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- Hunker, H.L. and A.J. Wright (1963), "Factors of Industrial Location in Ohio" Ohio State University, Nigeria.

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- Kumar S. (2011): "Customer Value: A Comparative Study of Rural and Urban Customers," Thesis, Kurukshetra University, Kurukshetra.

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A CONTRIBUTION TO HEALTH TOURISM RESEARCH: THE CASE OF DEMAND FOR THERMAL RESORTS IN CROATIA

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ABSTRACT
Heath tourism is fast-growing industry in the world. In Croatia health tourism has great potential but it is not utilised as much as it could be. Aim of the research is to study health tourism primary thru tourism demand for thermal resorts in Croatia. Characteristics of the arrivals and overnight stays in thermal resorts are analysed and dynamic linear modelling is performed. Demand for thermal resorts is decomposed by residence of tourists and compared with total tourism demand in Croatia. Results of time series regression modelling are linear regression models with autoregressive moving-average errors. Linear regression with moving average error of the 1st order explains the dynamic of the tourism arrivals and linear regression with autoregressive error of the 1st order explains the dynamic of the tourism overnight stays in thermal resorts in Croatia.

KEYWORDS
health tourism, thermal resorts, natural cure factors, tourism demand, regression model with ARMA errors.

JEL CLASSIFICATION
I11, Z32, C22, C51.

INTRODUCTION
Tourism plays a significant role in Croatian economy. The Strategy of Development of Tourism Until 2020 (Government of the Republic of Croatia, 2013) states that dominant touristic products are the sun and the sea, nautical tourism (yachting/cruising), business tourism and cultural tourism. As a product with visible growth potential, strategy identifies health tourism, cycling tourism, gastronomy and oenology, rural and mountain tourism, golf tourism, adventure and sport tourism and eco-tourism.

Health tourism is an old phenomenon, the novelty is the magnitude. While minority health tourism is from ancient time, mass health tourism is the product of modernity (Reisman, 2010). The term health tourism is generally used as an umbrella term for wellness tourism and medical tourism (Smith and Puczko, 2014). In Croatia products of health tourism that are most relevant are wellness tourism, healing tourism and medical tourism (Government of the Republic of Croatia, 2013) with healing tourism as a core of health tourism offer (Ivandić et al., 2014). In order to achieve that role, differentiation and quality improvement of healing resorts is needed. Healing tourism is form of health tourism where natural cure factors and physical therapy procedures are used. Natural cure factors could be climate, sea, thermal (including thermal mud) (Ivanišević, 2001). Natural cure factors are base for thermal resorts.

Croatian statistics defines thermal resorts as "all settlements where the healing effect of thermal or mineral waters, peloids (healing mud), naphthalene and other geological and mineral components has been scientifically or empirically proven and which have establishments aimed at healing and rehabilitation of visitors." (Statistical Reports, 2016). Before 2015 thermal resorts were named "bathing resorts".

REVIEW OF LITERATURE
Among papers about health tourism we world emphasize some articles about health tourism development and especially research about healing/thermal tourism in Croatia. Development of health tourism is Croatia is analysed in Kušen (2006, 2011), Bagat and Sekelj-Kauzlarić (2004), Grgona (2002), Vlahović (2001), Milas (2001), Peršić (2000), Blažević and Blažević (2000), Skupnjak (2000), Geić et al. (2010), Bartoluci and Hendija (2011, 2012).

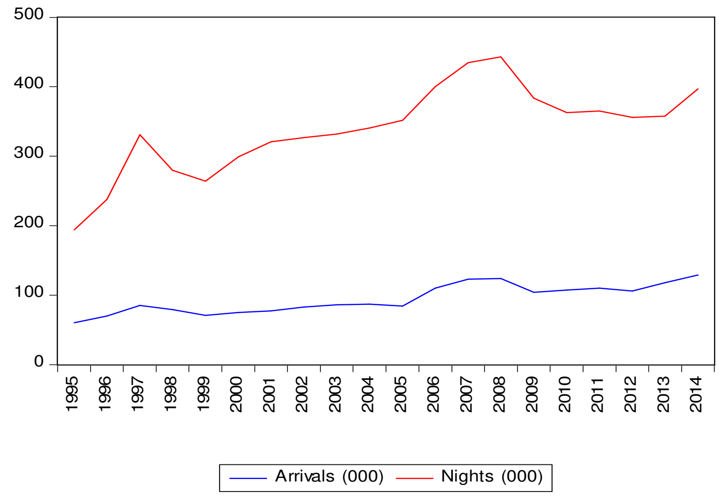
Thermal aspect of health tourism is in focus in Gregorić and Musliu (2016), Milinović (2012), Kunst and Tomljenović, (2011), Pleško et al. (2001), Ivanišević (2001), Turk (2000), and Sušanj et al. (2000), Radnic et al. (2009), Borović and Marković (2015).

ANALYSIS OF THE DEMAND FOR THERMAL RESORTS IN CROATIA
Data for the demand for thermal resorts are obtained from the Statistical Yearbook of the Republic of Croatia (1996, 2006, 2010 and 2015). Since there was a war in Croatia that affected tourism demand, only post-war period from 1995 to 2014 is concerned.

Arrivals and overnight stays of tourists are analysed in total numbers and by residence. Tourists are grouped by residence as foreign and domestic tourists.

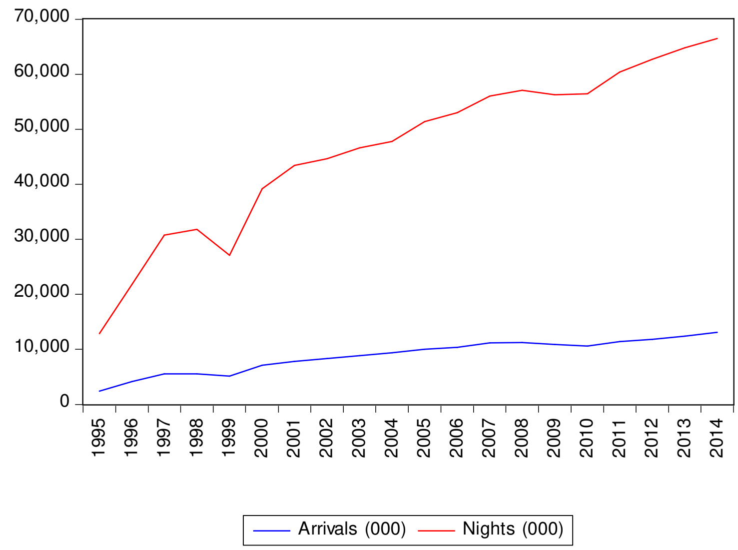
Arrivals and nights in thermal resorts in Croatia in the post-war period from 1995 to 2014 are presented in figure 1, while figure 2 shows arrivals and nights in total resorts, not only in thermal resorts.

FIGURE 1: ARRIVALS AND NIGHTS IN THERMAL RESORTS



Source: Statistical Yearbook of the Republic of Croatia (1996, 2006, 2010, 2015)

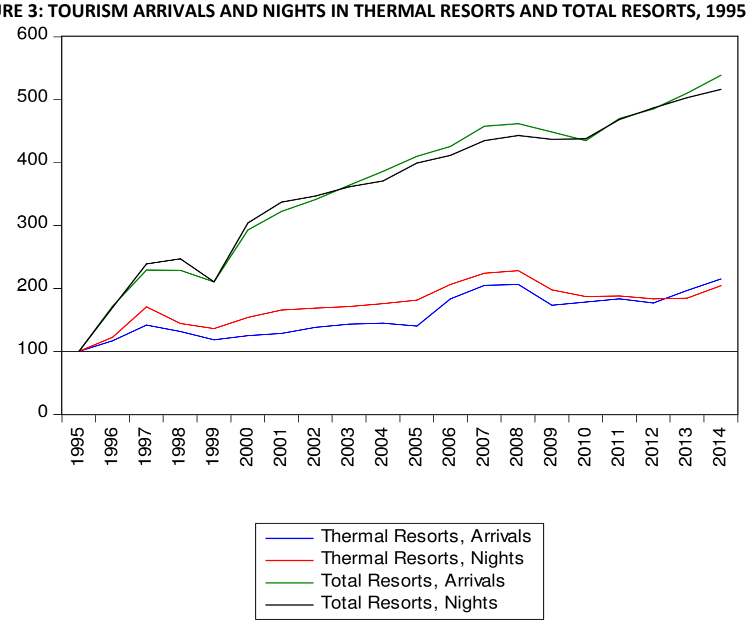
FIGURE 2: ARRIVALS AND NIGHTS - TOTAL



Source: Statistical Yearbook of the Republic of Croatia (1996, 2006, 2010, 2015)

Comparison of growth of the tourist demand in thermal resorts and in total resorts could be seen in figure 3.

FIGURE 3: TOURISM ARRIVALS AND NIGHTS IN THERMAL RESORTS AND TOTAL RESORTS, 1995 = 100



Source: authors' calculation

It is obvious that growth of tourist arrivals and tourist nights in thermal areas grew slower than in total resorts. Compound annual growth rate (CAGR) of demand in thermal places is 4.1% for tourism arrivals from 1995 to 2014 and 3.8% for overnight stays. During same period demand in total resorts grew at much faster rate: growth of the tourist arrivals was 9.3%, while growth of the tourism nights was 9.0%. When we decompose demand to foreign and domestic demand we can see that fast growth of the total demand is because of foreign tourist, domestic tourism demand grew much slower. Detailed comparison of the compound annual growth rate is presented in table 1.

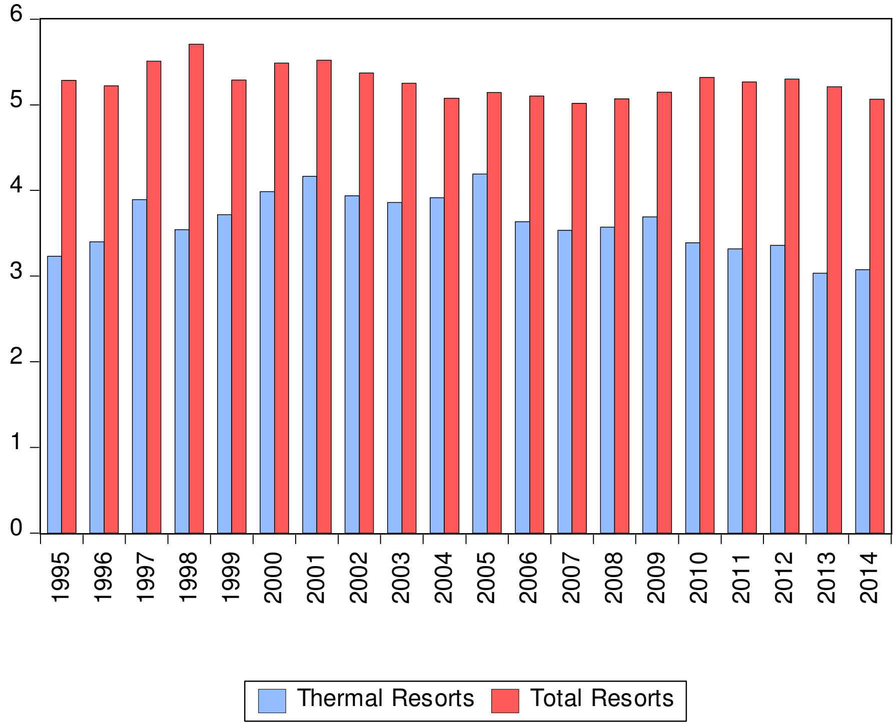
TABLE 1: CAGR OF THE TOURISM DEMAND FOR PERIOD 1995 TO 2014

	Thermal resorts	Total resorts
Arrivals total	4.1%	9.3%
Arrivals foreign	9.5%	12.1%
Arrivals domestic	2.7%	1.6%
Nights total	3.8%	9.0%
Nights foreign	8.1%	11.0%
Nights domestic	2.7%	0.9%

Source: authors' calculation

Tourist stays in thermal resorts less than in total resorts. In figure 4 we can see average duration per arrivals in thermal places and in total places.

FIGURE 4: AVERAGE NUMBER OF TOURIST NIGHTS BY ARRIVAL IN THERMAL RESORTS AND TOTAL RESORTS



Source: authors' calculation

Analysing average duration in period from 1995 to 2014, which is calculated as unweighted mean of duration, we can see that in thermal resorts it is 3.62 day per visit, while in total resorts it is 5.27 days. Average duration in thermal resorts is 1.65 day or 31% less than in total resorts. Average duration decomposed to the domestic and foreign tourist is shown in table 2.

TABLE 2: AVERAGE DURATION BY ARRIVALS FROM 1995 TO 2014

Residence	Thermal resorts (days)	Total resorts (days)	Total / Thermal	Thermal / Total	Thermal – Total (days)
Total	3.62	5.27	1.45	0.69	-1.65
Foreign	3.31	5.63	1.70	0.59	-2.32
Domestic	3.72	3.67	0.99	1.01	+0.05

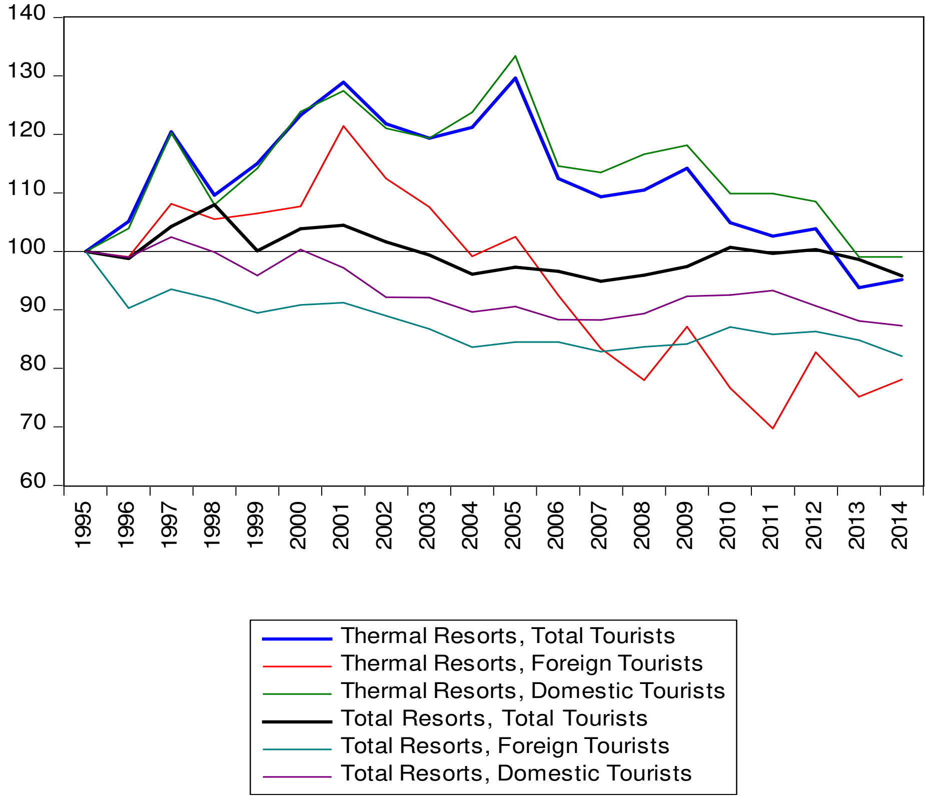
Note: average duration is calculated as unweighted mean duration in period from 1995 to 2014

Source: authors' calculation

In table 2 we can see that difference in duration stays is mainly because of foreign tourists who have stayed at average 2.32 days or 41% less in thermal resorts than in total resorts. Average duration of domestic tourists in thermal resorts and in total resorts is almost the same: 3.72 for thermal resorts and 3.67 for total resorts. It means that in thermal resorts domestic tourists have stayed 0.05 days or 1% more than in total resorts.

The dynamic of average duration shown as index 1995 = 100 in thermal and total resorts by residence can be seen in figure 5.

FIGURE 5: AVERAGE NUMBER OF TOURIST NIGHTS BY ARRIVAL IN THERMAL RESORTS AND TOTAL RESORTS BY RESIDENCE, 1995=100

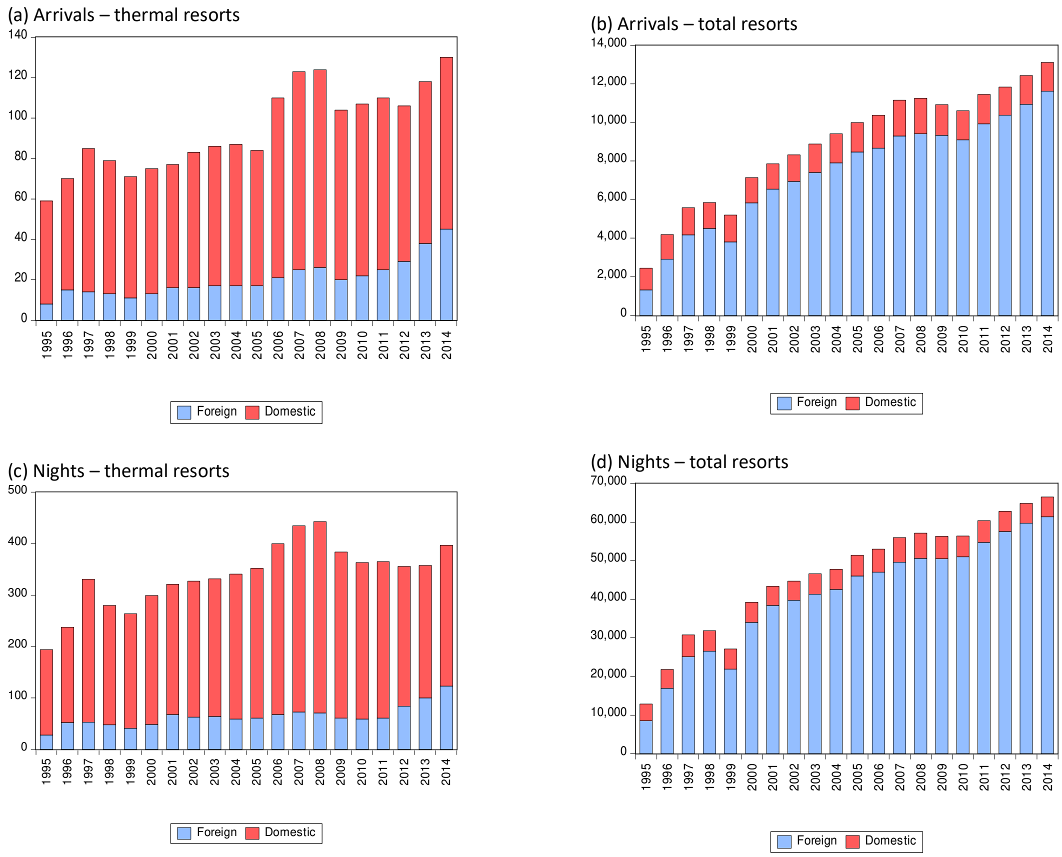


Source: authors' calculation

We can see that all analysed groups of tourist in period from 1995 to 2014 have shorter duration at the end of period than at the begging. Foreign tourists in thermal resorts that have average smallest duration, also have the largest falling of duration in analysed period.

Comparison of tourism arrivals and nights by residence is presented in figure 6.

FIGURE 6: COMPARING FOREIGN AND DOMESTIC TOURIST ARRIVALS AND NIGHTS IN THERMAL RESORTS AND TOTAL RESORTS



Source: Statistical Yearbook of the Republic of Croatia (1996, 2006, 2010, 2015)

TIME SERIES MODELLING

Arrivals and overnight stays in thermal resorts in Croatia for total tourists has been analysed using time series modelling. In order to get more objective results, out-of-sample forecast is performed. Data from 1995 to 2014 are split in two periods, in-sample period from 1995 to 2012 and out-of-sample period from 2013 to 2014. Models are built using in-sample period data and validated using out-of-sample period data.

From the figure 1 we can assume linear dynamics of the demand so at first, linear regression models of arrivals and nights are built using time as independent variable. Form of the linear regression model is:

$$Y_t = \beta_0 + \beta_1 x_t + u_t \quad (1)$$

Assumptions of liner regression models are: linearity, independence of errors, normality of error and equality of variances also called homoscedasticity (Levine et al., 2015). Models are estimated by ordinary least squares method (OLS) and validate using different statistical tests. Both models violate the assumption of independence of errors because of autocorrelation. In order to account for the autocorrelation, regression models with autoregressive moving average errors (ARMA) are built. Error of model of tourism arrivals is following moving average (MA) process, while model of tourism nights is following autoregressive process (AR).

MODELLING ARRIVALS IN THERMAL RESORTS

Linear regression model of arrivals in thermal places for the period from 1995 to 2012 is estimated as:

$$\underset{}{Arrivals_t} = \underset{(5.006)}{62.490} + \underset{(0.462)}{3.019} x_t + u_t \quad (2)$$

Where:

x_t =1 in 1995 and unit for x_t is 1 year

Arrivals are measured as thousands of tourist arrivals

Standard errors are in parentheses

All tests are performed using level of significance $\alpha = 0.05$. At first stage of model evaluation, some basic diagnostics test of the overall model significance and time variable significance are performed. F-test shows that model is significant: $F(1,16) = 42.607$, $p < 0.001$. $R^2 = 0.727$ and $R^2_{adjusted} = 0.710$ indicating high degree of determination. T-test shows that parameter for time variable x_t is significant: $t(17) = 6.527$, $p < 0.001$.

Since previous tests show that model and independent variable are significant at chosen significance level, assumptions of the model are tested. Normality of errors is tested by Jarque-Bera test. Results of test: $\chi^2(2, N = 18) = 3.245$, $p = 0.197$ are consistent with the hypothesis that errors are normally distributed. Assumption of homoscedasticity is tested with White's heteroscedasticity test. Results of the test: $\chi^2(2, N = 18) = 1.655$, $p = 0.437$ indicates equality of variances. Assumption of independence of errors is tested by testing autocorrelation using Breusch-Godfrey LM test. Test for autocorrelation up to 2nd order gives following results: $\chi^2(2, N = 18) = 7.005$, $p = 0.030$ indicating presence of autocorrelation.

We tried to fix for autocorrelation adding ARMA model of errors. It was found that for arrivals in thermal resorts, moving average of the 1st order, MA (1), resolves the problem of autocorrelation. Linear regression with moving average error of the 1st order is expressed as:

$$Y_t = \beta_0 + \beta_1 x_t + u_t \quad (3)$$

$$\text{with errors } u_t = \epsilon_t + b_1 \epsilon_{t-1} \quad (4)$$

Generalized least squares (GLS) algorithm is used for estimating regression model with MA errors. Fitted linear regression model with 1st order moving average error is:

$$Arrivals_t = \underset{(6.479)}{62.568} + \underset{(0.593)}{2.974} x_t + u_t \quad (5)$$

$$\text{with } u_t = \epsilon_t + \underset{(0.210)}{0.595} \epsilon_{t-1} \quad (6)$$

Where:

x_t =1 in 1995 and unit for x_t is 1 year

Arrivals are measured as thousands of tourist arrivals

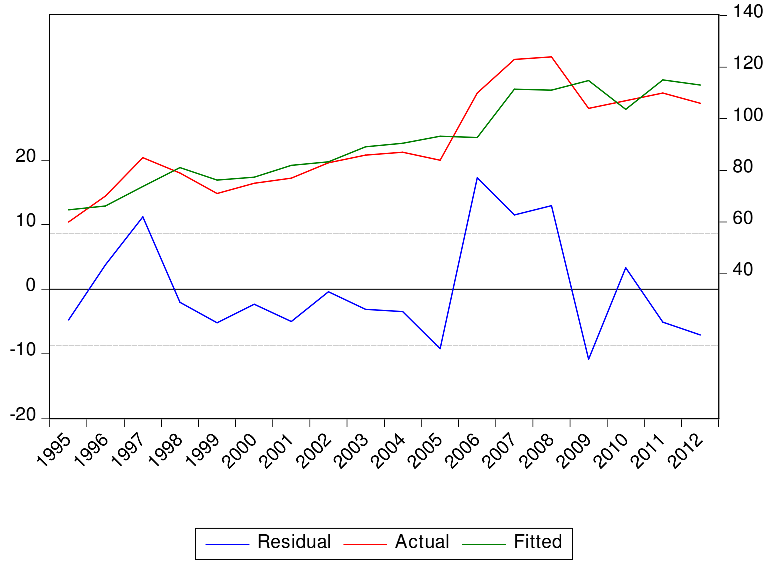
Standard errors are in parentheses

Evaluation of the model begins with estimating overall significance of the model. Results of the F-test is: $F(1,16) = 32.676$, $p < 0.001$ implying that model is significant. $R^2 = 0.813$ and $R^2_{adjusted} = 0.788$ which shows high degree of determination. Coefficient of the variable x_t is significant what can be seen from the results of the t-test: $t(17) = 5.018$, $p < 0.001$.

Assessment of the model continues with testing of the assumptions of the model. Jarque-Bera test indicates normality of errors: $\chi^2(2, N = 18) = 2.058$, $p = 0.357$. White's heteroscedasticity test shows that variances are homogenous: $\chi^2(2, N = 18) = 4.591$, $p = 0.868$. Breusch-Godfrey LM test for autocorrelation up to 2nd order gives results: $\chi^2(2, N = 18) = 2.782$, $p = 0.249$. We can see that autocorrelation which was problem before adding MA term is fixed.

Results of the linear regression model with moving average errors for tourism arrivals in thermal resorts in Croatia, actual, fitted and residual value are presented in figure 7.

FIGURE 7: TOURISM ARRIVALS (000) IN THERMAL RESORTS IN CROATIA – RESULTS OF THE MODELLING



Source: authors' calculation

Since model is estimated for in-sample period from 1995 to 2012, forecast evaluation is performed for out-of-sample period 2013-2014. Forecasting errors of the out-of-sample period are averaged using different ways and shown in table 3:

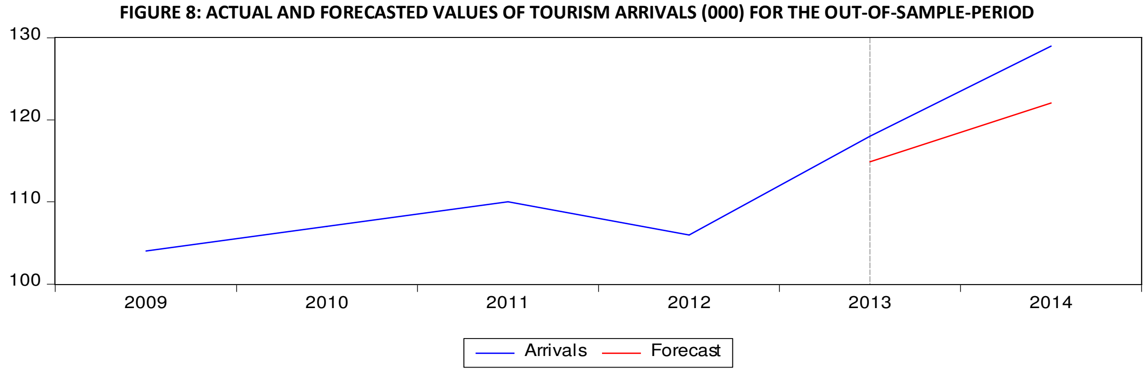
TABLE 3: FORECASTING ERROR OF THE POLYNOMIAL MODEL WITH MOVING AVERAGE ERRORS FOR TOURIST ARRIVALS

Averaging method	RMSE	MAE	MAPE	SMAPE	Theil U1	Theil U2
Error	5.385	5.034	4.016	4.108	0.022	0.631

Source: authors' calculation

Figure 8 shows actual and forecasted values for out-of-sample period.

FIGURE 8: ACTUAL AND FORECASTED VALUES OF TOURISM ARRIVALS (000) FOR THE OUT-OF-SAMPLE-PERIOD



Source: authors' calculation

MODELLING TOURISM NIGHTS IN THERMAL RESORTS

Linear regression model of overnight stays in thermal resorts is estimated. The model is as follows

$$Nights_t = 243.928 + 9.557x_t + u_t \quad (7)$$
$$(19.601)\ (1.811)$$

Where

x_t =1 in 1995 and unit for x_t is 1 year

Nights are measured as thousands of tourist overnight stays

Standard errors are in parentheses

Goodness of fit measures show overall significance of the model. Results of the F-test is: F (1,16) = 27.855, p < 0.001. Coefficient of determination is R^2 = 0.635 and $R^2_{adjusted}$ =0.612. Parameter of the time variable is significant at the chosen significance level what can be seen from the results of the t-test: t(17) = 5.278, p <0.001. Assumptions are checked next. Normality of errors is tested with Jarque-Bera test and results are χ^2(2, N = 18) = 0.594, p = 0.743 in favour with the presumption of normality. Equality of variances is tested with White's heteroscedasticity test. Results of the test: χ^2(2, N = 18) = 4.519, p = 0.104 show equality of variances. Autocorrelation of errors is checked using Breusch-Godfrey LM test. Results of the test for up to 2nd degree are: χ^2(2, N = 18) = 6.091, p = 0.048 which shows presence of autocorrelation.

In order to resolve the problem of autocorrelation ARMA model of error is added. It was sufficient to add autoregressive error of the first order: AR(1). The new model is linear regression model with autoregressive error and general form of the model is:

$$Y_t = \beta_0 + \beta_1 x_t + u_t \quad (8)$$
$$\text{with errors } u_t = a_1 u_{t-1} + \epsilon_t \quad (9)$$

Model is estimated using GLS algorithm. Estimated model for tourism nights in thermal resorts in Croatia is:

$$Nights_t = 234.665 + 9.546x_t + u_t \quad (10)$$
$$(37.407)\ (3.408)$$
$$\text{with errors } u_t = 0.626u_{t-1} + \epsilon_t \quad (11)$$
$$(0.242)$$

Where:

x_t =1 in 1995 and unit for x_t is 1 year

Nights are measured as thousands of tourist overnight stays

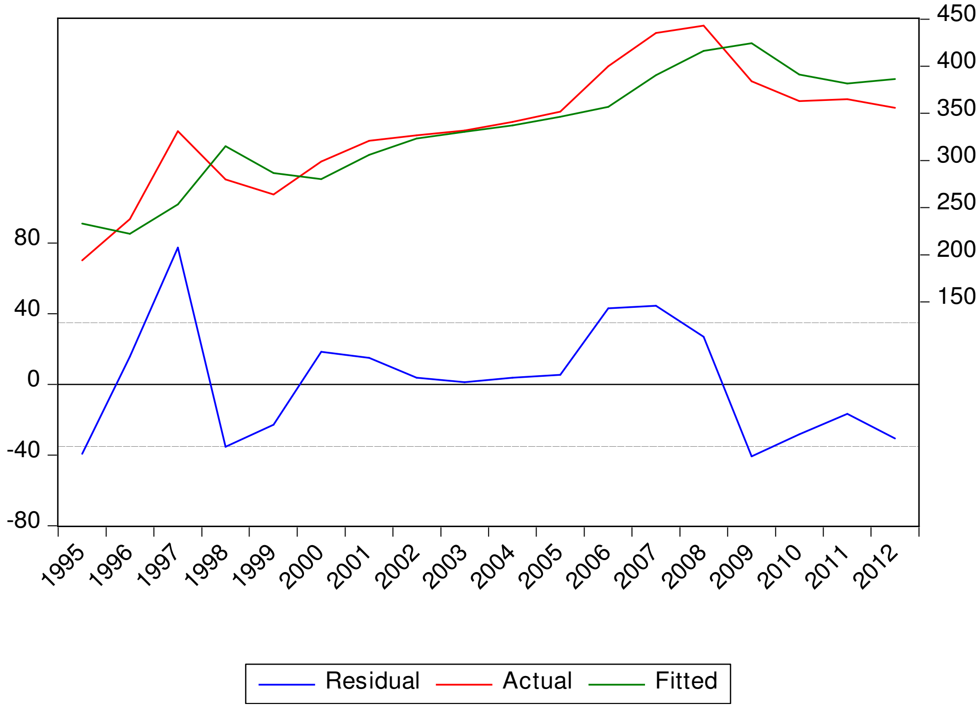
Standard errors are in parentheses

Diagnostic of the model starts with analysing F-test and coefficient of determination. Results of the F-test: $F(1,16) = 20.894$, $p < 0.001$ shows overall significance of the model. Coefficient of determination and adjusted coefficient of determination $R^2 = 0.736$ and $R^2_{adjusted} = 0.701$ are high. Independent variable is significant at the level of significance $\alpha = 0.05$, $t(17) = 2.801$, $p = 0.013$.

Testing is continuing with checking assumption of the regression model. Jarque-Bera test shows normality of errors: $\chi^2(2, N = 18) = 0.883$, $p = 0.643$. Results of the White's heteroscedasticity test support the hypothesis of homoscedasticity: $\chi^2(2, N = 18) = 8.153$, $p = 0.227$. Breusch-Godfrey LM test for autocorrelation shows that violation of the assumption of autocorrelation is fixed, results for the test up to the 2nd order are: $\chi^2(2, N = 18) = 3.204$, $p = 0.202$.

Results of the modelling of tourism nights in thermal resorts in Croatia using linear regression model with autoregressive errors, actual, fitted and residual value for the in-sample period from 1995 to 2012 are presented in figure 9.

FIGURE 9: TOURISM NIGHTS (000) IN THERMAL RESORTS IN CROATIA – RESULTS OF THE MODELLING



Source: authors' calculation

Forecast estimation is performed on the out-of-sample period from 2013 to 2014. Forecasting errors are averaged in several ways and results are presented in table 4.

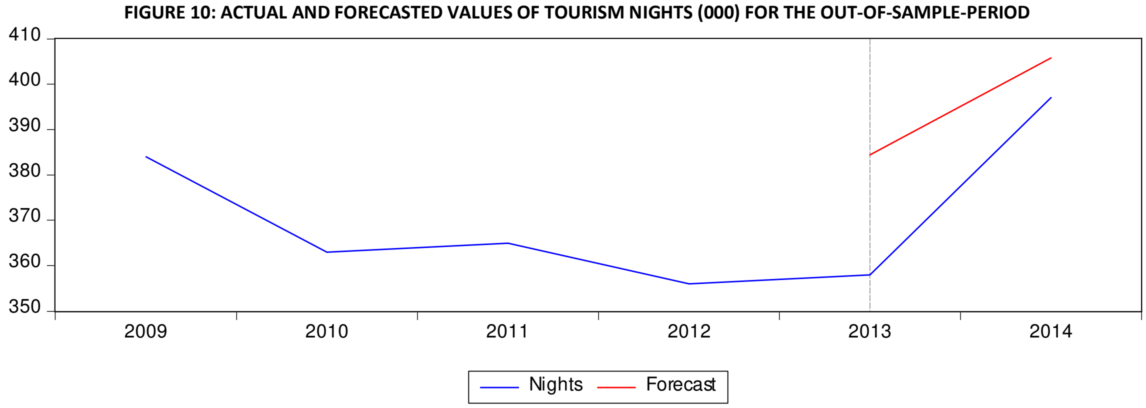
TABLE 4: FORECASTING ERROR OF THE POLYNOMIAL MODEL WITH AUTOREGRESSIVE ERRORS FOR TOURIST NIGHTS

Averaging method	RMSE	MAE	MAPE	SMAPE	Theil U1	Theil U2
Error	19.695	17.611	4.799	4.655	0.025	0.226

Source: authors' calculation

Actual and forecasted values for the out-of-sample-period can be seen in figure 10.

FIGURE 10: ACTUAL AND FORECASTED VALUES OF TOURISM NIGHTS (000) FOR THE OUT-OF-SAMPLE-PERIOD



Source: authors' calculation

CONCLUSION

Tourism is very important in Croatian economy. Health tourism is a branch of tourism that has a great potential but it is not used as much as it could be. As a contribution to the development of health tourism in Croatia, this work studies the demand for thermal resorts in Croatia in the post-war period from 1995 to 2014.

In the analysed period demand for thermal resorts in Croatia was growing slower than in total resorts. Growth for the demand of both, thermal resorts and total resorts is results of the growth of demand of foreign tourists in the first place. Growth of the demand of the domestic tourists is much slower. In thermal resorts tourists stay in average less than in total resorts, but this is because of foreign tourists, while domestic tourists stay in thermal resorts longer than in total resorts.

In the period of interest all analysed groups has decreased duration time, so average nights spend is less at the end than in the beginning of the period for all cases.

Time series econometric modelling has been conducted in order to find model that describes data generating process of demand for thermal resorts. Models are built for the in-sample period from 1995 to 2012 and evaluated for the out-of-sample period from 2013 to 2014. At first stage linear regression models for arrivals and overnight stays are built. Assessment of the models showed presence of autocorrelation of errors so models have been modified to fix for autocorrelation problem. It was found that errors are following ARMA data generating process: errors of the model of tourism arrivals are following moving average process, while tourism nights are following autoregressive process. Finally two models are built that passed evaluation checking, linear regression model with moving average error of the 1st order for tourism arrivals and linear regression model with autoregressive error of the 1st order for tourism nights.

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