PRICE DEVELOPMENTS IN THE HOSPITALITY INDUSTRY IN SLOVENIA

Sergej Gričar[1]

Štefan Bojnec[2]

This paper focuses on the determinants of the hospitality industry price developments, which is based on the time-series seasonally unadjusted monthly statistical data from January 2000 to September 2010. By using the principal component analyses, the two common components of the hospitality industry price behaviours are identified: the general level of prices and the bipolar component of demand for services in hospitality industry. The econometric tests confirmed that the non-stationary sequences in time-series data are integrated of the same order and the residuals contain a stochastic trend. The first difference is stationary. The results indicate that the hospitality industry prices are significantly positively associated with domestic consumer prices and hospitality industry prices in the euro zone. The regression equation in the first differences also confirmed that the hospitality industry prices are significantly negatively associated with the fuel prices and with the dummy variable, which captures the time period after the Euro adoption in Slovenia in 2007.

Keywords:

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L83

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[1] *Ph.D. Student, Faculty of Management Koper, University of Primorska, Cankarjeva 5, 6104 Koper, Slovenia, e – mail: sergej.gricar@gmail.com*

[2] *Ph.D., Full Professor, Faculty of Management Koper, University of Primorska, Cankarjeva 5, 6104 Koper, Slovenia, e – mail: stefan.bojnec@fm-kp.si*

I. INTRODUCTION

During the recent years, the developments in the hospitality industry prices in Slovenia have received much attention from the media, policy makers and the general public. The main concerns relate to the potential consequences for consumers and living standards of the upward trends in and an increasing variability of the hospitality industry prices.The hospitality industry prices in Slovenia have increased from January 2000 until September 2010 by62.8% and in the euro zone by only 34.5% (Eurostat, 2011). The hospitality industry price increases in Sloveniamight be driven by different determinants, which are analysed in this paper.

Among possible factors that might contribute to price developments in the hospitality industry are increased demands (for example increased tourist arrivals), increased input costs (for example petroleum), increased prices for non-tradable goods (for example electrical energy), and increased wages in tradable sector, while any tax raises the cost of transaction. The Euro adoption in Slovenia was on 1st January 2007. The impact of the Euro adoption to inflation in Slovenia was significant in the first quarter of 2007, but between the second quarter 2007 and in 2008 by food price increases.The pressures for consumer price increases started in 2002 and in mid-2007 due to a considerable increase in oil prices and prices of basic raw materials and food at the world markets. The impact of the Euro adoption to the hospitality industry prices was significant from the December 2006 until February 2007 (Gričar and Bojnec,2009).Financial and economic crisis since the third quarter of 2008 has caused the reduction in demands.

The objective of this paper is to investigate the dynamics and determinants explainingprice developments in the Slovenian hospitality industry during the period from January 2000 to September 2010 by using the principal component analysis and regression analysis. The findings and implications of results are of relevance for tourism economic science with managerial and hospitality management policy implications.

In order to assess thedeterminants of the Slovenian hospitality industry prices, the following three hypotheses (H) are set:

H1: Hospitality industry pricesare positively associated with the domestic macroeconomic environment and the hospitality industry prices in the euro area.

H2: Hospitality industry prices are positively associated with demand for tourism services, and negatively associated with the appreciation of the domestic currency.

H3: Hospitality industry prices are positively associated with the hospitality industry input costs.

The rest of the paper is structured as follows. The next second section presents basic statistical facts on the Slovenian hospitality industry. Third section provides methodology related to the Autoregressive (AR)/ Integrated (I)/Moving Average (MA) (ARIMA) model for price analysis. The fourth section presents the data used. The fifth section presents and discusses the empirical results focusing on the basic time series testing. Finally, the last section concludes and points possible directions and extensions for future research.

II. BASIC STATISTICAL FACTS IN THE SLOVENIAN HOSPITALITY INDUSTRY

Hospitality services are specific in its management. Because services cannot be pre–produced and stored, synchronizing supply and demand is often difficult (Verhoven et al., 2011). The hospitality industry consists of broad category of fields within the service industry that includes lodging, restaurants, event planning, theme parks, transportation, cruise line, and additional fields within the tourism industry. The hospitality industry depends on the availability of leisure time and disposable income. A hospitality unit such as a restaurant, hotel, or even an amusement park consists of multiple groups activities such as facility maintenance, direct operations (servers, housekeepers, porters, kitchen workers, bartenders, and similar), different types of management, and marketing. The hospitality industry covers a wide range of organizations offering accommodation, food and beverage, meeting and events, gaming, entertainment and recreation, tourism services, and visitor information.

While the tourism capacities in Slovenia have increased, the number of tourists, tourist arrivals and overnight stays in Slovenia vary by individual year (SORS, 2011). In 2009, there were 41.3 thousands rooms and 112.0 thousands beds by types of tourist accommodations. Hotels are the most important single types of tourist accommodations. In the same year, there were around 3 million tourist arrivals and 9 million overnight stays. Foreign tourists were more important than domestic tourists among tourist arrivals and overnight stays. Among tourist arrivals and overnight stays by countries of origin, at the first four places are tourists from Italy, Austria, Germany, and Croatia.

Three types of municipalities by tourism development in terms of tourism supply and tourism demand are the most important: mountain resorts, seaside resorts, and health resorts (SORS, 2011). While the average length of stay of tourists in Slovenia is 3.0 nights, in health resorts it is 4.0 nights and in seaside resorts 3.6 nights.The health resorts have experienced also the highest rates of utilisation of tourism capacities with less substantial seasonal variations, which are more common for mountain and seaside tourism resorts.

For international competitiveness of the hospitality industry and its internationalization as it is the case for Slovenia, the hospitality industry price developments over time are likely to play an important role for tourism demands in the structure of the Slovenian tourism industry supply, for cross-country price competition, and price transparency. Therefore, the focus of our analysis is on price developments in the hospitality industry in Slovenia.

III. METHODOLOGY

The economic downturn pertaining to the recent financial crisis and economic recession are stark reminders that economies can experience unexpected changes with substantive effects on their economies and operation. Such sudden changes or more precisely, structural brakes in time-series data lead to difficulties in economic forecasting and empirical modelling, as well as raising doubts about the value of economic models and theories underlying them.

For the econometric analysis, we chose an approach that allows for sufficiently rich dynamics while capturing information from a large number of time series. Vector autoregression (VAR) analysis would not be the adequate tool because of its limitation to hardly manage more than a few time series. To exploit the information imbedded in many disaggregated time series data and to avoid the curse of dimensionality, we rely on a version of principal component analysis (e.g. Forni et al., 2000). We combine the principal component analysis with autoregressive (AR) model to analyse the interdependencies between the estimated latent factors, following the factor augmented AR approach by Bernanke et al. (2005).

Some previous empirical studies on the ARIMAmodel ($\alpha + \rho(L)y_t = \theta(L)e_t \equiv Y_t = a_0 + \sum_{i=1}^{p} a\, y_{t-1} + \sum_{i=0}^{q} \beta_i\, \epsilon_{t-1}$) either do not address the properties of the time series data used or simply assume their stationarity. However, nonstationarity can be pronounced in macroeconomic time-series data for emerging economies. The (non)stationarity results for variables depend on the test used and on the assumption about the deterministic components. Consequently, we test the autocorrelation, and conduct regression analysis between dependent and explanatory variables, and the principal component analysis. Dependent variable is index of prices in the hospitality industry (IPHI). Explanatory variables are: index of prices in the hospitality industry in the euro zone (IPHIEA), index of fuel prices (IFP), tourists arrivals (tourists), index of service prices (ISP), index of product prices by producers (IPPP), index of natural gas prices (IGP), nominal effective exchange rate (NEER), value added tax rate (VR), index of wages in the hospitality industry (IWHI), index of prices for food and non-alcoholic beverages (IFB), dummy variable for the euro adoption (D1), and dummy variable for the period after the euro adoption (D2). We apply a sample autcorrelogram (ACF) test where degree and direction of dependence between time series of the same articles is measured by the autocorrelation (ρ_s), where are:$\rho_0 = 1,\ \rho_1 = a_1,\ \rho_2 = (a_1)^2,\ and\ \rho_s = (a_1)^s$. Value in relation to the length of delay $(a_1)^s$ is usually displayed as a special chart called autocorrelogram (Enders, 2004). If the residuals are stationary, it means that either observedvariables are stationary I(0) or that they are nonstationary I(1) or higher.

The theory of linear equations can be extended to allow the forcing process to be stochastic. This class of linear stochastic difference equations underlies much of theory of time-series econometrics. Especially is the Box-Jenkins (1976) methodology for estimating time-series models of the form:

$$Y_t = a_0 + \sum_{i=1}^{p} a\, y_{t-1} + \sum_{i=0}^{q} \beta_i\, \epsilon_{t-1}, \text{ for } t = 1,\dots, T, \qquad (1)$$

where are:

$a_0$isa location variable,$a_0 + \sum_{i=1}^{p} a\, y_{t-1}$is AR ($p$) part of the model, and$\sum_{i=0}^{q} \beta_i\, \epsilon_{t-1}$is MA ($q$) part of the model.

The problem of instability in the variance model is often present in time series. Economic and econometric theory give an explanation that the variables that are subject to change by more than 100% from the baseline, they arenon-stationary as well as their modification could be also negative. In most cases, they become stationary in the first difference I(1):$Y_t = \beta_1 + \beta_2 Y_{t-1} + \epsilon_t$, for t = 1, ..., T).Examples are macroeconomic variables such as prices, and the exchange rate, but rare examples are of the higher differential. Some variables are already fixed with I(0), such as tax rate and rate of unemployment.In order to mitigate or even eliminate this problem, it is possible to use several approaches. In the presence of heteroscedasticity, which means that the variance is different over the time, it is possible to take another way. Through explicit inclusion in the model – such as the ARMA specification, which can capture the variability –is obtained the average variance (Hendry and Nielsen, 2007). The AR (p) is the autoregressive process with the rate (p) that gives the linear model of equality, which means that there is only one stochastic error ϵ_t. Similar to the AR (p) is the MA (q) polynomial model and unsteady translation delays in the rates, which are fixed. In the moving average (MA (q)) there are the stochastic errors $\epsilon_t$for past events (q), the average is not the same and there is the same delay term. Box and Jenkins's (1976) process generates a stochastic data that is named as the process of creating datawithout borders: + ∞; ∞. Random variables are selected, which means that the probability distribution forecasts future value in the case of different variables. If the homogeneous part of the difference equitation is with*p* lags and the model for x_t contains *q* lags, the model is called ARMA(*p*, *q*) model. If *q*=0, the process is called a pure autoregressive process denoted by AR(*p*) and if *p*=0, the process is a pure moving-average process denoted by MA(q). If one or more characteristic roots of x_t is greater or equal to unity, the y_t sequence is said to be an integrated process and y_t is called the ARIMA model. If any portion of the homogeneous equitation is present, the mean, variance, and all covariances will be time-dependent.

In order to rebut the spurious regression, we checked the reliability of regression estimates in a way that we evaluate the regression of transformed variables with the first difference of variables (without logarithms) (Luetkepohl and Xu, 2011). We use the following equation:

$$y_i=\alpha+\beta_1 x_1+\beta_2 x_2+\beta_3 x_3+...+\beta_k x_k+\varepsilon, \quad (2)$$

where are:

$\alpha$is regression constant;$y_i$is dependent variable;β_1, β_2,..., $\beta_k$are regression coefficients of independent or explanatory variables x_i, where i = 1, ..., k;εisdisturbance(Hendry and Nielsen, 2007).Note that theresidual can be autocorrelated for different reasons: (i) inflation shocks (e.g. cost-pushshocks) are autocorrelated, (ii) the prediction error and the random effect, and (iii) there are omitted variables (e.g. various external variables for small open economies).

IV. DATA USED

The dataset consists of monthly data ranging from January 2000 to September 2010.The principal source of the time series data used is the Statistical Office of the Republic of Slovenia (SORS) and Eurostat.The inflation rate is measured by the consumer price index (CPI). The CPI inflation is even more relevant in small open economies that are highly exposed to imports. We use also monthly wages. The foreign inflation rate and the hospitality industry prices are measured by the rates in the Euro area. The oil price is measured by average quarterly world price of barrel of crude oil. Data comes from the US Energy Information Administration. The exchange rate is the Eurostat nominal effective exchange rate index against 12 main trading partners with 2000 as the base year. The focus is on the ARIMA model based on the first and non-seasonal differences, called the stochastic models and also on the first order of the seasonal MA part. This model class was found to be more successful for times series analyses than model with both the first and the seasonal differences and the model without any differences. In that case the unadjusted monthly data is used to analyse the ARIMA_{12} model.

V.EMPIRICAL RESULTS

A. Price developments

Figure 1 presents price developments in the hospitality industry in Slovenia in comparison with the hospitality industry prices in the euro zone. The January 2000=100 is taken as the based month.

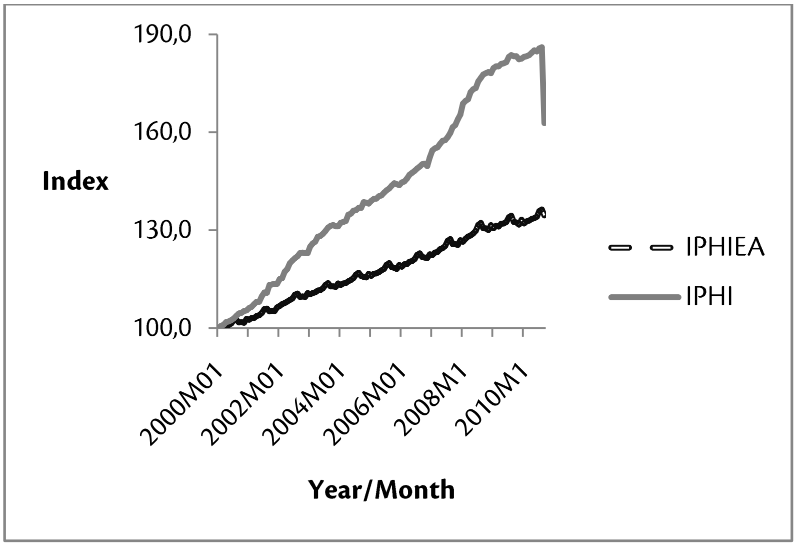

FIGURE 1. PRICEDEVELOPMENTS IN THE HOSPITALITY INDUSTRY IN SLOVENIA AND IN THE EURO ZONE FROM JANUARY 2000 TO SEPTEMBER 2010 (JANUARY 2000=100)

Source: Author's calculation

Note: IPHIEA – index of prices in the hospitality industry in the euro zone. IPHI – index of prices in the hospitality industry in Slovenia.

The maximum value for the index for the hospitality industry prices in Slovenia is 186.1 in August 2010; while in the euro zone is 136.3also in August 2010. In the case of Slovenia,three different periods can be distinguished: the first period of four years preceding the EU accession (January 2000 – December 2004).The second period is from the EU accessionto the entry in the exchange rate mechanism (ERM II) and the euro area (January 2004 – December 2007).The third period covers from the euro adoption to the outburst of the global financial crisis (January 2007 – September 2008 and after then).Slovenia joined the ERM II (in June 2004) almost immediately after its accession to the EU (in May 2004).Therefore, it would make no sense to distinguish between the period from the EU accession to the entry in the ERM II and the period after the entry in the ERM II and before the euro adoption, since the first of these periods was simply too short

(less than two months) to be analytically meaningful.

B. Principal component analysis

By extracting the common components from a large number of time series data, the principal component analysis is also helpful in cases where the numbers of time series data are short. This is a prominent feature of the data for the new EU member states (Krušec, 2007). In such cases the factor analysis models can be preferred to the VAR models since the use of particular variables as good forecasting devices in the economy undergoing a transition is not clear a priori. On the other hand, the factor analysis models provide a methodological approach that allows us to remain diagnostic about the structure of the economy.

The first common factor explains 76% of the variance of the series of variables for the hospitality industry prices. The second factor explains 10% of the variance.The Keiser – Meyer – Olkin statistic measure of sampling adequacy is greater than 0.5. This implies the appropriateness to use the multivariate factor analysis.

To estimate the factor weights by using the principal component analyses, different rotation methods are used (Table 1). The weights by variables are rather stable when the different rotation methods are applied. Changes occur in the Maximum likelihood method – Varimax with Kaiser normalisation. The first common factor is the general level of prices in the economy, which explains the bulk of the variance for the hospitality industry prices. The central role of prices in the economy as a purchasing determinant and post-purchasing process is well recognized (Činjarević et al., 2010). These results by using the principal component analysis support the *H1*that the hospitality industry prices are positively associated with the general price levels, and by the hospitality industry prices in the euro zone, but negatively associated with the VR.

The second common factor captures the highest weights for tourists' arrivals, the VR, and exchange rates (NEER). They are related to tourism demand and the price sensitivity to the euro, including the exchange rate. They are important for international competitiveness and for revenues from the travelling industry (Uravić and Šugar, 2009). However, the *H2* is confirmed only partly that the hospitality industry prices are positively associated with tourist demands while the euro appreciation has increased and not decreased the hospitality industry prices.

Finally, we do not find significant the third common factor pertaining to energy. Following the recent literature (Xavier et al., 2011; Šugar and Tikvicki, 2011) this factor should not play an important role in the price comovement. Therefore, by using the principal component analysis we do not confirm hypothesis *H3*.

TABLE 1. COMPONENT MATRICES

Estimated factor weights of variables for the hospitality industry prices in Slovenia, January 2000 –September 2010						
	Principal component analysis					
	Without factor rotation		Maximum likelihood – Oblimin with Kaiser normalisation		Maximum likelihood – Varimax with Kaiser normalisation	
	Components		Components		Components	
variable	1	2	1	2	1	2
CPI	.988	-.099	.985	-.100	.791	.601
CPIEA	.977	.034	.977	.033	.692	.690
IPHIEA	.978	-.004	.977	-.005	.718	.664
IFB	.953	-.067	.951	-.068	.743	.600
IWHI	.782	.382	.791	.381	.313	.812
tourists	.387	.419	.397	.418	-.002	.570
IPPP	.986	-.051	.985	-.052	.756	.635
ISP	.984	-.103	.981	-.104	.790	.595
IFP	.852	.382	.861	.381	.363	.861
NEER	-.723	.554	-.709	.554	-.906	-.087
VR	.742	-.533	.729	-.534	.906	.115
IGP	.883	.333	.890	.332	.419	.845

Source: Author's calculation

Note: CPI – consumer price index. CPIEA – consumer price index in the euro zone.IPHIEA – index of prices in the hospitality industry in the euro zone. IFB – index of prices for food and non-alcoholic beverages. IWHI – index of wages in the hospitality industry. tourists – tourists arrivals. IPPP – index of product prices by producers. ISP – index of service prices. IFP – index of fuel prices.NEER – nominal effective exchange rate. VR – value added tax rate. IGP – index of natural gas prices.

To sum up, by using the principal component analysis, the hospitality industry prices increased when increased consumer prices (inflation), when increased the hospitality industry prices in the euro zone, when the euro appreciate, and when there is an increase in tourist demands. The higher VR offsets possible increases in the hospitality industryprices.

C. Regression analysis

A regressive technique on a time series data is used (Mele, 2010). For the explanatory (independent) variables of time series data it can be stated as follows: except for the VR,the autocorrelation is present.That is to say, it presents statistically significant positive autocorrelation coefficients of the first of at least second order (tourists).In most cases, it is at least until 12 orders. All autocorrelation coefficients are found to be with increasing delays of approximately geometric fall. The ACF shows that each of these time series data is statistically significant only in the first postponement. This combined with falling positive autocorrelation coefficients prolongs the delays in a signal that will have to be included in the regression model.Also the AR (Table 2) of the first order suggeststhe relationship in a favour to use the regression model. The original time series data model is of the first difference, except for the VR, that managed autocorrelationto eliminate from all variables.In similar way Čižmešija and Sorić (2010) expressed, that all variables are formally tested for unit root presence. They used the Augmented Dickey-Fuller (ADF) test. The results suggest that all series can be treated as *I(1)*, *i.e.* integrated of order one.Hence all following the VAR modelling will be conducted using variables in the first differences.

We focus on the Box-Jenkins approach for identification, estimation, diagnostic checking, and forecasting time-series (Bojnec and Gričar, 2011). The ARMA model can be viewed as a special class of the linear stochastic difference equations. By definitions an ARMA model is a covariance stationary.It has a finite and time-invariant mean and covariances. For the ARMA model to be stationary, the characteristic roots of the difference equation must lie inside the unite circle. Moreover, the process must have started infinitely far in the past or the process must always be in equilibrium. In the identification stage, the sample autocorrelations and the partial correlations are examined. A slowly decaying autocorrelation function suggests nonstationary behaviour. In such circumstances, Box and Jenkins (1976) recommended differencing the data (Table 2). Since the order of differencing is irrelevant for the IPHIEA, we can form the transformed sequence. Thus, we use the seasonal difference. The ACF and PACF results are presented in Table 2. The properties of these series are much more amenable to the Box-Jenkins methodology. The autocorrelation and partial autocorrelation for the first few lags are strongly suggestive of an AR(1) process. Recall that the ACF for an AR(1) process will decay and the PACF will cut to zero after lag 1.

TABLE 2. ARIMA MODEL

$X_t = \alpha X_{t-1} + \epsilon_t$; N=128					$(\Delta^d \Delta_s^D)$		$\alpha + \rho(L)y_t = \theta(L)e_t$			
Time Series	*ACF*		*PACF*		*ARIMA*[1]		*ACF*		*PACF*	
	a_1	a_{12}	a_1	a_{12}	(p,d,q) $(P,D,Q)_s$	R^2	a_1	a_{12}	a_1	a_{12}
CPI	.947	.694	.974	-.016	$(1,1,0)(0,0,0)_{12}$	0.31	.240	.384	.240	.314
CPIEA	.977	.740	.977	-.007	$(1,1,0)(0,0,0)_{12}$	0.72	.014	.072	.014	.069
IPHI	.984	.732	.984	-.034	$(1,1,0)(0,0,0)_{12}$	0.15	-.014	.072	.014	.069
IPHIEA	.976	.733	.976	-.008	$(1,1,0)(0,1,0)_{12}$	0.98	-.208	.128	-.208	.081
IFB	.975	.663	.975	.009	$(1,1,0)(0,1,0)_1$	0.77	-.555	.495	-.555	.007
IWHI	.897	.323	.897	.062	$(1,1,0)(0,0,0)_{12}$	0.11	-.375	.042	.240	.314
Tourists	.738	.893	.974	.553	$(1,0,0)(0,1,0)_{12}$	0.46	-.284	.827	-.284	.616
IPPP	.970	.680	.970	-.020	$(1,1,0)(0,0,0)_{12}$	0.23	-.330	.105	-.330	-.008
ISP	.976	.706	.976	-.037	$(1,1,0)(0,1,0)_{12}$	0.49	-.224	.549	-.244	.296
IFP	.970	.487	.970	-.007	$(1,1,1)(0,0,0)_{12}$	0.48	-.695	.028	-.695	.053
NEER	.938	.331	.938	-.007	$(1,1,0)(0,1,0)_{12}$	0.53	.611	.278	.611	-.044
VR	.957	.479	.957	-.029	$(0,0,0)(0,0,0)_{12}$	0.48	-.500	.000	-.500	-.077
IGP	.963	.526	.963	-.031	$(1,1,1)(0,0,0)_{12}$	0.09	-.642	-.222	-.642	-.071
K1	.971	.682	.971	-.022	$(1,1,0)(0,0,0)_{12}$	0.37	-.569	.232	-.569	.009
K2	.914	.380	.914	-.110	$(1,1,0)(0,0,0)_{12}$	0.61	-.602	.519	-.062	.016

Source: Author's calculation

Note: $(\Delta^d \Delta_s^D)$ – d. differencing. ARIMA model, where are ρlag y_t, Llag operator. θvalue, e_t random errors $\alpha + \rho(L)y_t = \theta(L)e_t \equiv Y_t = a_0 + \sum_{i=1}^{p} a\, y_{t-1} + \sum_{i=0}^{q} \beta_i\, \epsilon_{t-1} |\alpha| < 1$– stationary time series.CPI – consumer price index. CPIEA – consumer price index in the euro zone. IPHI – index of prices in the hospitality industry, IPHIEA – index of prices in hospitality industry in euro zone. IFB – index of prices for food and non-alcoholic beverages. IWHI – index of wages in the hospitality industry. Tourists – tourists' arrivals. IPPP – index of product prices by producers. ISP – index of service prices. IFP – index of fuel prices. NEER – nominal effective exchange rate. VR – value added tax rate. IGP – index of natural gas prices. K1 – principal component analysis first synthetic variable. K2 – principal component analysis second synthetic variable.q – nonseasonal ARMA coefficients. d – number of nonseasonal differences.P – number of multiplicative autoregressive coefficients. D – number of seasonal differences. Q – number of multiplicative moving average coefficients.s – seasonal period. R^2 – adjusted coefficient of determination.

For the time series of the IPHI we use the ARIMA model $(1,1,0)(0,0,0)_{12}$. With this model we get low Bayes information criteria (BIC) (-0.582), Q(18)=2.470 and significance level 1.000. The values for the ACF are a_1 0,984 and a_2 0,732 and for the PACF a_1 0,984 and a_2 -0,034. In that case we can say that our time series for the IPHI is stationary. We can also say that the CPI, IPHIEA, and IFP are stationary. Namely we find that the ACF and the PACF cuts to zero after lag. Model in Table 3 has been compared on the basis of statistical significance with the residual of Ljung-Box Q-statistic, the BIC information criterion and gives us the most stable time series model. Information criteria are statistical parameters which assessed benefits and costs from the integration of additional delay in the regression model. The BIC criterion is used to select the econometric model.

In addition to standard tests, the analyses of time series have a particular focus on the analysis of residuals. Q statistic for the analysis of residuals is in χ^2 distribution with m degrees of freedom equal to the number of lags. If the calculated Q exceeds a critical value, then Q reject a null hypothesis, which states that all autocorrelation coefficients are equal to zero simultaneously. Then accept the alternative hypothesis, which states that at least one autocorrelation coefficient is significantly different from zero.The sample autocorrelations and partial correlations of the suitability transformed data are compared to those of various theoretical ARIMA processes. The model is well-estimated as it has coefficients that imply stationarity and invariability, while fits of the data has residuals that approximate a white-noise process.

Therefore, by the multiple regression analysis is investigated the association between the dependent variable IPHI and the explanatory variables. In the regression estimation are included 126 monthly observations for the each variable (January 2000=100). Table 3 presents the regression results. The two synthetic variables (the two common components from the principal component analysis) are included in the multiple regression analysis as well. The value for F-test is greater than theoretical value for F distribution at the degree of freedom $m_1=k$ in $m_2=n-k-1$ at the degree of risk $\alpha=0.005$.

TABLE 3. REGRESSION ANALYSIS OF THE STATIONARY COMPONENTS

Dependent variable: diffIPHI					
	Constant	*diffCPI*	*diffIPHIEA*	*diffIFP*	*D2*
1	*0.491*	*0.283*	*0.678*	*-0.011*	*-1.500*
	(3.656)***	*(1.794)***	*(15.685)****	*(-1.908)***	*(-1.648)***
R^2	*0.678*				
D-W	*2.130*				
N	*126*				
F test	*66.759*				

Source: Author's calculation

Note: Lines name: 1 – regression analysis of ARIMA coefficients. diff – differenced variable(s). IPHI – index of prices in the hospitality industry. CPI – consumer price index. IPHIEA – index of prices in the hospitality industry in the euro zone. IFP – index of fuel prices. D2 – dummy variable after the euro adoption (D2=1 from March 2007 to December 2007, and 0 otherwise). R^2 – adjusted coefficient of determination. DW – Durbin–Watson statistic. N – degrees of freedom for residuals. *** significant at 1%. ** significant at 5%. * significant at 10%. t – statistics are in the brackets.

The adjusted coefficient of determination shows the high degree of the regression explanation by the specified variables. The expected positive/negative associations between the dependent diff IPHI variable and the individual explanatory variables are confirmed. As the most statistically significant are proved the following explanatory variables: diffICGSEA, diffCPI, diffIFP, and D2. The estimation results indicate that the hospitality industry prices in the euro zone represents the main determinantfor the prices in hospitality industry in Slovenia. Next is the inflation (consumer price index) and finally energy (fuel) prices.Those three variables alone explain more than a half of the variability in the hospitality industry prices in Slovenia since the year 2000.These results indicate that the price developments in the hospitality industry in Slovenia are determined by: first, the hospitality industry prices in the euro zone. This finding is inherent in the idea of creating a monetary union contributing to the convergence of prices in the member states towards a common European price level.

Second, after the euro adoption in Slovenia in January 2007, in March 2007 the hospitalitiy industry prices have significantly declined.These patterns in real price developments are important for marketers and managers for understanding of price competitiveness.

Third,the fuel pricesplay a significantrole in mitigating the level of the hospitality industry prices. All another investigated variables which are in the hospitality industry as input costs are rejected. This variables are IFB, IPPP, ISP and IGP.

To sum up the regression analysis results, the first and second findings confirm the *H1* that the overall macro-economic factors and macroeconomic shocks, domestic and external environment are important for the hospitality industry prices. We have not confirm the *H2*that the hospitality industry prices are significantly associated with demand for tourism services and with the appreciation of the domestic currency. The H3 is confirmed only with fuel prices as an input cost,but in a negative direction of the association sign.

VI. CONCLUSION

This paperhasused time series data to investigate pricedevelopments inthe hospitality industry in Slovenia by means of the multivariate statistical principal component analysis and by the econometric regression analysis of the transformed variables in the first differences. Different explanatory variables are specified in the models to explain the price developments in the hospitality industry in Slovenia during the last ten years.

The principal component analysisconfirms two common components, where the first component is called the general price level. The second component is a bipolar, while it shows a strong positive weights for the variables NEER and tourists and has a negative weight for the variable VR. We named it the demand for services in the hospitality industry.

The autocorrelation and regression models show that, after controlling for seasonal effects, four variables alone explain more than 60% of the variability in the hospitality industry prices in Slovenia since the year 2000. In the regression equation, ignoring the constant which has no economic meaning,we find a positive long-run relationship between the hospitality industry prices and fourexplanatory variables in the hospitality industry: hospitality industry prices in the euro zone, consumer price index (inflation), fuel prices, and dummy variable D2, which captures the period after the euro adoption in Slovenia. The first two coefficients and dummy variable have the expected sign. They indicate a positive association between the hospitality industry prices and the hospitality industry prices in the euro zone and domestic inflation level, but a negative association with the D2. The hospitality industry prices in hotels and restaurants after the euro adoption in Slovenia have significantly declined.However, we do finda negative impact of the fuel prices on the hospitality industry prices.

The hospitality industry prices have declined after the (macro)economic shock as revealed by the VR when using the principal component analysis and the dummy variable D2 when using the regression analysis as the econometric method for time series.

Among issues for the future research are to use the VAR and cointegration models on time series data analysis. In addition to the hospitality industry prices, this methodology can be used also for investigation of similar economic questions in other areas of market price analysis and other time series data analysis.

REFERENCES

Bernanke, B., J.Boivin, and P. Elias,(2005),"Measuring the Effects of Monetary Policy: A Factor-augmented Vector Autoregressive (FAVAR) Approach", *The Quarterly Journal of Economics*,120 (1):387–422.

Bojnec, Š., and S. Gričar, (2011), "Price Behaviour in Hospitality Industry in Slovenia during the Last Decade", *In: Marketing Challenges in New Economy, 22nd Cromar Congress*, Pula, Croatia.

Box, G.E.P., and G.M. Jenkins, (1976), *Time Series Analysis Forecasting and Control*, (San Francisco: Holden-Day).

Čižmešija, M. and P. Sorić, (2010), "Assessing Croatian GDP Components via Economic Sentiment Indicator", *Ekonomska istraživanja*, 23 (4): 1–10.

Činjarević, M., K. Tatić, and A. Avdić, (2010), "An Integrated Model of Price, Service Quality, Satisfaction and Loyalty: An Empirical Research in the Banking Sector of Bosnia and Herzegovina", *Ekonomska istraživanja*, 23 (4): 142–160.

Eurostat, (2011), http://epp.eurostat.ec.europa.eu/portal/page/portal/statistics/search_database.

Forni, M., M. Hallin, M. Lippi, and L. Reichlin,(2000),"The Generalized Dynamic-Factor Model: Identification and Estimation", *The Review of Economics and Statistics*, 82:540–554.

Gričar, S., and Š. Bojnec, (2009), *Dejavniki gibanja cen v gostinstvu*, (Koper: Fakulteta za management).

Hendry, D., and B. Nielsen,(2007),*Econometric Modelling*,(New Jersey: Princeton University Press).

Juselius, K., (2003),*Wage, Price, and Unemployment Dynamics and the Convergence to Purchasing Power Parity in the Euro Area*, (Institute of Economics, University of Copenhagen).

Krušec, D., (2007),"Short Term Inflation Projections for Slovenia: Comparing Factor Models with AR and VAR Models", *Prikazi in analize*, 14 (1):57–76.

Luetkepohl, H., and X. Fang,(2011),"Forecasting Annual Inflation with Seasonal Monthly Data: Using Levels versus Logs of the Underlying Price Index",*Journal of time series econometrics*, 3(1):1–21.

Mele, M., (2010), "A Time Series Approach on the Chinese Exchange Rate Regime", *Ekonomska istraživanja*, 23 (3): 1–11.

SORS (2011), "Statistical Yearbook 2011". Ljubljana: Statistical Office of the Republic of Slovenia.

Šugar, V., and M. Tikvicki, (2011), "Entrepreneurship vs. Ecopreneurship – Integrated Approach to Housing", *In: Enterpreneurship and Macroeconomic Management: Reflections* *on the World in Turmoil, 5th International Scientific Conference*, ed. Rakitovac, K.A., V., Šugar, and V., Bevanda, Pula, Croatia, March 24–26, 1546–1569.

Uravić, L., and V. Šugar, (2009), "Tourist destination – standards, stars and quality; from myths and delusions to the reality", *Ekonomska istraživanja*, 22 (3): 111–127.

Verhoeven, J.W.M., T.J.L. Rompay, and A.T.H. Pruyn, (2009): "The Price Fasade: Symbolic and Behavioral Price Cues in Service Environments", *International Journal of Hospitality Management*, 28:604–611.

Xavier, I., N. Jyrki, and L. Xing, (2001), "Determinants of Food Price Inflation in Finland", In: *EAAE 2011 Congress Change and Uncertainty; Challenges for Agriculture, Food and Natural Resources*, Zürich, Switzerland, 1–12.

Yang, C., L. Cheng, and G. Withiam,(2009),"Strategic-Pricing Policy Based on Analysis of Service Attribute",*Cornell Hospitality Quarterly*, 50 (4):498–509.