIONARY
FRANCE	-0,969779 (0,7614)	-1,869266 (0,6610)	-6,796280 * (0,0000)	-6,890716 * (0,0000)	STATIONARY AT 1ST DIFFERENCE
GERMANY	-1,347772 (0,6035)	-2,125116 (0,5238)	-7,575972 * (0,0000)	-7,569460 * (0,0000)	STATIONARY AT 1ST DIFFERENCE
GREECE	-1,436281 (0,5604)	-1,099939 (0,9222)	-12,01599 * (0,0001)	-13,18640 * (0,0001)	STATIONARY AT 1ST DIFFERENCE
ITALY	-1,457558 (0,5498)	-1,799346 (0,6958)	-7,346069 * (0,0000)	-7,574785 * (0,0000)	STATIONARY AT 1ST DIFFERENCE
SPAIN	-2,313131 (0,1705)	-1,719629 (0,7334)	-11,13543 * (0,0001)	-11,46919 * (0,0001)	STATIONARY AT 1ST DIFFERENCE

Note: (1) The optimal lag length for the unit root tests were based on the SIC criterion, (2) Numbers in parentheses represent the p-values, (3) * implies significance at the 5% level

Table 11: Phillips – Perron Test Results for Arrivals

PP TEST					
ARRIVALS	LEVEL		1ST DIFFERENCE		DECISION
	INTERCEPT	TREND & INTERCEPT	INTERCEPT	TREND & INTERCEPT	STATIONARY/NON STATIONARY
FRANCE	0,685205 (0,9911)	-1,521306 (0,8140)	-4,963208 * (0,0001)	-5,108526 * (0,0004)	STATIONARY AT 1ST DIFFERENCE
GERMANY	0,339235 (0,9790)	-3,982148 * (0,0131)	-4,177257 * (0,0013)	-4,012897 * (0,0121)	STATIONARY AT LEVEL
GREECE	0,281553 (0,9759)	-1,194898 (0,9045)	-4,342253 * (0,0008)	-4,415808 * (0,0037)	STATIONARY AT 1ST DIFFERENCE
ITALY	0,514399 (0,9863)	-2,843183 (0,1867)	-3,831624 * (0,0039)	-3,813310 * (0,0209)	STATIONARY AT 1ST DIFFERENCE
SPAIN	-0,543704 (0,8760)	-1,779469 (0,7054)	--4,101819 * (0,0017)	-4,069755 * (0,0103)	STATIONARY AT 1ST DIFFERENCE

Note: (1) The optimal lag length for the unit root tests were based on the SIC criterion, (2) Numbers in parentheses represent the p-values, (3) * implies significance at the 5% level

Table 12: Phillips – Perron Test Results for Uncertainty

PP TEST					
UNCERTAINTY	LEVEL		1ST DIFFERENCE		DECISION
	INTERCEPT	TREND & INTERCEPT	INTERCEPT	TREND & INTERCEPT	STATIONARY/NON STATIONARY
FRANCE	-2,817166 (0,0604)	-4,350132 * (0,0045)	-13,30617 * (0,0001)	-14,05290 * (0,0001)	STATIONARY AT LEVEL
GERMANY	-3,900057 * (0,0032)	-5,464716 * (0,0001)	-39,70676 * (0,0001)	-40,90752 * (0,0001)	STATIONARY AT LEVEL
GREECE	-4,092112 * (0,0017)	-4,225208 * (0,0065)	-10,53188 * (0,0001)	-10,41342 * (0,0000)	STATIONARY AT LEVEL
ITALY	-3,666660 * (0,0065)	-3,703398 * (0,0278)	-12,00594 * (0,0001)	-11,91174 * (0,0001)	STATIONARY AT LEVEL
SPAIN	-2,639289 (0,0895)	-4,067971 * (0,0103)	--17,71049 * (0,0001)	-17,54784 * (0,0001)	STATIONARY AT LEVEL

Note: (1) The optimal lag length for the unit root tests were based on the SIC criterion, (2) Numbers in parentheses represent the p-values, (3) * implies significance at the 5% level

Table 13: Kwiatkowski – Phillips –Schmidt –Shin Test Results for Real Gdp

KPSS TEST					
REAL GDP	LEVEL		1ST DIFFERENCE		DECISION
	INTERCEPT	TREND & INTERCEPT	INTERCEPT	TREND & INTERCEPT	STATIONARY/NON STATIONARY
FRANCE	1,195312 (0,463000)	0,132630 * (0,146000)	0,105016 * (0,463000)	0,082452 * (0,146000)	STATIONARY AT LEVEL
GERMANY	1,196938 (0,463000)	0,132952 * (0,146000)	0,141954 * (0,463000)	0,113378 * (0,146000)	STATIONARY AT LEVEL
GREECE	0,549203 (0,463000)	0,208706 (0,146000)	0,338694 * (0,463000)	0,201205 (0,146000)	STATIONARY AT 1ST DIFFERENCE
ITALY	0,221068 * (0,463000)	0,168024 (0,146000)	0,190504 * (0,463000)	0,164005 (0,146000)	STATIONARY AT LEVEL
SPAIN	0,875447 (0,463000)	0,180544 (0,146000)	0,199256 * (0,463000)	0,157909 (0,146000)	STATIONARY AT 1ST DIFFERENCE

Note: (1) The optimal lag length for the unit root tests were based on the SIC criterion, (2) Numbers in parentheses represent the 5% critical value, (3) * implies significance at the 5% level

Table 14: : Kwiatkowski – Phillips –Schmidt –Shin Test Results for Real Effective Exchange Rate

KPSS TEST					
REAL EFFECTIVE EXCHANGE RATE	LEVEL		1ST DIFFERENCE		DECISION
	INTERCEPT	TREND & INTERCEPT	INTERCEPT	TREND & INTERCEPT	STATIONARY/NON STATIONARY
FRANCE	0,702463 (0,463000)	0,215040 (0,146000)	0,155952 * (0,463000)	0,074286 * (0,146000)	STATIONARY AT 1ST DIFFERENCE
GERMANY	0,766040 (0,463000)	0,169913 (0,146000)	0,080270 * (0,463000)	0,060907 * (0,146000)	STATIONARY AT 1ST DIFFERENCE
GREECE	0,292209 * (0,463000)	0,292805 (0,146000)	0,375137 * (0,463000)	0,128484 * (0,146000)	STATIONARY AT LEVEL
ITALY	0,377119 * (0,463000)	0,229495 (0,146000)	0,248998 * (0,463000)	0,054255 * (0,146000)	STATIONARY AT 1ST DIFFERENCE
SPAIN	0,338435 * (0,463000)	0,270723 (0,146000)	0,358491 * (0,463000)	0,120182 * (0,146000)	STATIONARY AT LEVEL

Note: (1) The optimal lag length for the unit root tests were based on the SIC criterion, (2) Numbers in parentheses represent the 5% critical value, (3) * implies significance at the 5% level

Table 15: Kwiatkowski – Phillips –Schmidt –Shin Test Results for Arrivals

KPSS TEST					
ARRIVALS	LEVEL		1ST DIFFERENCE		DECISION
	INTERCEPT	TREND & INTERCEPT	INTERCEPT	TREND & INTERCEPT	STATIONARY/NON STATIONARY
FRANCE	1,127288 (0,463000)	0,198831 (0,146000)	0,217997 * (0,463000)	0,042508 * (0,146000)	STATIONARY AT 1ST DIFFERENCE
GERMANY	1,216457 (0,463000)	0,063597 * (0,146000)	0,191609 * (0,463000)	0,138384 * (0,146000)	STATIONARY AT LEVEL
GREECE	1,019831 (0,463000)	0,259531 (0,146000)	0,214160 * (0,463000)	0,086904 * (0,146000)	STATIONARY AT 1ST DIFFERENCE
ITALY	1,161644 (0,463000)	0,125417 * (0,146000)	0,219295 * (0,463000)	0,059526 * (0,146000)	STATIONARY AT LEVEL
SPAIN	1,144746 (0,463000)	0,124027 * (0,146000)	0,081728 * (0,463000)	0,08154 * (0,146000)	STATIONARY AT LEVEL

Note: (1) The optimal lag length for the unit root tests were based on the SIC criterion, (2) Numbers in parentheses represent the 5% critical value, (3) * implies significance at the 5% level

Table 16: Kwiatkowski – Phillips –Schmidt –Shin Test Results for Uncertainty

KPSS TEST					
UNCERTAINTY	LEVEL		1ST DIFFERENCE		DECISION
	INTERCEPT	TREND & INTERCEPT	INTERCEPT	TREND & INTERCEPT	STATIONARY/NON STATIONARY
FRANCE	1,053943 (0,463000)	0,107562 * (0,146000)	0,223174 * (0,463000)	0,103860 * (0,146000)	STATIONARY AT LEVEL
GERMANY	1,196938 (0,463000)	0,132952 * (0,146000)	0,141954 * (0,463000)	0,113378 * (0,146000)	STATIONARY AT LEVEL
GREECE	0,256229 * (0,463000)	0,112125 * (0,146000)	0,053615 * (0,463000)	0,053782 * (0,14600)	STATIONARY AT LEVEL
ITALY	0,230147 * (0,463000)	0,090837 * (0,146000)	0,076516 * (0,463000)	0,062525 * (0,146000)	STATIONARY AT LEVEL
SPAIN	0,850352 (0,463000)	0,125621 * (0,146000)	0,232583 * (0,463000)	0,231156 (0,146000)	STATIONARY AT LEVEL

Note: (1) The optimal lag length for the unit root tests were based on the SIC criterion, (2) Numbers in parentheses represent the 5% critical value, (3) * implies significance at the 5% level

4.2 Lag Length Selection

Table 17: Lag Length Selection

COUNTRY	LAG LENGTH
FRANCE	1
GERMANY	7
GREECE	4
ITALY	5
SPAIN	4

Note: (1) The optimal VAR lag order selection was based on the AIC criterion

4.3 Granger Causality Test

Table 18: Granger Causality Test Results for France

FRANCE	
REAL GDP	**PROPABILITY**
EXCHANGE RATE DOES NOT GRANGER CAUSE REAL GDP	0,4800
ARRIVALS DO NOT GRANGER CAUSE REAL GDP	0,6035
UNCERTAINTY DOES GRANGER CAUSE REAL GDP	0,0081 *
EXCHANGE RATE	**PROPABILITY**
REAL GDP DOES NOT GRANGER CAUSE EXCHANGE RATE	0,7859
ARRIVALS DO NOT GRANGER CAUSE EXCHANGE RATE	0,0655
UNCERTAINTY DOES NOT GRANGER CAUSE EXCHANGE RATE	0,9447
ARRIVALS	**PROPABILITY**
REAL GDP DOES NOT GRANGER CAUSE ARRIVALS	0,8107
EXCHANGE RATE DOES NOT GRANGER CAUSE ARRIVALS	0,2599
UNCERTAINTY DOES NOT GRANGER CAUSE ARRIVALS	0,0945
UNCERTAINTY	**PROPABILITY**
REAL GDP DOES NOT GRANGER CAUSE UNCERTAINTY	0,3427
EXCHANGE RATE DOES NOT GRANGER CAUSE UNCERTAINTY	0,1938
ARRIVALS DOES NOT GRANGER CAUSE UNCERTAINTY	0,4350

Note: (1) * implies significance at the 5% level

Table 19: Granger Causality Test Results for Germany

GERMANY	
REAL GDP	**PROPABILITY**
EXCHANGE RATE DOES NOT GRANGER CAUSE REAL GDP	0,0927
ARRIVALS DO GRANGER CAUSE REAL GDP	0,0033*
UNCERTAINTY DOES GRANGER CAUSE REAL GDP	0,0540*
EXCHANGE RATE	**PROPABILITY**
REAL GDP DOES NOT GRANGER CAUSE EXCHANGE RATE	0,6966
ARRIVALS DO NOT GRANGER CAUSE EXCHANGE RATE	0,5845
UNCERTAINTY DOES NOT GRANGER CAUSE EXCHANGE RATE	0,9300
ARRIVALS	**PROPABILITY**
REAL GDP DOES NOT GRANGER CAUSE ARRIVALS	0,0776
EXCHANGE RATE DOES NOT GRANGER CAUSE ARRIVALS	0,1873
UNCERTAINTY DOES NOT GRANGER CAUSE ARRIVALS	0,1384
UNCERTAINTY	**PROPABILITY**
REAL GDP DOES GRANGER CAUSE UNCERTAINTY	0,0218 *
EXCHANGE RATE DOES GRANGER CAUSE UNCERTAINTY	0,0131 *
ARRIVALS DO GRANGER CAUSE UNCERTAINTY	0,0015 *

Note: (1) * implies significance at the 5% level

Table 20: Granger Causality Test Results for Greece

GREECE	
REAL GDP	**PROPABILITY**
EXCHANGE RATE DOES NOT GRANGER CAUSE REAL GDP	0,7479
ARRIVALS DO NOT GRANGER CAUSE REAL GDP	0,2985
UNCERTAINTY DOES NOT GRANGER CAUSE REAL GDP	0,1689
EXCHANGE RATE	**PROPABILITY**
REAL GDP DOES NOT GRANGER CAUSE EXCHANGE RATE	0,1449
ARRIVALS DO NOT GRANGER CAUSE EXCHANGE RATE	0,0962
UNCERTAINTY DOES NOT GRANGER CAUSE EXCHANGE RATE	0,6734
ARRIVALS	**PROPABILITY**
REAL GDP DOES NOT GRANGER CAUSE ARRIVALS	0,5527
EXCHANGE RATE DOES GRANGER CAUSE ARRIVALS	0,0046 *
UNCERTAINTY DOES NOT GRANGER CAUSE ARRIVALS	0,6518
UNCERTAINTY	**PROPABILITY**
REAL GDP DOES NOT GRANGER CAUSE UNCERTAINTY	0,9709
EXCHANGE RATE DOES NOT GRANGER CAUSE UNCERTAINTY	0,1155
ARRIVALS DO NOT GRANGER CAUSE UNCERTAINTY	0,6215

Note: (1) * implies significance at the 5% level

Table 21: Granger Causality Test Results for Italy

ITALY	
REAL GDP	**PROPABILITY**
EXCHANGE RATE DOES NOT GRANGER CAUSE REAL GDP	0,2393
ARRIVALS DO NOT GRANGER CAUSE REAL GDP	0,1733
UNCERTAINTY DOES NOT GRANGER CAUSE REAL GDP	0,0615
EXCHANGE RATE	**PROPABILITY**
REAL GDP DOES NOT GRANGER CAUSE EXCHANGE RATE	0,1569
ARRIVALS DO NOT GRANGER CAUSE EXCHANGE RATE	0,7827
UNCERTAINTY DOES NOT GRANGER CAUSE EXCHANGE RATE	0,9461
ARRIVALS	**PROPABILITY**
REAL GDP DOES NOT GRANGER CAUSE ARRIVALS	0,8730
EXCHANGE RATE DOES NOT GRANGER CAUSE ARRIVALS	0,2026
UNCERTAINTY DOES NOT GRANGER CAUSE ARRIVALS	0,6339
UNCERTAINTY	**PROPABILITY**
REAL GDP DOES NOT GRANGER CAUSE UNCERTAINTY	0,6768
EXCHANGE RATE DOES GRANGER CAUSE UNCERTAINTY	0,0023*
ARRIVALS DO NOT GRANGER CAUSE UNCERTAINTY	0,4573

Note: (1) * implies significance at the 5% level

Table 22: Granger Causality Test Results for Spain

SPAIN	
REAL GDP	**PROPABILITY**
EXCHANGE RATE DOES NOT GRANGER CAUSE REAL GDP	0,8012
ARRIVALS DO NOT GRANGER CAUSE REAL GDP	0,0604
UNCERTAINTY DOES GRANGER CAUSE REAL GDP	0,0014 *
EXCHANGE RATE	**PROPABILITY**
REAL GDP DOES GRANGER CAUSE EXCHANGE RATE	0,0009 *
ARRIVALS DO NOT GRANGER CAUSE EXCHANGE RATE	0,6195
UNCERTAINTY DOES NOT GRANGER CAUSE EXCHANGE RATE	0,1363
ARRIVALS	**PROPABILITY**
REAL GDP DOES NOT GRANGER CAUSE ARRIVALS	0,8867
EXCHANGE RATE DOES GRANGER CAUSE ARRIVALS	0,0332 *
UNCERTAINTY DOES NOT GRANGER CAUSE ARRIVALS	0,6558
UNCERTAINTY	**PROPABILITY**
REAL GDP DOES NOT GRANGER CAUSE UNCERTAINTY	0,4567
EXCHANGE RATE DOES NOT GRANGER CAUSE UNCERTAINTY	0,9597
ARRIVALS DO GRANGER CAUSE UNCERTAINTY	0,0195 *

Note: (1) * implies significance at the 5% level

4.4 Impulse Response Function

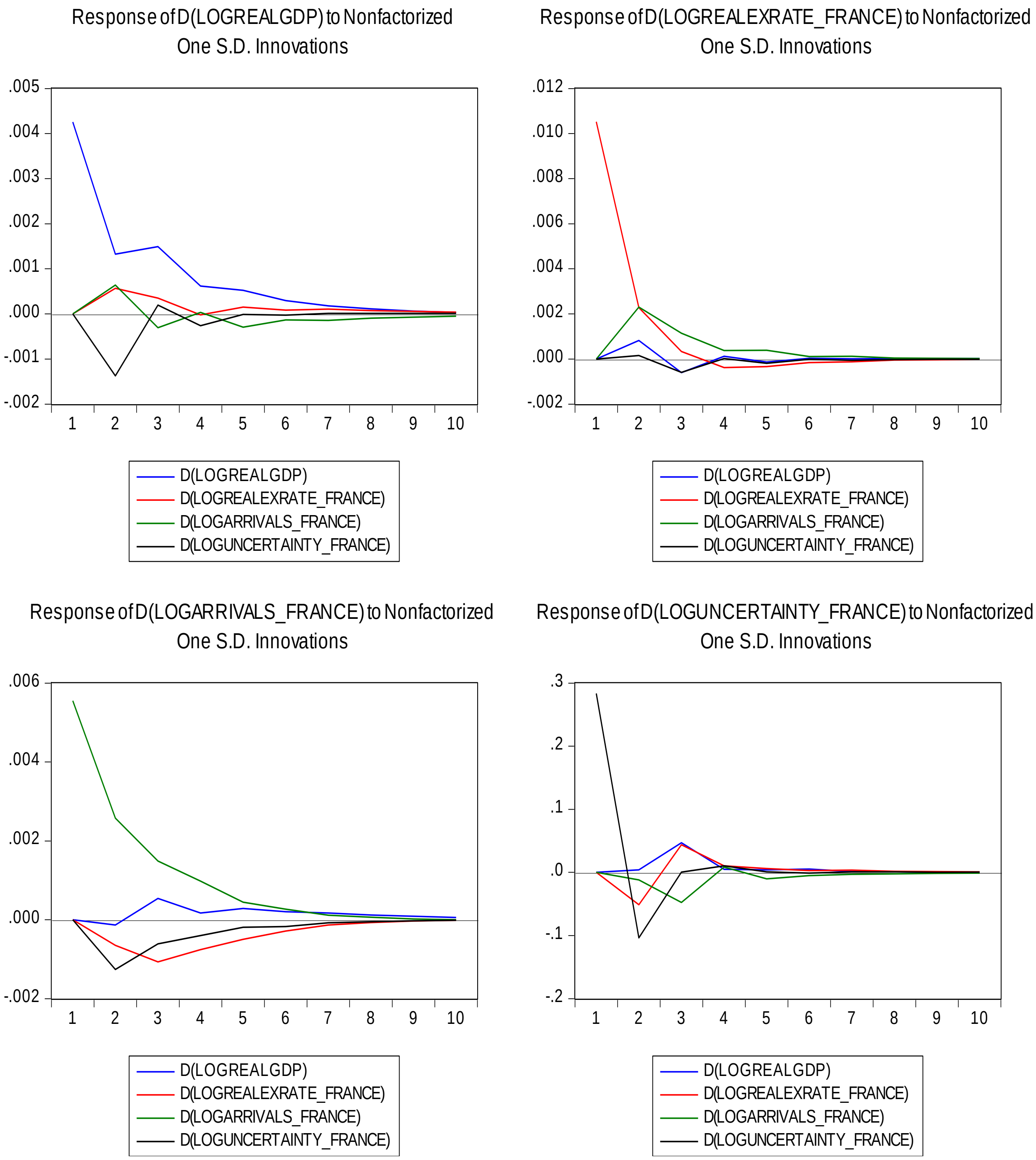

Figure 1: Impulse Response Function for France

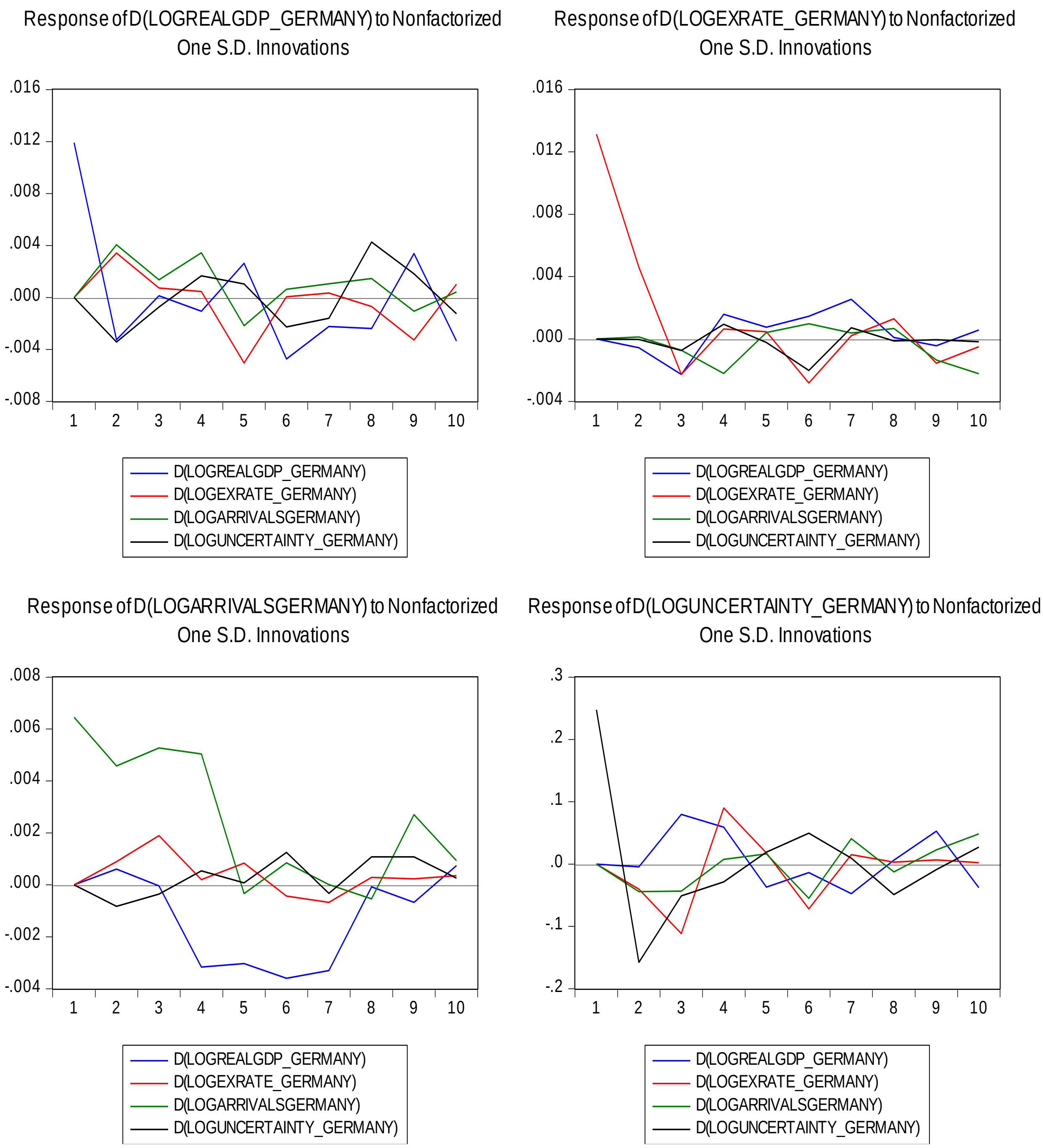

Figure 2: Impulse Response Function for Germany

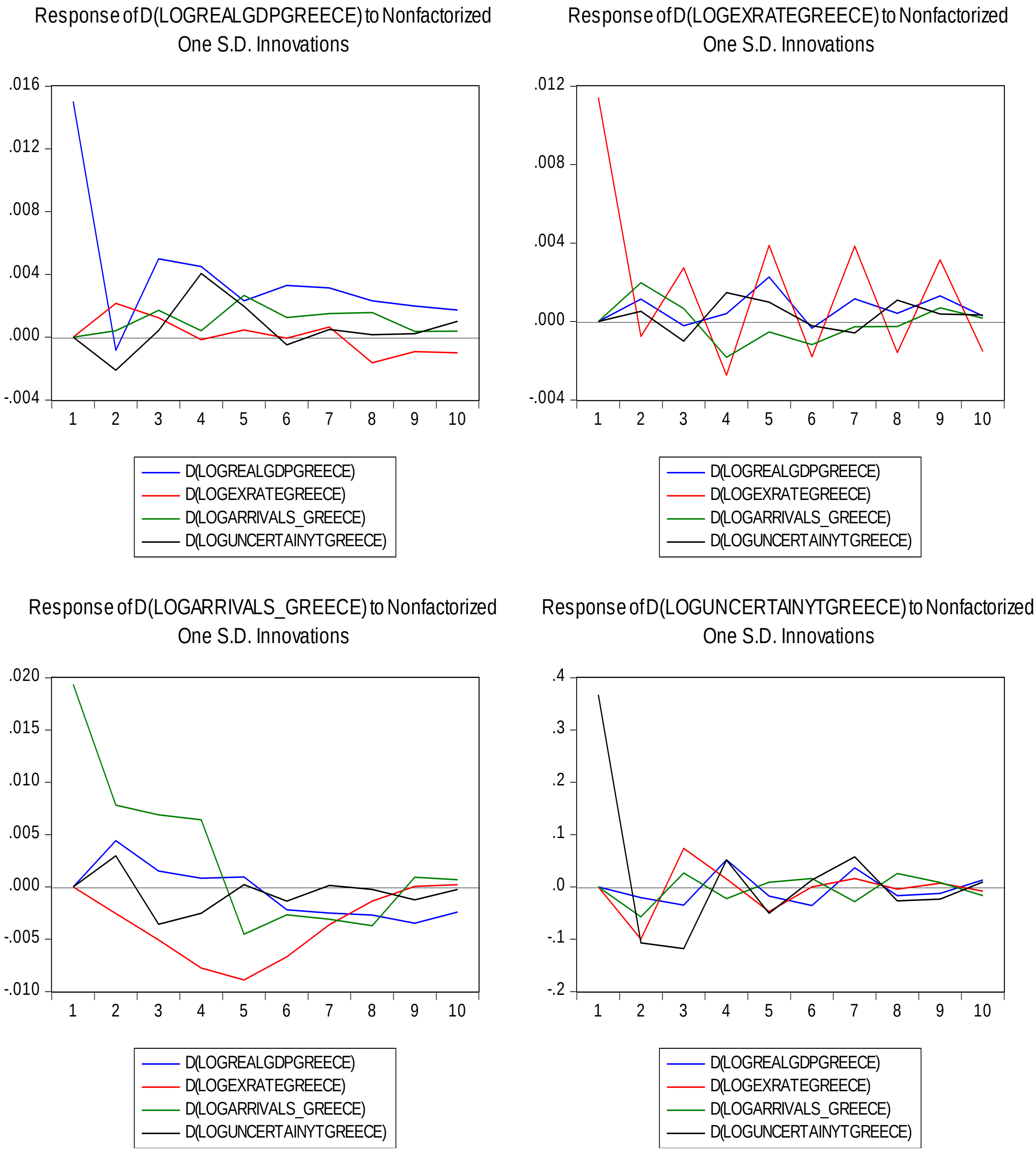

Figure 3: Impulse Response Function for Greece

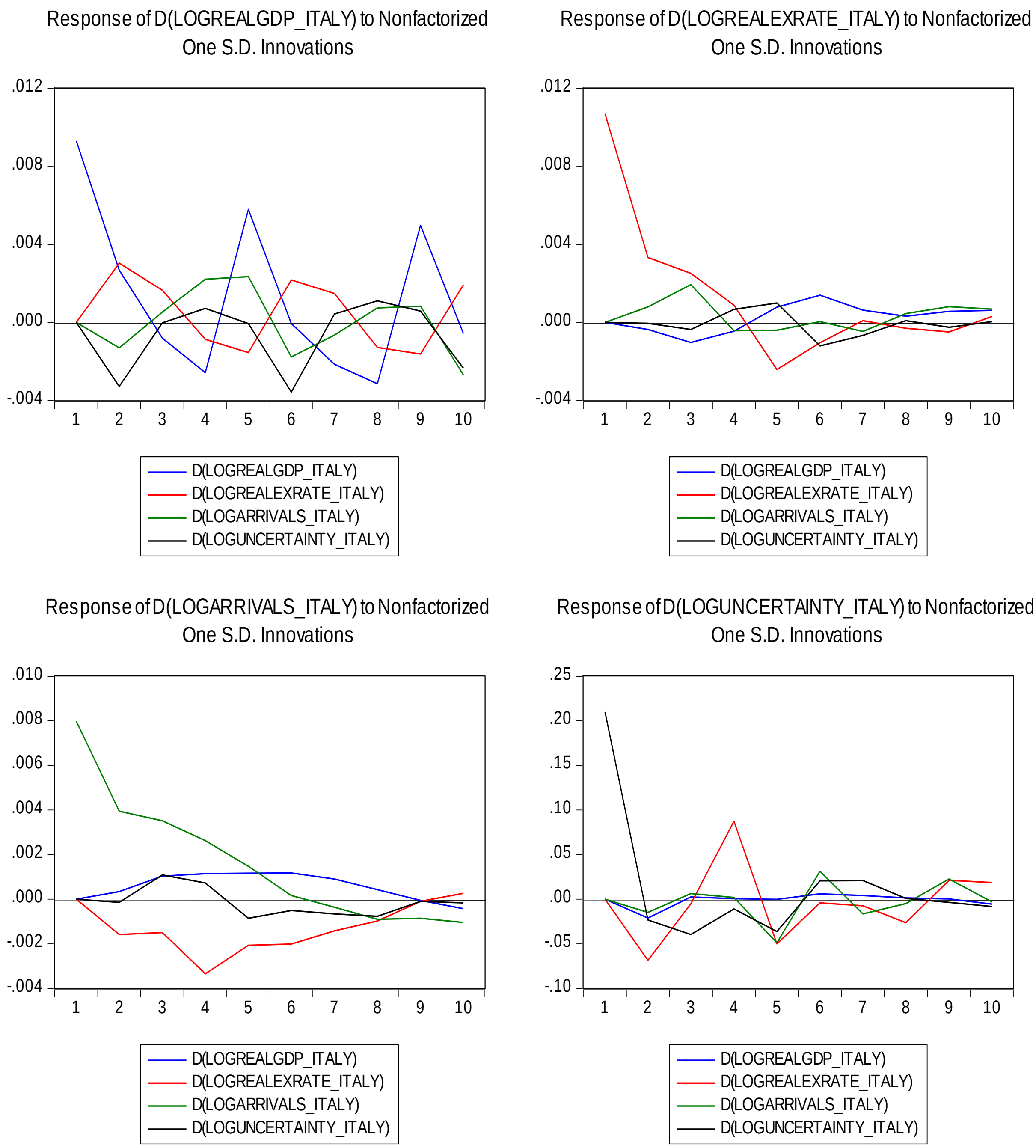

Figure 4: Impulse Response Function for Italy

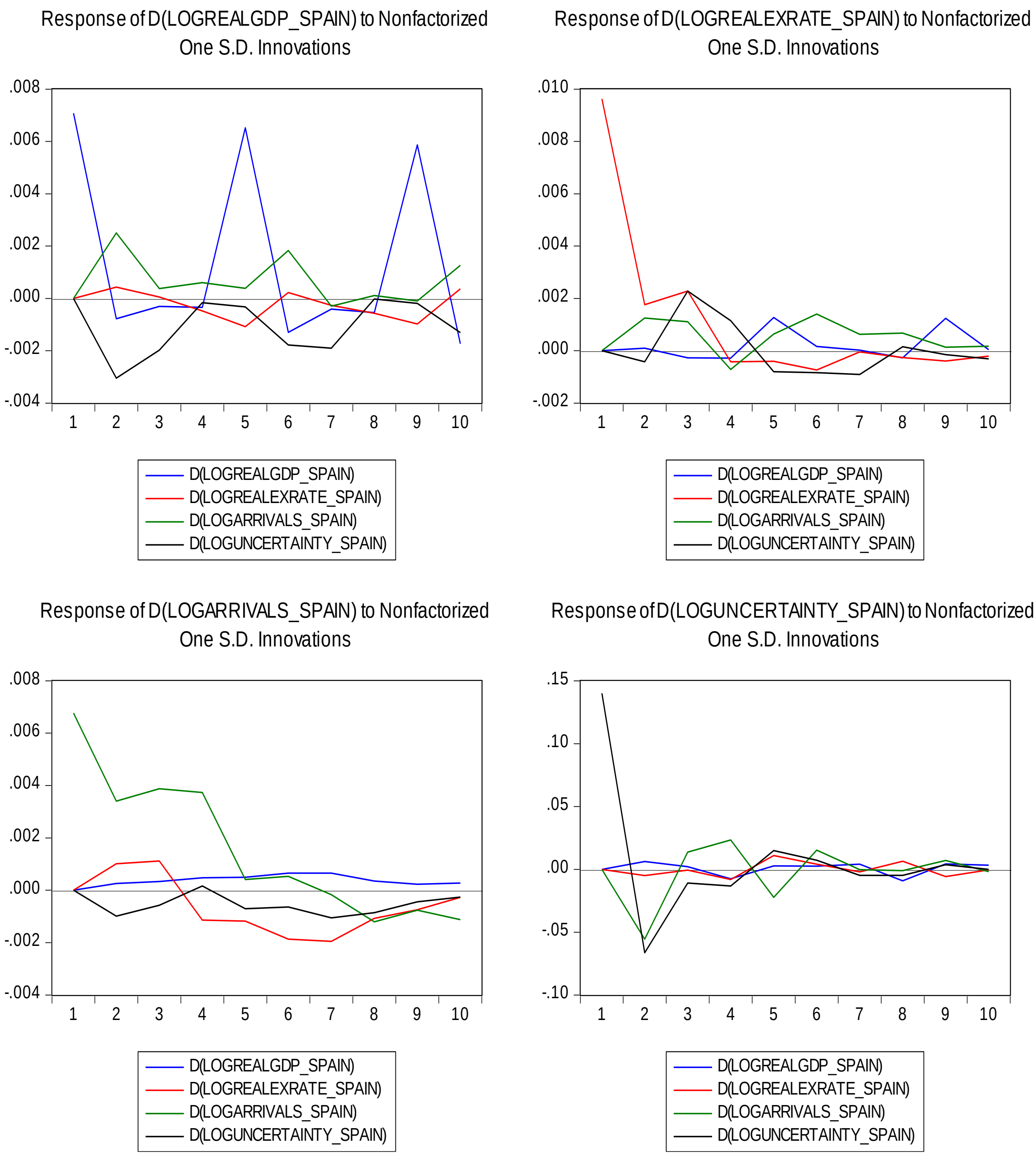

Figure 5: Impulse Response Function for Spain

4.4 Variance Decomposition

Table 23: Variance Decomposition for France

VARIANCE DECOMPOSITION OF REAL GDP (FRANCE)				
PERIOD	**REAL GDP**	**EX.RATE**	**ARRIVALS**	**UNCERTAINTY**
1	100,0000	0,000000	0,000000	0,000000
5	87,51510	2,432729	2,439716	7,612453
10	87,33133	2,481229	2,626295	7,561143
15	87,32217	2,484257	2,632898	7,560678
20	87,32208	2,484289	2,632951	7,560679
VARIANCE DECOMPOSITION OF EXCHANGE RATE (FRANCE)				
PERIOD	**REAL GDP**	**EX.RATE**	**ARRIVALS**	**UNCERTAINTY**
1	0,585541	99,41446	0,000000	0,000000
5	1,255663	93,07462	5,340588	0,329127
10	1,259831	93,04523	5,362375	0,332562
15	1,260129	93,04485	5,362417	0,332600
20	1,260133	93,04485	5,362417	0,332600
VARIANCE DECOMPOSITION OF ARRIVALS (FRANCE)				
PERIOD	**REAL GDP**	**EX.RATE**	**ARRIVALS**	**UNCERTAINTY**
1	0,502220	2,372872	97,12491	0,000000
5	2,258247	4,292687	88,69086	4,758206
10	2,538236	4,423864	88,22818	4,809717
15	2,543732	4,423661	88,22303	4,809581
20	2,543760	4,423676	88,22299	4,809578
VARIANCE DECOMPOSITION OF UNCERTAINTY (FRANCE)				
PERIOD	**REAL GDP**	**EX.RATE**	**ARRIVALS**	**UNCERTAINTY**
1	0,412932	0,230834	0,094066	99,26217
5	2,172500	3,949526	2,542273	91,33570
10	2,193100	3,962325	2,583194	91,26138
15	2,193127	3,962525	2,583542	91,26081
20	2,193130	3.962525	2,583543	91,26080

Table 24: Variance Decomposition for Germany

VARIANCE DECOMPOSITION OF REAL GDP (GERMANY)				
PERIOD	**REAL GDP**	**EX.RATE**	**ARRIVALS**	**UNCERTAINTY**
1	100,0000	0,000000	0,000000	0,000000
5	67,83353	13,23065	12,45771	6,478115
10	63,22927	14,01913	9,784080	12,96752
15	60,78579	15,13288	10,92437	13,15696
20	60,67196	15,35960	10,57003	13,39840
VARIANCE DECOMPOSITION OF EXCHANGE RATE (GERMANY)				
PERIOD	**REAL GDP**	**EX.RATE**	**ARRIVALS**	**UNCERTAINTY**
1	2,586487	97,41531	0,000000	0,000000
5	5,817735	91,29569	2,222482	0,664089
10	9,778872	83,04976	4,800284	2,371087
15	11,05451	80,51761	5,627122	2,800763
20	11,75985	79,35439	6,070827	2,814933
VARIANCE DECOMPOSITION OF ARRIVALS (GERMANY)				
PERIOD	**REAL GDP**	**EX.RATE**	**ARRIVALS**	**UNCERTAINTY**
1	7,835196	7,511658	84,65315	0,000000
5	16,54934	4,707503	77,90896	0,834205
10	26,29920	4,810837	65,85223	3,037737
15	27,69773	7,163594	61,09939	4,039290
20	27,27303	8,178589	60,56520	3,983182
VARIANCE DECOMPOSITION OF UNCERTAINTY (GERMANY)				
PERIOD	**REAL GDP**	**EX.RATE**	**ARRIVALS**	**UNCERTAINTY**
1	0,943663	4,619527	0,016077	94,42073
5	9,080261	16,21570	3,166448	71,53759
10	11,41461	17,19675	7,275974	64,11267
15	12,78344	17,83788	9,148254	60,23043
20	12,92423	17,83787	9,389090	59,84881

Table 25: Variance Decomposition for Greece

VARIANCE DECOMPOSITION OF REAL GDP (GREECE)				
PERIOD	**REAL GDP**	**EX.RATE**	**ARRIVALS**	**UNCERTAINTY**
1	100,0000	0,000000	0,000000	0,000000
5	87,68259	2,200503	2,814902	7,302005
10	85,75909	3,382876	4,149436	6,708593
15	85,17070	3,807433	4,399802	6,622063
20	84,75355	4,210487	4,451655	6,584310
VARIANCE DECOMPOSITION OF EXCHANGE RATE (GREECE)				
PERIOD	**REAL GDP**	**EX.RATE**	**ARRIVALS**	**UNCERTAINTY**
1	1,316027	98,68397	0,000000	0,000000
5	5,227466	87,87538	4,697067	2,200085
10	7,036170	85,79177	4,648804	2,533261
15	9,301402	83,85287	4,527913	2,317813
20	9,590867	83,78740	4,388708	2,233020
VARIANCE DECOMPOSITION OF ARRIVALS (GREECE)				
PERIOD	**REAL GDP**	**EX.RATE**	**ARRIVALS**	**UNCERTAINTY**
1	3,184144	0,205128	96,61073	0,000000
5	6,182748	22,05543	68,51211	3,249705
10	10,44403	24,75402	61,68390	3,118044
15	11,49929	24,49415	60,75154	3,255013
20	12,35403	24,21387	60,19441	3,237681
VARIANCE DECOMPOSITION OF UNCERTAINTY (GREECE)				
PERIOD	**REAL GDP**	**EX.RATE**	**ARRIVALS**	**UNCERTAINTY**
1	7,157101	0,701871	1,724121	90,41691
5	6,095420	9,356500	3,734502	80,81358
10	6,710956	9,078713	4,942507	79,26782
15	6,743753	9,138251	5,147281	78,97072
20	6,748136	9,154536	5,157410	78,93992

Table 26: Variance Decomposition for Italy

VARIANCE DECOMPOSITION OF REAL GDP (ITALY)				
PERIOD	**REAL GDP**	**EX.RATE**	**ARRIVALS**	**UNCERTAINTY**
1	100,0000	0,000000	0,000000	0,000000
5	78,41950	9,844893	5,565242	6,170367
10	69,24962	13,20411	6,209758	11,33651
15	68,49331	13,71872	6,495321	11,29264
20	67,83913	14,05307	6,729418	11,37838
VARIANCE DECOMPOSITION OF EXCHANGE RATE (ITALY)				
PERIOD	**REAL GDP**	**EX.RATE**	**ARRIVALS**	**UNCERTAINTY**
1	3,740036	96,25996	0,000000	0,000000
5	6,144055	89,37240	3,464412	1,019137
10	8,299823	85,32114	4,191665	2,187371
15	8,628158	84,65885	4,480364	2,232627
20	8,917620	84,23415	4,543343	2,304884
VARIANCE DECOMPOSITION OF ARRIVALS (ITALY)				
PERIOD	**REAL GDP**	**EX.RATE**	**ARRIVALS**	**UNCERTAINTY**
1	0,965811	6,228895	92,80529	0,000000
5	8,157296	25,63729	64,57838	1,627038
10	10,16948	27,73633	59,81715	2,277033
15	11,71886	28,66236	57,37672	2,242062
20	11,80709	28,63911	57,27458	2,279212
VARIANCE DECOMPOSITION OF UNCERTAINTY (ITALY)				
PERIOD	**REAL GDP**	**EX.RATE**	**ARRIVALS**	**UNCERTAINTY**
1	0,021654	1,245458	4,315818	94,41707
5	0,636749	21,83170	6,017407	71,51414
10	0,973747	22,38964	8,065687	68,57092
15	0,994550	22,47186	8,191124	68,34247
20	1,007717	22,46995	8,195224	68,32711

Table 27: Variance Decomposition for Spain

VARIANCE DECOMPOSITION OF REAL GDP (SPAIN)				
PERIOD	**REAL GDP**	**EX.RATE**	**ARRIVALS**	**UNCERTAINTY**
1	100,0000	0,000000	0,000000	0,000000
5	79,43254	2,839871	7,780967	9,946624
10	76,59800	3,397448	8,825580	11,17898
15	77,57822	3,467646	8,080539	10,87360
20	78,71584	3,521781	7,660007	10,10238
VARIANCE DECOMPOSITION OF EXCHANGE RATE (SPAIN)				
PERIOD	**REAL GDP**	**EX.RATE**	**ARRIVALS**	**UNCERTAINTY**
1	2,726062	97,27394	0,000000	0,000000
5	4,325785	86,85904	2,927995	5,887184
10	5,928502	81,88151	5,397432	6,792559
15	6,845464	80,71356	5,461574	6,979406
20	7,757153	79,83622	5,460979	6,945643
VARIANCE DECOMPOSITION OF ARRIVALS (SPAIN)				
PERIOD	**REAL GDP**	**EX.RATE**	**ARRIVALS**	**UNCERTAINTY**
1	9,472151	1,160541	89,36731	0,000000
5	11,18348	7,432856	79,70943	1,674225
10	11,49543	12,74755	72,27557	3,481443
15	11,42921	12,99055	72,12622	3,454019
20	11,46643	13,03791	72,04592	3,449739
VARIANCE DECOMPOSITION OF UNCERTAINTY (SPAIN)				
PERIOD	**REAL GDP**	**EX.RATE**	**ARRIVALS**	**UNCERTAINTY**
1	0,470229	6,013345	3,093774	90,42265
5	1,323200	4,544873	13,34016	80,79176
10	2,182426	4,811535	13,781118	79,22486
15	2,479042	4,800633	13,83809	78,88224
20	3,010466	4,800078	13,76736	78,42210

5. Discussion

To avoid misleading test results that arise when statistical findings are drawn from non-stationary time series, it is vital to first examine the stationarity of the data. Tables 1 – 16 present the results of three unit root (Augmented Dickey Fuller, Augmented Dickey Fuller - Generalized Least Squares & Phillips - Perron) and one stationarity (Kwiatkowski-Phillips-Schmidt-Shin) test that were conducted to determine the order of integration of the variables. The lag selection was based on Schwartz Information Criterion and tests have been performed on the basis of 5 percent significance level. Based on the p-values, as presented in the tables, it can be easily concluded that the majority of the logarithmic forms of the variables under study were not stationary at conventional levels. When the data was tested in 1^{st} differences, the problem appeared to be solved as all the variables went stationary. As a result, it can be indicated that variables are integrated of order one I(1). The combination of the four analyses minimized the risk of wrong conclusions and allowed to proceed in the next step of the study, the selection of the optimal lag length for each VAR analysis. Table 17 includes the lag length that maximizes the fit of each country's VAR model based on the Akaike Information Criterion. The following paragraphs are dedicated to discuss Granger Causality, Impulse Response and Variance Decomposition test results for each country separately.

- France

Granger Causality test results (Table 18) showed that only uncertainty do granger cause the real gdp of France (p-value: 0,0081<0,05). As for the Impulse Response Function (Figure 1), results are quite interesting. Regarding real gdp, in a time span of 10 periods, a shock to itself seems to mostly affect real gdp, which slowly dies as the impact return to almost zero in the 8^{th} period. Respectively, a shock to uncertainty causes an instant decrease to French gdp, which returns to its initial level after 5^{th} period. A one standard deviation shock to real effective exchange rate cause significant decreases to itself for six periods after which the effect dissipates. A shock to arrivals causes an increase to real effective exchange rate which slowly returns to zero at 6^{th} period. As for the arrivals, they are strongly affected by all the variables, the impact of which converges back to zero after seven periods. Concerning uncertainty, a shock to real gdp and exchange rate causes a slight increase that returns to its initial level after the 4^{th} period. Continuing into Variance Decomposition (Table 23), it is quite reasonable to notice that during the first period the variances of all the under study variables are mainly provoked by themselves. After a reasonable timescale, the effect is split. Focusing on the 10th period, variances in real gdp stem from variances in itself (87,3%), uncertainty (7,56%), arrivals (2,62%) and exchange rate (2,48%). In the same way, changes in exchange rate originate by itself (93,0%), arrivals (5,36%), real gdp (1,25%) and uncertainty (0,33%). As for arrivals, changes issue from arrivals themselves (88,2%), uncertainty (4,80%), exchange rate (4,42%) and real gdp (2,53%). Last but not least, variances in uncertainty spring from itself (91,2%), exchange rate (3,96%), arrivals (2,58%) and real gdp (2,19%).

- Germany

Granger Causality test results (Table 19) showed that arrivals (p-value: 0,0033<0,05) and uncertainty (p-value: 0,0540<0,05) do granger cause real gdp, while real gdp (p-value: 0,0218<0,05), exchange rate (p-value: 0,0131<0,05) and arrivals (p-value: 0,00015<0,05) granger cause uncertainty. It is obvious that there is a bilateral causal relationship between real gdp and uncertainty. Proceeding to Impulse Response Function (Figure 2), it seems that the under study variables are quite prone to shocks resulting in a general disarray which requires a considerable period of time in order to revert to the initial levels. Shocks to all variables of interest provoke increases and decreases during the entire ten period time span, indicating absence of stability. Noteworthy is that a shock to real gdp affects positively the real effective exchange rate until the impact return to almost zero in the 8th period. At the same time, a shock to real gdp causes decreases to arrivals, the impact of which converges back to zero after eight periods. Continuing into Variance Decomposition for Germany (Table 24), it can be easily said that variances are more dispersed than in France. In particular, variances in real gdp stem from variances in itself (63,2%), exchange rate (14,0%), uncertainty (12,9%) and arrivals (9,78%) in period 10. As for the exchange rate, changes issue mainly from itself (83,0%), real gdp (9,77%), arrivals (4,80%) and uncertainty (2,37%). Similarly, variances from arrivals originate by themselves (65,8%), real gdp (26,2%), exchange rate (4,81%) and uncertainty (3,03%). Lastly, variances in uncertainty spring from itself (64,1%), exchange rate (17,1%), real gdp (11,4%) and arrivals (7,27%).

- Greece

Granger Causality test results (Table 20) showed that only exchange rate do granger cause the arrivals of Greece (p-value: 0,0046<0,05). As for the Impulse Response Function (Figure 3), results are quite interesting. It seems that the variables of interest are quite prone to shocks, which provoke increases and decreases during the entire ten period time span. Worth taking a look at is that a shock to arrivals cause increases to real gdp for nine periods after which the effect dissipates. This result proves that tourism in Greece functions as a key element of the economic activity. Meanwhile, a shock to exchange rate induces decreases to arrivals, the impact of which converges back to zero after nine periods. Proceeding to Variance Decomposition (Table 25), during the first period the variances of all the under study variables are mainly provoked by themselves. After a reasonable timescale, the effect is split. In period 10, variances in real gdp stem from variances in itself (85,7%), uncertainty (6,70%), arrivals (4,14%) and exchange rate (3,38%). As for the exchange rate, changes issue mainly from itself (85,7%), real gdp (7,03%), arrivals (4,64%) and uncertainty (2,53%). In the same way, changes in arrivals originate by arrivals themselves (61,6%), exchange rate (24,7%), real gdp (10,4%) and uncertainty (3,11%). Last but not least, variances in uncertainty spring from itself (79,2%), exchange rate (9,07%), real gdp (6,71%) and arrivals (4,94%).

- Italy

Granger Causality test results (Table 21) showed that only exchange rate does granger cause uncertainty (p-value: 0,0023<0,05). Proceeding with the Impulse Response Function (Figure 4), it seems that real gdp is quite vulnerable to shocks caused by the other variables of the model. As for the arrivals, a one standard deviation shock to exchange rate and uncertainty induces decreases for nine periods after which the effect dissipates. In contrast, a shock to real gdp affects positively the country’s arrivals until the impact return to almost zero in the 9th period. Concerning uncertainty, shocks to all other under study variables of interest appears to slightly influence causing small increases/decreases during the time span of 10 periods. Relating to Variance Decomposition (Table 26), results are quite interesting. In the beginning, variances of all the variables are mainly provoked by themselves. After a reasonable period of time, it can be observed that the effect is split. Focusing on the 10th period, variances in real gdp stem from variances in itself (69,2%), exchange rate (13,2%), uncertainty (11,2%) and arrivals (6,20%). In the same way, changes in exchange rate originate by itself (85,3%), real gdp (8,29%), arrivals (4,19%) and uncertainty (2,18%). As for arrivals, variances issue from arrivals themselves (59,8%), exchange rate (27,7%), real gdp (10,1%) and uncertainty (2,27%). Finally, changes in uncertainty spring from itself (68,5%), exchange rate (22,3%), arrivals (8,06%) and real gdp (0,97%).

- Spain

Granger Causality test results (Table 22) showed that uncertainty does granger cause real gdp (p-value: 0,0014<0,05), real gdp granger causes exchange rate (p-value: 0,0009<0,05), exchange rate granger causes arrivals (p-value: 0,0332<0,05) and arrivals do granger cause uncertainty (p-value: 0,0195<0,05). Proceeding to Impulse Response Function (Figure 5), it is obvious that real gdp is quite vulnerable to shocks caused by the other variables of the model. Quite interesting is that arrivals in Spain tend to have the same reaction as arrivals in Italy. Specifically, a one standard deviation shock to exchange rate and uncertainty induces decreases in arrivals, while a shock to real gdp provokes a slight increase, the impact of which converges back to zero after ten periods.

Concerning uncertainty, shocks to all the other variables create slight increases/decreases which seem to be manageable as they move near the initial levels. Continuing into Variance Decomposition for Spain (Table 27), period 10 shows that variances in real gdp stem from variances in itself (76,5%), uncertainty (11,1%), arrivals (8,82%) and exchange rate (3,39%). In the same way, changes in exchange rate originate by itself (81,8%), uncertainty (6,79%), real gdp (5,92%) and arrivals (5,39%). As for arrivals, variances issue from arrivals themselves (72,2%), exchange rate (12,7%), real gdp (11,4%) and uncertainty (3,48%). Last but not least, variances in uncertainty spring from itself (79,2%), arrivals (13,7%), exchange rate (4,81%) and real gdp (2,18%).

6. Conclusion

Tourism industry has been characterized as one of the most important engines of the economy. It is recognized as a catalyst not only for the developing countries but also for the developed ones. The purpose of this study is to test the relationship between tourism and economic development in 5 European countries with different economic background and compare the results. In order to test the aforementioned relationship a VAR model was constructed using real gdp as the dependent variable and real effective exchange rate - tourism arrivals as the independent ones. In order τo enrich the research, uncertainty was also added to the model. The data used was quarterly, covering a 20-year time period (Q1:2000-Q4:2019) for five top tourist destinations in Europe (France, Germany, Greece, Italy and Spain). Granger Causality, Impulse Response Function and Variance Decomposition tests were performed, as well.

The empirical results showed that in all the under study countries there is a linkage among tourism industry and economic development. The difference between them lies in the magnitude of the influence. More precisely, it was certain that there would be a nexus as the selected countries are characterized as top tourism destinations with huge historical importance, distinctive art and unique archaeological sites. However, the pattern of causality differs considerably across countries. This observation is justified by the fact that in some economies tourism functions as a key element of the economic activity and is the main source of income, whereas in other economies for example with strong manufacturing or service sector, tourism is low weighted. Taking into consideration the results of Granger Causality, Impulse Response Function and Variance Decomposition tests, it is obvious that France has the weakest linkage between tourism and economic development. On the other side, Germany, Greece, Italy and Spain appear to have stronger linkage, which is why they are more vulnerable to shocks and changes as the global financial crisis or the pandemic covid-19.

The evidence presented in this research has significant implications for the process of policy making. First of all, policy makers should take into account the volatility and time-varying nature of tourism – economic growth linkage so as to demonstrate the most suitable plan for every country each time based on the circumstances. Secondly, using previous data and considering the past of an economy can assist policy makers to prevent an economical collapse or protect from future mistakes. History provides a plethora of information that can be valuable in such procedures.

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