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INTRODUCTION

REVIEW OF LITERATURE

NEED/IMPORTANCE OF THE STUDY

STATEMENT OF THE PROBLEM

OBJECTIVES

HYPOTHESES

RESEARCH METHODOLOGY

RESULTS & DISCUSSION

FINDINGS

RECOMMENDATIONS/SUGGESTIONS

CONCLUSIONS

SCOPE FOR FURTHER RESEARCH

ACKNOWLEDGMENTS

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APPENDIX/ANNEXURE

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**CONTRIBUTIONS TO BOOKS**

- Sharma T., Kwatra, G. (2008) Effectiveness of Social Advertising: A Study of Selected Campaigns, Corporate Social Responsibility, Edited by David Crowther & Nicholas Capaldi, Ashgate Research Companion to Corporate Social Responsibility, Chapter 15, pp 287-303.

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- Schemenner, R.W., Huber, J.C. and Cook, R.L. (1987), "Geographic Differences and the Location of New Manufacturing Facilities," Journal of Urban Economics, Vol. 21, No. 1, pp. 83-104.

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- Garg, Sambhav (2011): "Business Ethics" Paper presented at the Annual International Conference for the All India Management Association, New Delhi, India, 19–22 June.

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# INTERNATIONAL TOURISM DEMAND MODELLING: A MULTIVARIATE APPROACH

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## ABSTRACT

*This study provides an econometric model helpful to analyse and understand international tourism demand in Croatia. Such, more detailed and systematic studies should be considered as starting points of future macroeconomic development strategies, pricing strategies and tourism sector routing strategies in Croatia, as a predominantly tourism oriented country. Tourism represents a significant source of profit for Croatian economy. Croatia is predominantly an international tourist destination, in fact international tourists account for a 88% of total tourists number. The objective of the study is therefore to examine determinants and functional form of international tourism demand in Croatia. The econometric estimates showed that the number of tourist abroad departures, tourism price and tourism seasonal character are significant variables in explaining international tourists' number. The present study emphasizes the necessity of more systematic quantitative tourism demand determinants analysis and researches. Econometric modelling should be considered as a significant Croatia's tourism sector development tool.*

## JEL CODES
C22, C51, C52, L83.

## KEYWORDS
Tourism demand, international tourism demand econometric modelling, regression model.

## INTRODUCTION

It is common knowledge that international tourism demand in Croatia is predominant with respect to domestic flows. According to the Institute of Tourism, of a total of 12 million arrivals realized in Croatia, in 2013, 88% were international arrivals. In 2013 the Croatian GDP was estimated to be 43,4 billion Kuna and the tourism sector revenues about 7,2 billion Kuna. According to data of the Ministry of Tourism of the Republic of Croatia, the tourism sector registered a 3,3% growth with respect to 2012. Of a total of 12 441 476 tourists arrivals in 2013, international tourists realized 10 955 168 arrivals and 59 688 187 overnights (Table 1).

**TABLE 1: TOURIST TRAFFIC IN CROATIA IN 2013**

| | Tourist arrivals | Tourist overnights |
|---|---|---|
| Domestic | 1 486 308 | 5 139 627 |
| Foreign | 10 955 168 | 59 688 187 |
| Total | 12 441 476 | 64 827 814 |

Source: Croatian Ministry of Tourism: http://www.mint.hr/UserDocsImages/140624_HTZ-TURIZAM-2013_HR.pdf, Accessed on December 1, 2014

Data on the structure of international tourists' realized in 2013 are plotted in figure 1.

**FIGURE 1: STRUCTURE OF INTERNATIONAL TOURISM ARRIVALS IN THE REPUBLIC OF CROATIA**

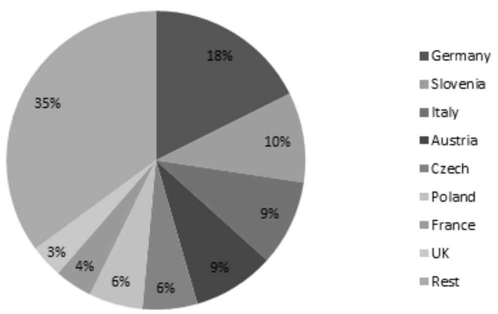



Figure 1 shows that, the highest number of foreign tourist arrivals in 2013 were realized by German tourists, followed by tourists from Italy and Slovenia. Smaller, but very important, are tourist arrivals from Austria, Czech Republic, Hungary, Poland and France, while the remainder relates to other foreign tourists. German tourists have the highest average length of stay; approximately 7,5 days.

## REVIEW OF LITERATURE

It is common knowledge that tourism demand is considered a function of a set of variables. In a comprehensive study Song and Li (Song and Li, 2008) carried out a review of published studies on tourism demand modelling and forecasting and concluded that one of the major advantages of econometric approaches over time-series models lies in their ability to analyse the causal relationships between the tourism demand variable and its influencing6 factors. Economic theory

postulates that income and price are the core determinants that affect the demand for tourism. In econometric modelling "...the consumer price index (CPI) in a destination country is taken to be a proxy for the cost of tourism in the destination country." (Song, et.al., 2009).
Song, Wong and Chon (Song, Wong and Chon, 2003) examined the demand for Hong Kong tourism and the empirical results confirm that the most important factor that determine the demand for tourism are the cost of tourism in Hong Kong and the economic condition in the origin country measured by the income level, as well as the "word of mouth" effect. The tourism literature suggests that, among others, the main determinants of tourism demand are income, household consumption, unemployment rate and the harmonised consumer price index (Serra, et.al., 2014). In one research, Song et.al. (2009), examined the impact of price on tourism demand. Thereby, the tourism price variable is measured by the relative consumer price index of origin country to that of the tourism generating country, adjusted by the corresponding exchange rate.
Algieri´s research (2006) included the variation of income, interest rates, and price, as well as unforeseen events, such as political changes, and predicted what impact such variations have on the revenue generated from tourism in Russia. It is noted cointegration relationship between these variables and confirmed the hypothesis set by economic theory.
Using time series data on tourist visits to Turkey, realized number of departures of Turkish tourists, income and relative price, in the period from 1970$^{th}$ to 2005$^{th}$, Halicioglu (2011) applied extended Granger causality analysis, in order to determine the direction of impact.

## IMPORTANCE OF THE STUDY
Tourism is, directly and indirectly, a significant source of profit for a wide range of activities in Croatia. This study provides a model helpful to analyse, understand and model international tourism in Croatia, especially from German tourism market. Such, more detailed and systematic studies should be considered as starting points of future macroeconomic development strategies, pricing strategies and international tourism sector routing strategies in Croatia, as a predominantly international tourism oriented country.

## STATEMENT OF THE PROBLEM
Despite, the great importance of tourism for Croatian economy, there is a lack of exhaustive researches on quantitative tourism demand modelling and forecasting. International tourism demand, especially main tourism markets, is not enough considered in those studies. As Croatia is a predominantly international tourism destination, international tourism demand and its determinants should be analysed and researched more systematically.

## OBJECTIVE OF RESEARCH
The objective of this research is to examine the patterns and the functional form of the German tourism demand in Croatia, and also to emphasize the impact of selected independent variables on the German tourism arrivals as dependent variable.

## HYPOTHESES
The main hypothesis in this study is that international tourism demand in Croatia, as complex phenomenon, requires the implementation of a multivariate approach in modelling, in order to enable detail and systematic researches of its patterns and determinants. After reviewing the literature on international tourism demand analysis, in this study several research hypotheses, regarding German tourism modelling in Croatia are proposed:
Hypothesis 1: The number of German tourists' arrivals in Croatia reveals a marked tendency of growth.
Hypothesis 2: The tourism price variable has a negative influence on German tourism demand in Croatia.
Hypothesis 3: German tourism demand in Croatia is highly seasonally sensitive.

## INTERNATIONAL TOURISM DEMAND MODELLING – A MULTIVARIATE APPROACH
Out of the total incoming tourist flows in Croatia, German tourists constitute the majority of the international demand. Therefore, modelling international tourism demand is related solely to that group. In this paper, as a measure of the amount of German tourism demand the number of tourist arrivals from Germany to Croatia was considered.

## DATA AND RESEARCH METHODOLOGY
It is common knowledge that tourism demand is considered as a function of a set of variables. This study considers the number of German tourists as a measure of international tourism demand. In modelling the German tourism demand in Croatia, it is assumed that the tourism price variable, realized number of departures of German tourists abroad (in current and previous period) and seasonal dummy variables influence the tourism demand. All data are quarterly and cover the period 2003:$Q_1$ to 2012:$Q_4$. Data are obtained from the Croatian Bureau of Statistics and Eurostat. It is also supposed that a dynamic structure is likely to be a core element to explain the pattern of the German tourists' flows. "In the formulation of dynamic models, economists often have considered expectations about future economic variables in theoretical development. They have increasingly used lagged variables in recent econometric work in various attempts to formulate certain demand relationships more realistically." (Croes, Vanegas, 2005).
According to existing literature, as well as the availability of data, for the purposes of this paper, for modelling tourism demand of German tourists in Croatia were selected variables as shown in the table below.

| TABLE 2: VARIABLES INCLUDED IN THE ANALYSIS OF THE NUMBER OF GERMAN TOURISTS ARRIVALS IN THE REPUBLIC OF CROATIA | |
|---|---|
| **Variable** | **Description** |
| $\boldsymbol{ARRIVALS}$ | Realized number of German tourists arrivals in the Republic of Croatia |
| $\boldsymbol{DEPARTURES}$ | Realized number of German tourists departures abroad |
| $\boldsymbol{DEPARTURES_{t-1}}$ | Realized number of German tourists departures abroad in previous period |
| ***RCPI*** | Price variable (real costs of tourism services in the Republic of Croatia) |
| $\boldsymbol{D_1}$ | *Seasonal dummy* variable 1 |
| $\boldsymbol{D_2}$ | *Seasonal dummy* variable 2 |
| $\boldsymbol{D_3}$ | *Seasonal dummy* variable 3 |

Before proceedings with econometric analysis, selected variables were plotted, as shown in the following figures.

FIGURE 2: REALIZED NUMBER OF GERMAN TOURISTS ARRIVALS IN THE REPUBLIC OF CROATIA IN THE PERIOD FROM 2003 TO 2012 (QUARTERLY, IN THOUSANDS)

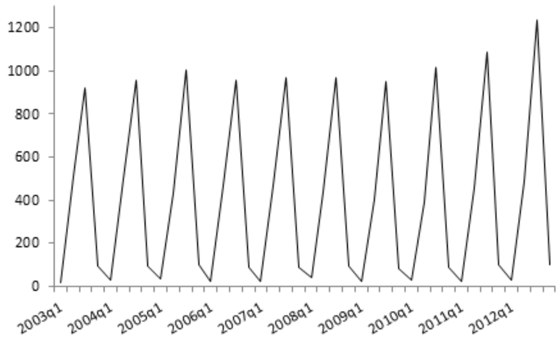



FIGURE 3: REALIZED NUMBER OF GERMAN TOURISTS DEPARTURES ABROAD IN THE PERIOD FROM 2003 TO 2012 (QUARTERLY, IN THOUSANDS)

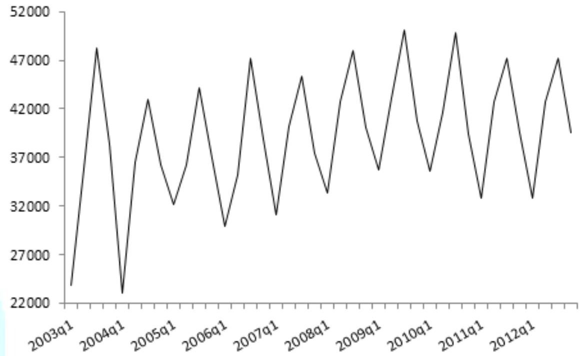
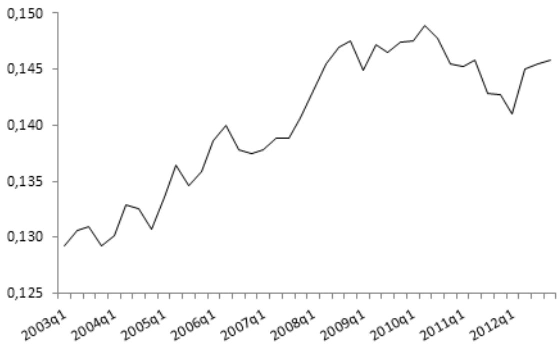



FIGURE 4: REAL COSTS OF TOURISM SERVICES IN THE REPUBLIC OF CROATIA IN THE PERIOD FROM 2003 TO 2012 (QUARTERLY, IN THOUSANDS)




Realized number of arrivals of German tourists in Croatia indicates an upward trend and a strong seasonal occurrence. Figures also show that the variance of the considered variables is not stable, which indicates the non-stationary of the analysed time series. In order to stabilize the variance and obtain a stationary time series, all variables were logarithmic transformed. Therefore, international tourism demand analysis continued with variables shown in the table below.

| TABLE 3: VARIABLES INCLUDED IN THE ANALYSIS OF THE NUMBER OF GERMAN TOURISTS ARRIVALS IN CROATIA — LOGARITHMICALLY VALUES | |
|---|---|
| **Variable** | **Description** |
| $\mathbf{lnARRIVALS}$ | Logarithm of realized number of German tourists arrivals in the Republic of Croatia |
| $\mathbf{lnDEPARTURES}$ | Logarithm of realized number of German tourists departures abroad |
| $\mathbf{lnDEPARTURES_{t-1}}$ | Logarithm of realized number of German tourists departures abroad in previous period |
| ***lnRCPI*** | Logarithm of price variable (real costs of tourism services in the Republic of Croatia) |
| $\mathbf{D_1}$ | *Seasonal dummy* variable 1 |
| $\mathbf{D_2}$ | *Seasonal dummy* variable 2 |
| $\mathbf{D_3}$ | *Seasonal dummy* variable 3 |

Before approaching the modelling and diagnostic testing, the dependent and the explanatory variables are retested for stationarity. The results are shown in the next table.

| TABLE 4: AUGMENTED DICKEY–FULLER TESTING RESULTS FOR VARIABLE $lnARRIVALS$ | | | | |
|---|---|---|---|---|
| Null Hypothesis: $lnARRIVALS$ has a unit root | | | | |
| Exogenous: Constant, Linear Trend | | | | |
| Lag Length: 2 (Automatic–based on SIC, maxlag=10) | | | | |
| | | | t–Statistic | Prob.* |
| Augmented Dickey–Fuller test statistic | | | −11,72943 | 0,0000 |
| Test critical values: | 1% level | | −4,226815 | |
| | 5% level | | −3,536601 | |
| | 10% level | | −3,200320 | |
| *MacKinnon (1996) one–sided p–values. | | | | |

| TABLE 5: AUGMENTED DICKEY–FULLER TESTING RESULTS FOR VARIABLE $lnDEPARTURES$ | | | | |
|---|---|---|---|---|
| Null Hypothesis: $lnDEPARTURES$ has a unit root | | | | |
| Exogenous: Constant, Linear Trend | | | | |
| Lag Length: 1 (Automatic–based on SIC, maxlag=10) | | | | |
| | | | t–Statistic | Prob.* |
| Augmented Dickey–Fuller test statistic | | | −15,33856 | 0,0000 |
| Test critical values: | 1% level | | −4,219126 | |
| | 5% level | | −3,533083 | |
| | 10% level | | −3,198312 | |
| *MacKinnon (1996) one–sided p–values. | | | | |

| TABLE 6: AUGMENTED DICKEY–FULLER TESTING RESULTS FOR VARIABLE $lnRCPI$ | | | | |
|---|---|---|---|---|
| Null Hypothesis: $lnRCPI$ has a unit root | | | | |
| Exogenous: Constant, Linear Trend | | | | |
| Lag Length: 2 (Automatic–based on SIC, maxlag=10) | | | | |
| | | | t–Statistic | Prob.* |
| Augmented Dickey–Fuller test statistic | | | –8,041089 | 0,0000 |
| Test critical values: | 1% level | | –4,243644 | |
| | 5% level | | –3,544284 | |
| | 10% level | | –3,204699 | |
| *MacKinnon (1996) one–sided p–values. | | | | |

As we can see, the critical values of $\tau_\tau$ at 5% significance level are –3,536601, –3,533083 and –3,544284, respectively. The calculated ADF statistics are lower than these three values, indicating that the series are stationary.

The data generating process is therefore a model as follows:

$$lnARRIVALS = \beta_0 + \beta_1 lnDEPARTURES + \beta_2 lnDEPARTURES_{t-1} + \beta_3 lnRCPI + \beta_4 D_2 + \beta_5 D_3 \quad (1)$$

Estimated parameters and basic statistics are given in the table below.

| TABLE 7: ESTIMATED PARAMETERS | | | | |
|---|---|---|---|---|
| Dependent Variable: $lnARRIVALS$ | | | | |
| Method: Least Squares | | | | |
| Date: 00/00/00 Time: 00:00 | | | | |
| Sample (adjusted): 2003Q2 2012Q4 | | | | |
| Included observations: 39 after adjustments | | | | |
| Variable | Coefficient | Std. Error | t–Statistic | Prob. |
| $C$ | –80,20615 | 11,37549 | –7,050788 | 0,0000 |
| $lnDEPARTURES$ | 2,574388 | 0,603820 | 4,263502 | 0,0002 |
| $lnDEPARTURES_{t-1}$ | 1,887940 | 0,589699 | 3,201535 | 0,0030 |
| $lnRCPI$ | –6,701241 | 1,295582 | –5,172378 | 0,0000 |
| $D_2$ | 2,519088 | 0,267236 | 9,426460 | 0,0000 |
| $D_3$ | 2,360304 | 0,231634 | 10,18982 | 0,0000 |
| R–squared | 0,965680 | Mean dependent var | | 12,18035 |
| Adjusted R–squared | 0,960480 | S.D. dependent var | | 1,396916 |
| S.E. of regression | 0,277703 | Akaike info criterion | | 0,416106 |
| Sum squared resid | 2,544917 | Schwarz criterion | | 0,672038 |
| Log likelihood | –2,114065 | Hannan–Quinn criter. | | 0,507932 |
| F–statistic | 185,7066 | Durbin–Watson stat | | 1,827029 |
| Prob(F–statistic) | 0,000000 | | | |

In general the model fits the data well with relatively high adjusted $R^2$ (96,06%). Overall, the estimated demand model can be considered as well specified. The key explanatory variables are consistent and significant at 5% level. All estimated parameters sign are correct and consistent with economic theory as expected, suggesting that all chosen variables have significant influence on German tourism demand for tourism in Croatia.

The OLS estimation of Equation (1) gives:

$$lnARRIVALS = -80{,}20615 + 2{,}574388 lnDEPARTURES + 1{,}887940 lnDEPARTURES_{t-1} - 6{,}701241 lnRCPI + 2{,}519088 D_2 + 2{,}360304 D_3 \quad (2)$$

After parameter estimation, in order to investigate the performance of the specified model, some basic diagnostic statistics are performed. In order to test the model for the presence of seasonal autocorrelation the current residuals obtained from the estimated models are plotted versus lagged residuals.

**FIGURE 5: CURRENT RESIDUALS VERSUS LAGGED RESIDUALS**

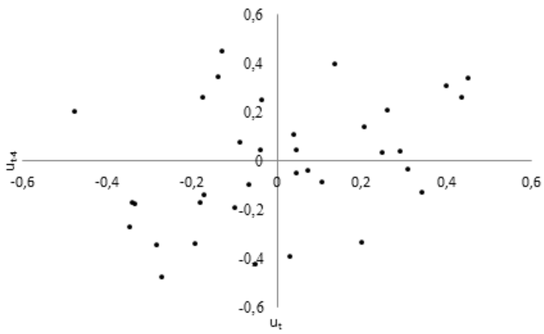



Figure 4 reveals the presence of autocorrelated residuals. To confirm the result, the Breusch-Godfrey test, also known as the LM test for autocorrelation, is performed. The test results of the applied Breusch-Godfrey test are show in the table below.

| TABLE 8: THE BREUSCH-GODFREY TEST RESULTS | | | |
|---|---|---|---|
| Breusch–Godfrey Serial Correlation LM Test: | | | |
| F–statistic | 2,767538 | Prob. F(4,29) | 0,0461 |
| Obs*R–squared | 10,77450 | Prob. Chi–Square(4) | 0,0292 |

The null-hypothesis of the Breusch-Godfrey test states the absence of autocorrelation. Here the null-hypothesis is rejected. As the empirical LM statistics (10,77450) exceeds the critical value of $\chi^2_{(0{,}05;2)} = 9{,}48773$ there is evidence of autocorrelation presence. It is well known "....that under both heteroscedasticity and autocorrelation the usual OLS estimators, although linear, unbiased and asymptotically normally distributed, are no longer minimum variance among all linear unbiased estimators; they may not be best linear unbiased estimators (BLUE). As a results, the usual, t, F and $\chi^2$may not be valid." (Gujarati,2009).

Knowing the consequences of the autocorrelation the model is transformed using the Cochrane-Orcutt two-step procedure. Therefore, ρ is estimated from the residuals and then the residuals $\hat{u}_t$are regressed on $\hat{u}_{t-1}$, $\hat{u}_{t-2}$, $\hat{u}_{t-3}$, $\hat{u}_{t-4}$.

The following regression is run:

$$u_t = \hat{\rho}_1 u_{t-1} + \hat{\rho}_2 u_{t-2} + \hat{\rho}_3 u_{t-3} + \hat{\rho}_4 u_{t-4} + \varepsilon_t \quad (2)$$

where:

$\hat{u}_t$ – are the residuals obtained from the original model regression

$\varepsilon_t$ – are the error term of this regression

under the condition:

$$-1 < \hat{\rho} < 1 \quad (3)$$

| TABLE 9: $\hat{\rho}$ ESTIMATION | | | | |
|---|---|---|---|---|
| Dependent Variable: Residual | | | | |
| Method: Least Squares | | | | |
| Date: 00/00/00 Time: 00:00 | | | | |
| Sample (adjusted): 2004Q2 2012Q4 | | | | |
| Included observations: 35 after adjustments | | | | |
| Variable | Coefficient | Std. Error | t–Statistic | Prob. |
| $\hat{\rho}(1)$ | 0,012841 | 0,182740 | 0,070268 | 0,9444 |
| $\hat{\rho}(2)$ | –0,293025 | 0,179988 | –1,628023 | 0,1136 |
| $\hat{\rho}(3)$ | –0,154967 | 0,170881 | –0,906870 | 0,3715 |
| $\hat{\rho}(4)$ | 0,214604 | 0,171793 | 1,249197 | 0,2209 |
| R–squared | 0,223659 | Mean dependent var | | 0,006264 |
| Adjusted R–squared | 0,148529 | S.D. dependent var | | 0,244120 |
| S.E. of regression | 0,225262 | Akaike info criterion | | –0,035894 |
| Sum squared resid | 1,573033 | Schwarz criterion | | 0,141860 |
| Log likelihood | 4,628145 | Hannan–Quinn criter. | | 0,025467 |
| Durbin–Watson stat | 1,788722 | | | |

Once ρ has been estimated, the original model as per equation (2), is transformed. The following model is obtained:

$$Y_t^* = \beta_0^* + \beta_1^* X_t^* + \cdots + \beta_5^* X_t^* \quad (4)$$

where:

$$\beta_0^* = \beta_0(1-\rho)$$
$$Y_t^* = (Y_t - \rho Y_{t-1})$$
$$X_t^* = (X_t - \rho X_{t-1}) \quad (5)$$
$$\beta_1^* = \beta_1, \beta_2^* = \beta_2, \beta_3^* = \beta_3, \beta_4^* = \beta_4, \beta_5^* = \beta_5$$

The variables transformed by the Cochrane-Orcutt two-step method used in the analysis are listed in the table below.

| TABLE 10: VARIABLES INCLUDED IN THE ANALYSIS OF THE NUMBER OF GERMAN TOURISTS ARRIVALS IN CROATIA — LOGARITHM AND COCHRAN-ORCUTT TRANSFORMED VALUES | |
|---|---|
| **Variable** | **Description** |
| $\mathbf{lnARRIVALSCO}$ | Logarithm of realized number of German tourists arrivals in the Republic of Croatia transformed by Cochrane-Orcutt method |
| $\mathbf{lnDEPARTURESCO}$ | Logarithm of realized number of German tourists departures abroad transformed by Cochrane-Orcutt method |
| $\mathbf{lnDEPARTURES_{t-1}CO}$ | Logarithm of realized number of German tourists departures abroad in previous period transformed by Cochrane-Orcutt method |
| $\mathbf{lnRCPICO}$ | Logarithm of price variable (real costs of tourism services in the Republic of Croatia) transformed by Cochrane-Orcutt method |
| $\mathbf{D_2CO}$ | *Seasonal dummy* variable 2 transformed by Cochrane-Orcutt method |
| $\mathbf{D_3CO}$ | *Seasonal dummy* variable 3 transformed by Cochrane-Orcutt method |

The estimated parameter are given in the table below.

| TABLE 11: PARAMETERS ESTIMATED AFTER COCHRANE–ORCUTT TRANSFORMATION | | | | |
|---|---|---|---|---|
| Dependent Variable: $lnARRIVALSCO$ | | | | |
| Method: Least Squares | | | | |
| Date: 00/00/00 Time: 00:00 | | | | |
| Sample (adjusted): 2004Q2 2012Q4 | | | | |
| Included observations: 35 after adjustments | | | | |
| Variable | Coefficient | Std. Error | t–Statistic | Prob. |
| $\beta_0$ | –112,7265 | 21,12956 | –5,335014 | 0,0000 |
| $lnDEPARTURESCO$ | 3,167315 | 0,791311 | 4,002617 | 0,0004 |
| $lnDEPARTURES_{t-1}CO$ | 1,847960 | 0,611232 | 3,023338 | 0,0052 |
| $lnRCPICO$ | –8,020457 | 1,503523 | –5,334442 | 0,0000 |
| $D_2CO$ | 2,383274 | 0,273412 | 8,716776 | 0,0000 |
| $D_3CO$ | 2,099820 | 0,259788 | 8,082816 | 0,0000 |
| R–squared | 0,922443 | Mean dependent var | | 14,82416 |
| Adjusted R–squared | 0,909071 | S.D. dependent var | | 0,750674 |
| S.E. of regression | 0,226361 | Akaike info criterion | | 0,021434 |
| Sum squared resid | 1,485941 | Schwarz criterion | | 0,288065 |
| Log likelihood | 5,624899 | Hannan–Quinn criter. | | 0,113475 |
| F–statistic | 68,98392 | Durbin–Watson stat | | 1,615286 |
| Prob(F–statistic) | 0,000000 | | | |

The following model is obtained:

$$lnDOLASCICO = -112{,}7265 + 3{,}167315\ lnODLASCICO + 1{,}847960\ lnODLASCI_{t-1}\mathrm{CO} - 8{,}020457\ lnRCPICO + 2{,}383274\ D_2C + 2{,}099820\ D_3CO \quad (7)$$

Transformed model fits the data well with relatively high adjusted $R^2$ (90,91%). Overall, the estimated demand model can be considered as well specified. The key explanatory variables are consistent and significant at 5% level. All estimated parameters sign are correct and consistent with economic theory as expected.

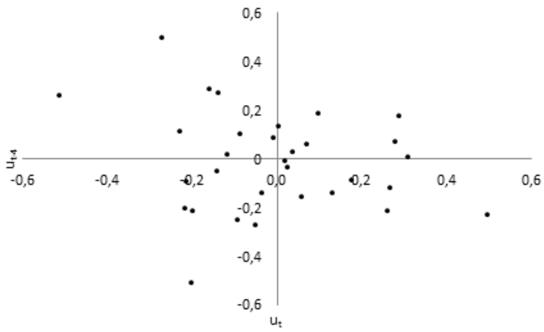
For a new, transformed model, the assumptions of classical linear regression model were tested. Ramsey RESET test was used for testing the assumption that model is correct specificity. Since the obtained $F = 2{,}3370489 < F_{(1;29)} = 4$, it can be concluded that the model is correctly specified.

Breusch-Godfrey test for autocorrelation is performed again. The test results of the applied Breusch-Godfrey test are show in the table below.

| TABLE 12: THE BREUSCH-GODFREY TEST RESULTS | | | |
|---|---|---|---|
| Breusch–Godfrey Serial Correlation LM Test | | | |
| F–statistic | 1,350948 | Prob. F(4,25) | 0,2791 |
| Obs*R–squared | 6,220694 | Prob. Chi–Square(4) | 0,1833 |

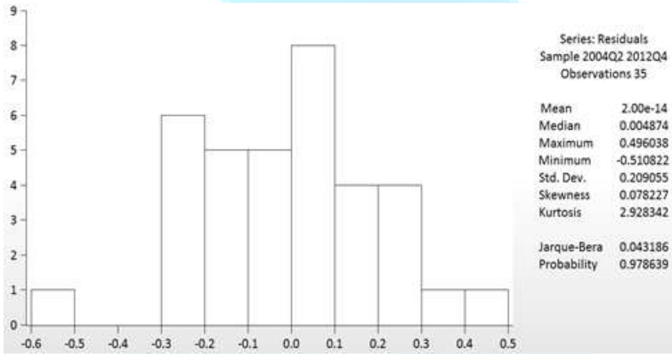
As the value of the calculated $nR^2$ (6,220694) is smaller than the critical value of the $\chi^2_{(0{,}05;2)} = 9{,}48773$ the null hypothesis of absence of autocorrelation can be accepted. Even the plot of the current residuals versus lagged residuals reveals no presence of autocorrelation (figure 6).

**FIGURE 6: COCHRANE-ORCUTT TWO-STEP PROCEDURE TRANSFORMED MODEL: CURRENT RESIDUALS VERSUS LAGGED RESIDUALS**



The testing for normality of the residuals is performed using the Jarque-Bera test.

**FIGURE 7: HISTOGRAM AND JARQUE-BERA TEST RESULTS**




As the value of the JB statistic $JB = 0{,}043186$ smaller than the critical value of the $\chi^2_{(0{,}05;2)} = 5{,}99146$ the null hypothesis of normally distributed residuals can be accepted.

To test the model for the presence of heteroscedasticity the White test is used. The results of the performed White test are shown in the table below.

| TABLE 13: THE WHITE TEST RESULTS | | | |
|---|---|---|---|
| Heteroskedasticity Test: White | | | |
| F–statistic | 0,913147 | Prob. F(5,29) | 0,4863 |
| Obs*R–squared | 4,760830 | Prob. Chi–Square(5) | 0,4458 |
| Scaled explained SS | 3,151350 | Prob. Chi–Square(5) | 0,6767 |

As the calculated White statistic (4,760830) is smaller than the critical value of $\chi^2_{(0{,}05;5)} = 11{,}07050$ the null hypothesis that there is no heteroscedasticty can be accepted. The mean of deviations resulting from the model (8) is zero, which confirms the assumption that the expected value of deviation of the estimated model is zero.

To test the multicollinearity of the variables the Variance Inflation Factor is considered.

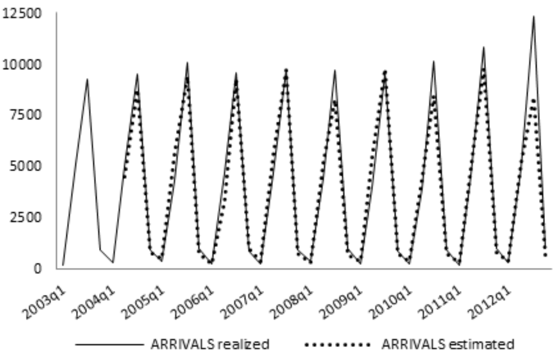
| TABLE 14: VARIANCE INFLATION FACTOR | |
|---|---|
| Variance Inflation Factors | |
| Date: 00/00/00 Time: 00:00 | |
| Sample: 2003Q1 2012Q4 | |
| Included observations: 35 | |
| Minimum possible value = 1.0 | |
| Values > 10.0 may indicate a collinearity problem | |
| $\ln DEPARTURES$ | 3,830 |
| $\ln DEPARTURES_{t-1}CO$ | 3,316 |
| $\ln RCPICO$ | 3,116 |
| $D_2CO$ | 4,620 |
| $D_3CO$ | 4,202 |

A general rule states that if the VIF of a variable exceeds 10, that variable is considered to be highly collinear. The minimum possible value of the VIF is 1. As shown the calculated VIF values indicate that there is no evidence of serious multicollinearity between variables in the estimated model.

The model fits the general movement of the analysed series during the entire sample period. The assumptions made in econometric modelling are not violated. The forecast results are reasonably good; the predicted values, in fact, are quite close to the actual values. The MAPE and the RMSE of the fit are 1,689 and 0,228 respectively.

Realized values and values estimated according to are shown in the figure below.

**FIGURE 8: GERMAN TOURISM ARRIVALS TO THE REPUBLIC OF CROATIA — REALIZED AND ESTIMATED VALUES**




As the U-coefficient is less than one (0,009), the model performs well in forecasting the number of German tourists (Figure 7).The estimation procedure and the model performance results reveal that the research hypothesis can be accepted; international tourism demand in Croatia, as complex phenomenon, requires the implementation of multivariate approach in modelling, in order to enable detail and systematic research of its patterns and determinants. The estimated coefficients of the model are in a line with the a priori expectations.

## CONCLUSIONS

Croatian economy is largely based on tourism. The aim of this study was to model the international tourist flows in Croatia and identify some of its key determinants. For that purpose a dynamic regression model was designed. The estimated coefficient and all performed diagnostic statistics showed that the specified model passes all the tests and that it fits the data reasonably well throughout the sample period. The number of German arrivals in Croatia is sensitive to the number of German departures abroad (current and lagged values), price variable and seasonal dummy variables. The empirical finding could be considered as the starting point of future detailed and more systematic quantitative analysis of international tourist flows patterns and their determinants. The analysis of tourism demand patterns should be considered crucial for forecasting and modelling, decision-making and all other activities that support tourism development.

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