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The Impact of Exchange Rate on Tourism Demand in the Euro Area (Using Panel Data Approach)

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Abstract

Tourism plays a key role worldwide. It is seen as an industry that brings in external revenues and is likely among the most impacted sectors by exchange rate fluctuations. The aim of this paper is to analyse the impact of exchange rate on inbound tourism in the Euro zone. Our study is based on 19 countries that have adopted the euro as their currency during the period 1999- 2018. Using panel data, econometrics based on the Seemingly Unrelated Regression (SUR) method. Empirical results demonstrate that exchange rate has a significant negative impact on inbound tourism, and at the same time there is a significant positive effect of GDP on it. Therefore, it is of a great importance to devalue the Euro currency so that attracting more tourists towards the Euro area.

Keywords: Exchange Rate, GDP, Inbound Tourism, Euro Zone, Panel Data.

Introduction

Since tourism can contribute to the increase of the economic growth and especially to the raise of employment rate, it is an essential economic sector in all European countries, as well as to socio-economic development and integration. In 2019, it was increased by 4.1% on a weighted average basis (ETC, 2020).

In 2017, Europe recorded an all-time record increase (+ 8 %) in international tourist arrivals, four times higher than in 2016 and above global growth (+ 7 %). In the same year, it consolidated its position as the world's leading destination for eight consecutive years (ETC, 2018).

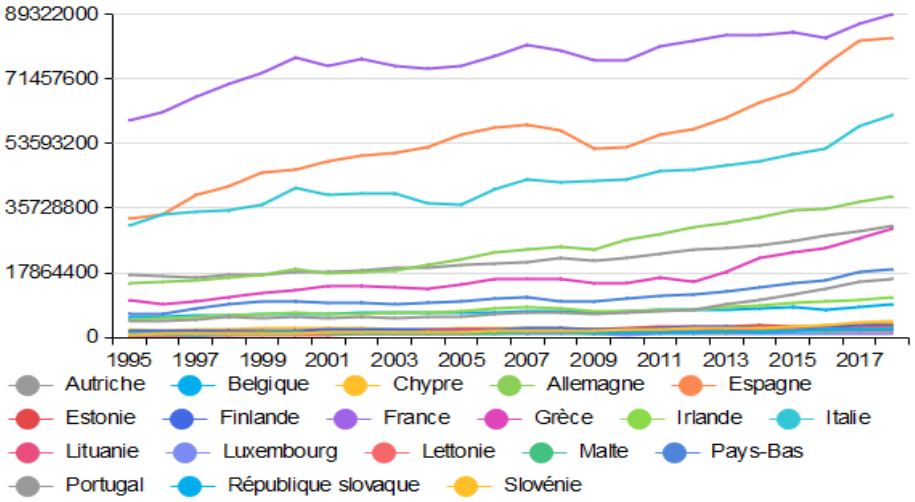
Each nation use currency that can determine and valuate the nation’s economic status of its sectors. Tourism is a significant sector of many international economies across the globe. And in turn, it is one of the greatest commonly affected industries by exchange rate movements. The tangible impact is particularly felt in countries where tourism is an important part of the economy. According to (Bailey et al., 2009), hospitality and tourism represent the largest sector in the world. They declared also that it is possibly the most impacted industry by exchange rate movements. This is exactly the reason behind the importance of exchange rate in the economy, specially tourism industry. As such, it is not wrong to say that currency has been so important in the growth and flourishment of the tourism sector.

The case of the recent experience of the unified money, the Euro which has been adopted so far by 19 members, and according to the European Parliament's Committee on Economic, Monetary and Industrial Policy report in February 1998, many aspirations were expected after the launch of the unified currency Euro on the 1st of January 1999 concerning its impact on tourism. First, the introduction of the single currency will make it possible to avoid conversion charges and bank commissions, which have a powerful incentive to encourage people's mobility. Furthermore, the reduction of risks and uncertainties related to foreign exchange fluctuations. Moreover, the existence of a unified currency will greatly facilitate travel and investment within the euro area and stimulate tourist flows.The report also considers that the Euro could be a major instrument for improving the existing situation in the European tourism sector. It also contributes in the evolution of tourist activity.

Several political, behavioural, economic and financial reasons may influence tourism demand. However, most of the economists focus foremost on economic and financial ones. More precisely, income and costs have a significant role in determining tourism demand. Theoretically, the cost of tourist products is linked negatively to tourist demand.

In addition, customer tastes, persistence of habits, marketing expenditure, population of origin, and many others are variables that assume a significant part in determining the demand for tourism. With regard to the policy of exchange rate impact on tourism, as indicated by(De La Rochefoucauld, 2007),a favourable or unfavourable exchange rate can encourage or, on the contrary, restrain domestic tourists in their travels abroad. Indeed, tourists are well informed about exchange rate fluctuations in the period prior to their traveling or the period in which they make their travel decisions (Forsyth & Dwyer, 2009).

Figure .1: The Evolution of Tourist Numbers between the EMU in 1995-2018



Source: Own elaboration, based on the IFS database

From this figure, variations in the number of tourist arrivals in the Euro area countries can be noticed. There are remarkable differences in the number of tourist arrivals in the different Euro area countries. We find in first place France, which reached about 89 million tourists in 2018, followed by Spain with 82 million tourists in the same year, then Italy with 61 million tourists for the year 2018, and then to a lesser extent we find Germany, Greece, the Netherlands and Portugal which reached respectively 38,30,18,16 million tourists in the year 2018. Other countries do not exceed the threshold of 18 million tourists. In general, we see a general upward trend for all countries during the study period, indicating an increase in

tourism demand in these countries with some decreases for some countries such as France between 2003-2005 and 2008-2010, Spain between 2008-2012 and Italy between 2001-2005.

Literature Review

The explanatory and contingent variables used in international models of tourism demand have been developed in the literature of the last half of the previous century. Over the last period, previous studies have shown several changes on tourism by emphasising on econometric approaches and design analysis using increasingly sophisticated methods. There are so many early studies in this sector. Since then, there have been major advances in this field of study in terms of variety, scientific frameworks and advancement in science methodologies.

Webber investigated the long-run demand for Australian outbound leisure tourism for 9 major tourism destinations using quarterly the period from 1983 (Q: 1) to 1997 (Q: 4)(Webber, 2001). He conducted his study using exchange rate volatility as an explanatory variable. He utilized also a composite substitute price variable. This explains the uniqueness of this study in an international context. The estimations and hypothesis- testing processes were carried applying both Johansen and Engle and Granger procedures. The results of 50%estimates revealed that the variance of the exchange rate was a significant determinant of long-run tourism demand. It was discovered also that substitute prices and real disposable income had inelastic long-run effects on tourism, at the same time the long run relative price elasticity tended to vary extensively across countries. The results indicated that exchange rate had significantly a different effect on tourism than relative prices uniquely in Indonesia.

SONG, LI, WITT & FEI, in their empirical research, focused on the demand for Hong Kong tourism by residents of Australia, U.K. and U.S.A (Song et al., 2010). The authors employed a general-to-specific modelling methodology which defines determinants of tourism demand on the basis of various demand measures. The results revealed that tourist arrivals in Hong Kong were primarily affected by tourist income and 'word-of-mouth'/habit persistence impacts, whereas the price of tourism in Hong Kong relative to that of the country of tourist origin was the most essential determinant of tourism spending in Hong Kong.

In (Ghialy, 2012), he demonstrated that the degree to which exchange rates could have negative impact on inbound tourism of Australia. Also, he showed the way in which exchange rate- fluctuations would raise the uncertainty of foreign tourist arrivals in Australia. His research was applied on 9 countries of origins, including China, India, Japan, Malaysia, New Zealand, Singapore, South Korea, U.K. and U.S. from 1991 to 2011. He used multivariate conditional volatility regressions to model time-varying conditional fluctuations in global tourism growth and exchange rates. Empirical studies indicated tourists from Malaysia and New Zealand were comparatively the most affected to monetary shocks. However, those memories of the shocks might be diminished in the long-run, indicating that there would not be a long-term negative effect of the sudden rise of the Australian dollar on the inbound tourism of Australia.

In their paper (Agiomirgianakis et al., 2014), they explore the impact of exchange rate Fluctuations on tourist flows to Turkey for the duration 1994-2012. Their findings indicated the existence of a negative relationship between them. Additionally, there was a negative effect of the relative price ratio on tourist flows suggesting comparatively costly areas discourage tourist arrivals, despite the intense foreign rivalry between alternative destinations. Moreover, as expressed in Purchasing Power Parties, GDP percapita attouristoriginhas a positive impact on tourist flows.

Another aspect of analysis based on exchange rate regimes, (De Vita, 2014)confirmed that maintaining a relatively stable exchange rate attracts tourist arrivals. His study was carried out for the 27 countries of the Organisation for Economic Co-operation and Development for the period 1980-2011. He introduced the recent classification of exchange rate regimes into his study. The same analysis orientation was made by (Santana-Gallego et al., 2010). Their objective was to study the relevance of the common currency on tourism by using panel data. The authors confirmed that the less flexible exchange rate benefits tourism. As a result, they have considered the exchange rate as a key factor in determining tourist arrivals.

In (Agiomirgianakisa et al., 2015), the scholars explored the impact on tourist arrivals exports of Exchange Rate Fluctuations (ERV) for Iceland from the firstsemester of 1990 to the fourth semester of 2014. A new method for calculating variability was introduced in this study. The methodological approach used was based on the cointegration principle, error correction representation of measurements of exchange rate fluctuations using Autoregressive Distributed Lags (ARDL) modelling to cointegration. In General, their results suggested visitors arriving for Iceland had a negative impact of volatility.

To determine the short- and long-term dynamic factors of the tourism trade, (CHI, 2015) used ARDL modelling (Bounds testing) for the period 1960-2001. He has concluded that variations in real incomes are the main determinants of the tourism balance. He has also found that an appreciation (depreciation) of the US dollar deteriorates (improves) the tourism trade balance.

In order to examine the impacts of exchange ratevolatilityon tourist flows in Turkey for the first quarters of 2003- 2016, the authors (Ergen & Yavuz, 2017)used the ARDL method to investigate the long-run cointegration relationship between exchange rate volatilitiesand tourist flows. Accordingly, it has been found a long-run cointegration relationship. This was determinedbetween the related variables with an error correction coefficient of -0.0982.

Serdar, Cem, &Dilekexplored the impact of income and real exchange rates on inbound tourism demand (tourist arrivals) from Germany, France, United Kingdom, Netherlands, Italy, Spain and Sweden to USAduring the third quarter of1996 and the first quarter of 2015 (Serdar et al., 2017). The Harmonized Index of Consumer Prices (HICP) for Restaurants and Hotels was used, in order to realize thisobjective,for the first time to transform the nominal exchange rate into the real exchange rate as an independent variable in the models of tourism demand analysis. Panel study of the Cross- sectional Dependency (CD) method and the Common Correlated Effects (CCE) methodology was employed. Empirical findings indicatedtourists visiting the US were more prone to shifts in the real exchange rate than changes in GDP. Although French tourists were very responsive to GDP, British ones were very sensitive to real exchange rates. The United Kingdom had the greatest sensitivity to the real exchange rate.It can be noticed that it was the nation outside the euro area and also intended to exit the European Union.

Another study in the US based on panel data for 14 countries over the period 1995-2014 determined the dominant factors of tourist attractiveness for the USA. The results show that GDP, the consumer price index and the real exchange rate have a significant impact on tourist demand, and in addition prices and the exchange rate have a negative sign with the number of tourist arrivals in the USA. While infrastructures are considered to be a very important variables for tourist demand in the USA (Yazdi & Khanalizadeh, 2017).

In a recent paper by(GAO, CHANG, & SU, 2018), the authors used the rolling window estimation to examine the time-varying causality between the number of tourists arrivals of

China and the exchange rate. In order to achieve that, a time-varying rolling window approach was used to revisit the dynamic causality. The findings obtained by them confirmed that since 2009 there was an increasing effect of exchange rate on the number of inbound tourisms, which consisted of the continuous market process of the Renminbi exchange rate. The findings have shown that inbound tourists should worry about the exchange rate with the extension of the trading band for currencies. The rolling window test indicated that the inbound tourism influences in the growth of the tourism sector and the marketization of the exchange rate should be taken into account by the Chinese government.

Data and Variables

Methods applied to evaluate and estimate the demand for tourism are diverse (Song & Li, 2008).As evidence, there is no single predictive method that continuously performs best in diverse situations, insteadautoregression, exponential smoothing and econometrics deserve to be considered as substitutes to the no-change model (Witt & Witt, 1995).Crouch had a same opinion but focused more on quantitativeestimatesof the economicdemand determinants(Crouch, 1995).More precisely, Lim mentioned tourist arrivals, tourist departures, expenditures and receipts as dependent variables. Additionally, he referred to wages, relative tourism prices and transport costs as explanatory variables (Lim, 1997).Besides, several core factors also influence tourism such as economic factors (including tourist income, tourism prices, and exchange rate) (Liu et al., 2018). According to Webber, the exchange rate is the most necessary reason in determining tourism demand (Webber, 2001) .

The variables used in this study represent number of the inbound tourism, official exchange rate and gross domestic product per capita in the 19 Member States of the Euro Zone (Austria, Belgium, Cyprus, Estonia, Finland, France, Germany, Greece, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, The Netherlands, Portugal, Slovakia, Slovenia and Spain). Data used in the econometric analysis were obtained from source of international financial statistic (IFS) data with 19 cross-sections for the years of 1995–2018 total 456 remarks of yearly data for the panel data analysis.

Methodology

In this study, the panel data methodology is used. This methodology is a means to study a specific issue within several sites. It is noticed periodicallyduringthe same time period.There are plenty of advantages of using panel data.First of all, Panel data is ideal because it allows researchers to controlindividual heterogeneity. Further, it is very useful in offering and providing more informative data. Thus, the researcher can get more reliable estimates. Besides, Panel data is mainly advantageous for containing more degrees of freedom. Therefore, it enhances the efficiency of the econometric predictions. Among the noticeable benefits of panel data is setting much data with more variability, and it gives less collinearity among the variables (Hsiao, 2014). In particular, it is also better to study the dynamics of adjustment. Moreover, panel data are better able to recognise and measure effects that are undetectable in pure cross-section or pure time-series data.Accordingly, panel data models allow the researcher to construct and test more complicated behavioural models than purely cross-section or time-series data (Baltagi, 2005).

In our study, the model is based on various studies cited above in the literature review. It is hypothesized that the number of tourist arrivals (a dependent variable) is a function of the exchange rate and GDP per capita. The model is presented in linear logarithmic form:

$$\boldsymbol{Ln(NBT_{it)} = \beta_{0i} + \beta_{1i} Ln(NER_{it}) + \beta_{2i} Ln(GDP_{it}) + \varepsilon_{it}}$$

We used **i** to subscript the cross section, here, a country, and **t** to subscript the time period.$\boldsymbol{\beta_{0i}}$is a separate intercept for each country, in other words, cross section fixed effects.$\boldsymbol{\beta_{1i}, \beta_{2i}}$are the coefficients of the explicative variables.$\boldsymbol{NBT_{it}}$ is a dependent variable, here, number of the inbound tourism. $\boldsymbol{NER_{it}}$ is an official exchange rate (local currency units against the U.S dollar).$\boldsymbol{GDP_{it}}$is a gross domestic product per capita.$\boldsymbol{\varepsilon_{it}}$is an error term similarly reflecting both, cross country and cross period fixed effects. Error term similarly reflecting both, cross country and cross period fixed effects.

Empirical Results

First of all, determining the panel structure is necessary. Hsiao suggests, in order to define the specification case (homogeneity and heterogeneity) of the model, a sequential test procedure. The specification test facilitates determining if the theoretical model is perfectly suitablefor all countries or there are particularities specific to each country.(Hsiao, 1986).

After testing the Behaviour Heterogeneity, it is possible to find several configurations: The constants$\boldsymbol{\alpha_i}$and the parameters $\boldsymbol{\beta_i}$are identical. We call this panel a homogeneous panel (Pooled). In this case the Ordinary Least Squares (OLS) makesconsistent and efficient parameter estimates (Park, 2011). The **N** constants $\boldsymbol{\alpha_i}$and the **N** parameter vectors $\boldsymbol{\beta_i}$are different for every individual. So, we have **N**(depending on the number of countries) different models, the panel structure is rejected.The **N** parameter vectors $\boldsymbol{\beta_i}$ are identical, $\boldsymbol{\beta i = \beta}$ while the constants $\boldsymbol{\alpha_i}$ are different for every individual. The result is a heterogeneous model with individual effects. Hypothesis testing is constructed from Fisher's statistics (Bourbonnais, 2015).

Test H_0^1: $\alpha_i = \alpha$ and $\beta_i{}' = \beta'$, $\forall i$, Fisher's statistic is as follows:

$$F_1 = \frac{(SSR_1 - SSR)/(N-1)(K+1)}{SSR/(N \times T - N(K+1))}$$

Where:

F1 follows Fisher law with $(N-1)(K+1)$ and $(N \times T - N(K+1))$ degrees of freedom. SSR is the sum of squared residuals**.** $SSR = \sum_{i=1}^{N} SSR_i$ for each individual (country). $SSR_1$is that of the constrained model (total homogeneity model or Pooled). It is calculated by estimating the model on the full sample at N*T observations. For our model the results are as follows:$SSR_1 = 802.2560$ and $SSR = 6.3539$. So:

$$F_1 = \frac{(802.2560 - 6.3539)/(19-1)(2+1)}{6.3539/(19 \times 24 - 19(2+1))} = 0.05232$$

The statistic thus calculated is less than $F^{0.05}(54\,;\,399) \approx 1.3694$of Fisher's table. We then accept the hypothesis H_0^1 of a perfect homogeneity of the model, so, this panel is referred to as a pooled panel.

The next step is the estimation of a static panel model by the OLS method, we obtained the following model:

$$\underset{\text{(6.54035)}}{\text{Ln(NBT}_{\text{t)}} = 6.9726} \underset{\text{(-0.80963)}}{- 0.03086\ \text{Ln(NER}_{\text{t}})} \underset{\text{(8.12854)}}{+ 0.8576\ \text{Ln(GDP}_{\text{t}})}$$

(.) t-statistic AdjustedR-squared: 0.138 D-W: 0.00339

The latter specification presents a problem of autocorrelation of errors. Having regard to the statistic by Durbin Watson proposed by(Bhargava, Franzini, & Narendranathan, 1982)which is equal to 0.00339.If we choose α = 0.05, then table of D-W will give the critical values corresponding to n = 24 and two regressors as d_L = 1.19 and d_U = 1.55. The statistic D-W d = 0.00339< d_L = 1.19. So, we reject H_0 and conclude that the errors are positively autocorrelated.(MONTGOMERY, PECK, & VINING, 2012).

This is a problem that often arises when applying a linear model. In similar cases, a Seemingly Unrelated Regression model (SUR) is used (Xiaokun & Kockelman, 2007). This modelling originally suggested obviously unrelated regression (SUR) to evaluate several equations with associated terms of error. It is possible that the equation has a separate collection of explanatory variables. Furthermore, the errors of such equation are likely to equate when relating to the answers of the same collection of empirical units (Zellner, 1962).

Nevertheless, the majority of the studies reject the potential autocorrelations across observations because it may lead to conclusions that are inaccurate. In the contrary, the SUR model suggested in our study considers these correlations too, making the model more behaviourallypersuasive and useful. The estimation result obtained is shown in the following figure:

Figure .2: Estimation result of the SUR method

Dependent Variable: NT
Method: Panel EGLS (Cross-section SUR)

Sample: 1995 2018
Periods included: 24
Cross-sections included: 19
Total panel (balanced) observations: 456
Linear estimation after one-step weighting matrix

Variable	Coefficient	Std. Error	t-Statistic	Prob.
NER	-0.030750	0.000495	-62.09957	0.0000
GDP	0.857645	0.001636	524.3658	0.0000
C	6.973192	0.017708	393.7786	0.0000

Weighted Statistics

R-squared	0.998388	Mean dependent var	-258.1191
Adjusted R-squared	0.998381	S.D. dependent var	833.8269
S.E. of regression	1.003241	Sum squared resid	455.9410
F-statistic	140325.7	Durbin-Watson stat	1.721486
Prob(F-statistic)	0.000000		

Source: Own elaboration, result obtained by Eviews v.10

The estimation output in figure2 gives us substituted coefficients for the equation:

$$Ln(NBT_{t)} = 6.9731 - 0.03075Ln(NER_t) + 0.8576Ln(GDP_t)$$

Econometric Analysis

As can be observed from figure.2:

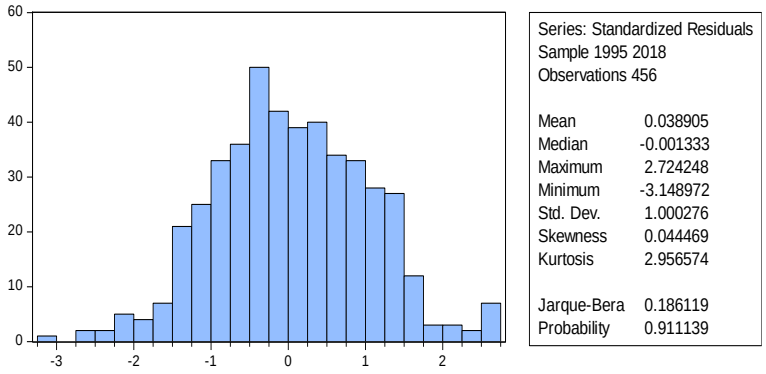
To decide on the individual significance of the variables, the Student statistic is used. So as to decide on the individual significance of the variables, the Student statistic is used. The estimation results show that both variables and the constant are statistically significant at the threshold of 1%.

Quality appreciation of the model is assessed using the Fischer statistic, which indicates whether the explanatory variables have an influence on the dependent variable. Either the null hypothesis test: all the coefficients of the model are null against the alternative hypothesis: there is at least one non-zero coefficient. In our case, the Associated Probability is less than 5% (tends to zero). Therefore, the null hypothesis is rejected and the model is globally significant. This result is consistent with the value of the statistic R2 adjusted (0.9983), which also provides information on the quality of the econometric model (R2 tends to unity).

Heteroscedasticity can be done using several tests (Breusch-Pagan test, Goldfeldtest, and White test). In our study, we took theBreusch-Pagan test, and tested the null hypothesis of homoscedasticity against the alternative hypothesis of heteroskedasticity. The test result shows that the associated probability is greater than 0.05. Therefore,we reject the alternative hypothesis and assume the homoscedasticity of the residuals. The D-W error autocorrelation test indicates that the statistic D-W=1.72 >d_U = 1,55. Thus, we accept the hypothesis of non-correlation of errors, i.e. the errors are independent of each other in our model.

To test the normality of the residues, theJARQUE and BERA J-B test was used. The J-B statistic is 0.1861 with a probability of 91% showing that the residuals are normally distributed (the null hypothesis of normality is accepted).

Figure .3: J-B test result (Eviews v.10)



Source: Own elaboration, result obtained by Eviews v.10

Economic Analysis

The signs of the different explanatory variables of our model are: On one hand, the negative sign of the NER variable is consistent with that expected, confirming the negative effect of NER on the number of tourist arrivals. Consequently, the 1% depreciation of NER leads to ariseinthe number of tourist arrivals to the Euro zone with a rate of 0.03%. Therefore, it will be in the interest of depreciation of the Euro to attract tourists since the prices of goods and services will be cheaper compared to their countries of origin. On the other hand,the effect of the GDP is positive.Hence, any 1% increase in GDP will increase the number of tourists by 0.85%. This can be explained by the improvement in the level of infrastructures in general and in particular touristic infrastructures.

Conclusion

Euro, a currency and monetary unit of the European Union, was introduced since 1999. Nineteen countries adopted gradually this common currency (Euro) till today.The importance of introducing the eurolays in the integration of European countries into one single market. Accordingly, the diversity of the benefits of the euro should be an incentive reason for Europe to deal with one single currency. In general, individuals, businesses and the economies, all in all, can feel the diverse positive effects of the shared euro. These benefits include, firstly, price transparency provided by sharing a common currency because there are stable prices and more choices for citizens and consumers. Moreover, the single currency brings economic stability that benefits businesses because it reduces uncertainty. This, in turn, benefits and encourages companies to invest because of stability and less transaction costs. Among the other advantages, with the single common currency, EMU countries become more open in terms of capital flows, trade and tourism. Sharing one single currency is convenient because this is translated by the higher level of the new opportunities of investment, and hence an economic flourishment and expansion.

The panel data study of the impact of exchange rate (Euro/Dollar) and GDP in the EURO area on tourist arrivals, based on SUR method (Seemingly Unrelated Regression) confirmed the existence of a negative correlation between the exchange rate and tourist arrivals with a coefficient of (-0.030). This negative sign is expected. This is not surprising having even though it has been confirmed by several previous studies, that of (Agiomirgianakis et al., 2014; Ergen & Yavuz, 2017; Serdar et al., 2017). These results do not contradict the findings received mainly in almost all the studies that found that the depreciation of the exchange rate of the host country has an impact on tourist arrivals by favouring the flow of inflows. Thus, the competitiveness of tourism varies in a way that is inversely proportional to the fluctuation of the exchange rate. Bearing in mind that this study eliminated a significant proportion of tourists whose exchange rate between the country of origin and the country of destination is the euro, which has no statistical significance in explaining tourist arrivals. Including their study, Donna L & Zheng have confirmed the absence of statistical significance of the euro in explaining the tourist arrivals to Italy from the euro area (Donna & Zheng, 2011)

The impact of the exchange rate is proportional in relation to the other explanatory variables that influence tourist entries. In our study, we treated the GDP variable. Indeed, we found a significant positive effect with a coefficient of (0.85). This variable is universal and globalizes several factors such as: the increase of infrastructure, improvement of lifestyle and development of industry.

In particular, the tourism sector has benefited a lot from the integration of the European Countries into a monetary union. In reality, tourism is connected to economy. The introduction of the Euro as a single monetary unit surely marked theprogress of this sector(Santana-Gallego, Ledesma-Rodriguez, & Pérze- Rodriguez, 2016). Hence, the introduction of the euro and the economic growth, in 2002, had multiple effects on tourism. In addition, the stability and security engendered by the integration has stimulated investment in the tourism sector. The UN- WTO(United Nations-World Tourism Organization) focused on the macroeconomic advantages of the euro. According to it, the political and economic integration pave the way to lower interest rates. As a result, inexpensive investment in the tourism sector, in addition to the provision of the long-run price stability. In addition to that, from 2002 to 2008, tourism investment increased by $79 billion. As a result, destinations increased and enhanced their facilities and infrastructure. So, their tourism capacity has expanded. Moreover, prices and transparency in the tourism sector have

led to an increase in competitiveness and quality. The introduction of the Euro has enhanced price transparency, as it facilitates for tourists being able to compare prices, and hence encouraged competition. All these factors have led to a growth in tourist flows both from EMU countries and third world countries not sharing the euro.

Hence, it is clear that any improvement in these latter factors positively promotes the attractiveness of tourists. Finally, it can be said that the results received are stochastic in nature and at the same time present a cause and effect relationship. They can be useful for forecasting purposes.

Our results are consistent with many studies. For example, (Crouch, 1993)has confirmed the existence of an underlying model which explains the influence of exchange rate variability on tourism. This result is obtained after examining 80 studies in a meta-analytic way, but only the differences in elasticity among studies, which can be explained by the specification of the selected model, remain.

Moreover, the emergence of the COVID-19 pandemic was unprecedented. Its effect on world markets was measured in currencies. It also has an enormous impact on all aspects of the economy, especially the tourism sector. it is preferable for the Euro-zone countries to base themselves on the exchange rate policy by devaluing their currencies in order to increase the number of tourists, which was reduced in the period of the Covid-19 pandemic, bearing in mind that the elasticity (exchange rate/number of tourists) obtained in our model is significant at 0.03%.

Therefore, it is necessary to control a satisfactory level of tourism as a means of reviving economic growth as suggested by several studies which have confirmed that tourism is a determining factor which has a positive effect on economic growth, for example(Sequeira & Nunes, 2008).

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