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Abstract

Exchange rates can be considered as one of the important determinants in tourism demand analysis especially at the national level, although sensitivity of demand to exchange rate changes may also vary by destination. The main goal of this paper is to compare the impact of changes in nominal exchange rates on the number of visitors from Eurozone countries in two specific destinations: Croatia, representing a Southern Europe/Mediterranean, predominantly 'sun and sea' destination and the Czech Republic, as a Central and Eastern European country and a typical cultural destination. A generalized linear model was used for data analysis and hypothesis testing. This paper identifies relationship between seasonally cleaned changes in the number of incoming tourists from Eurozone and average changes in monthly nominal exchange rate lagged between one and twelve months. The results show that there are significant differences in sensitivity of international tourism demand from Eurozone to changes in exchange rate between Czech Republic and Croatia and that delays in reaction to such changes are as expected different as well. The findings could improve short term forecasting of tourism demand as well as marketing targeting of destination management organization (DMO) activities. The results of this study can be practically used by National Tourism Organizations (NTOs) for marketing activities, because it is possible to reveal the tourists' behaviour from the source markets point of view. These findings, based on secondary data, could be used as a support tool for destination marketing, partially instead of primary data collection within the source markets.

Key words: destination marketing; exchange rate; exchange rate changes; tourism demand; Croatia; Czech Republic

Introduction

Explaining and understanding factors that influence international tourism demand are necessary for destination management and planning. Marketing oriented approaches to such explanations typically distinguish between the macro and micro environments (Ritchie & Crouch, 2003) and provide both categorizations of included factors as well as methods on how to analyse their impact. Without any doubt, amongst macro-environment factors that could significantly influence international tourism demand are currency exchange rates, which represent an important determinant in tourism demand analysis in many destinations, especially at the national level.

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In comparison with other macro-environment factors, exchange rates may be subject to volatility in relation to a number of factors including trade and investment flows, inflation, political influences or security situation. From a tourism perspective, their effect is also twofold as they influence both incoming as well as outgoing and domestic tourism. Nevertheless, because exchange rates have a direct impact on tourists' costs, their analysis and impact assume greater importance.

The main objective of this study is to contribute to the discussion about the impact of exchange rates on international tourism demand, as measured by tourist arrivals, on the one hand. On the other hand, this study aims to suggest ways of analysing and identifying the relationships between exchange rates and tourism demand from respective source markets (Eurozone), as measured by the number of foreign guests in accommodation establishments in the Czech Republic and Croatia. The results of this study have practical implications and can be used by National Tourism Organizations (NTOs) for marketing planning, targeting and communication, as they reveal the tourists' behaviour from the source markets point of view. These findings, based on secondary data, could be used as a support tool for marketing communication and campaigns planning, partially instead of expensive primary data collection within the source markets, which is a unique contribution.

Literature review

Modelling of exchange rate policies and relationships with trade and tourism is a topic of interest in a steady stream of research studies (Chaudhary, Hashmi & Khan, 2016; Meng, 2015). Exchange rates can also be considered as one of the important determinants in tourism demand analysis in many destinations especially at the national level (Yap, 2013). The sensitivity of demand to changes of exchange rates might also vary by destination. For example, a devaluation in the less developed countries is likely to have only little impact on demand (Crouch, 1995) and tourists often use exchange rates to compare the price of a holiday, not only in foreign destinations, but also with the price of a domestic holiday (Yap, 2013). That is why exchange rate is employed as an essential variable for measuring, modelling and forecasting of tourism demand.

Tourism demand and seasonality

Tourism demand refers to the willingness and ability of consumers to buy different amounts of a tourism product at different prices during any one period of time. Tourism demand, both domestic as well as international, is influenced by a range of price and non-price factors. Among the others, we can mention the size of the market (population), income, advertising and promotion, seasonality, product availability, buyer expectations of future prices, prices of substitute and complementary products, the amount of leisure time available and other factors such as special events, immigration level of random shocks (Dwyer, Forsyth & Dwyer, 2010). Along with the phenomenal growth in demand for tourism in the world over the past two decades is a growing interest in tourism research (Song & Li, 2008). The need for accurate forecasts of tourism demand to assist managerial and marketing decision making in tourism destinations is well recognised (Witt & Witt, 1995).

Tourism demand is essentially measured by tourist arrivals, the international tourism demand by international tourist arrivals from the major origin countries (Song & Li, 2008; Song & Witt, 2006). That is why several types of time series methods for tourism demand forecasting have been used. Time series analysis can be a valuable tool for tourism forecasters at the beginning of a forecasting project. It allows the forecaster to view trends in visitor behaviour, both long-term and cyclical. Using various methods and comparing several models it is possible to capture these trends to predict the number

of visitor arrivals (Burger, Dohnal, Kathrada & Law, 2001; Kulendran & King, 1997; Kulendran & Witt, 2003; Nelson, Dickey & Smith, 2011).

Tourism demand modelling and forecasting research relies heavily on secondary data in terms of model construction and estimation (Song & Li, 2008). The tourism demand models in published studies vary, but they can be basically divided into two groups. The first group focuses on univariate modelling approaches and the second group concentrates on multivariate modelling (econometric) techniques (Garín-Muñoz, 2006). The second group is more useful for policymaking and evaluation because these methods enable at least particular analyses of the factors, such as exchange rates, that influence tourism demand.

To find out the real picture about the impact of exchange rate on international tourism demand and destinations, it is necessary to remove the influence of other significant external factors, especially the seasonal component.

Seasonality is one of the most significant characteristics of tourism and has a notable impact on many aspects of tourism economy. Seasonality in tourism is a general characteristic, that appears in various ways in almost all countries and destinations in the world (Goh & Law, 2002; Koc & Altinay, 2007). Understanding and accurately measuring the effect of seasonality on tourism demand is essential not only for the efficient operation of tourism facilities and infrastructure, but also for destination managers, marketers and policy makers, as well as for tourism researchers and forecasters (Chan & Lim, 2011; Koc & Altinay, 2007).

In a tourism context, seasonality is usually defined under two categories - natural and institutional. On the one hand, the natural type of seasonality is related to regular and recurring temporal changes in natural phenomena at a particular destination, which are usually associated with climate, season of the year, precipitation, wind and daylight. On the other hand, the institutional type of seasonality is the result of religious, cultural, ethnic, and social factors such as industrial holidays and especially summer school vacations. Seasonal variations in tourism activity can result in several negative effects on the tourism destination and its economy (Koc & Altinay, 2007). However, the problem of identifying seasonal patterns in tourism demand accurately remains as one of the most important considerations in tourism research (Chan & Lim, 2011).

A seasonal series can be stationary or nonstationary and the seasonality might be understood as deterministic, if seasonal patterns remain constant over time, or stochastic, if seasonal pattern varies over years (Goh & Law, 2002; Hylleberg & Mizon 1989; Koc & Altinay, 2007). Traditionally, this is dealt with the decomposition of time series usually into trend (T), seasonal (S), cyclical (C) and irregular (I) components. One of the aims of the decomposition is to remove, among others, the seasonal component to obtain a clear picture of the national economy. However, the cyclical component is generally incorporated into the trend component. In fact, both the trend and seasonal components can also be divided into two categories: deterministic and stochastic (Koc & Altinay, 2007). One way of capturing seasonality is to include seasonal dummies in the regression (Goh & Law, 2002; Koc & Altinay, 2007), but other alternatives on how to analyse the seasonal patterns of tourism may be spectral analysis (Chan & Lim, 2011), moving averages, filters, and ARIMA methodology (Koc & Altinay, 2007). In the case of regression analysis, which is considered a conventional approach, a seasonal time series is regressed on a deterministic time trend and deterministic seasonal dummy variables. This method is appropriate only when a series contains deterministic components (Koc & Altinay, 2007). The parameters of the dummies are used to describe and give more information about seasonal fluctuations and seasonal

effects on the dependent variable. The description of the parameter is accurate under the assumption that the seasonality is implicitly deterministic (Goh & Law, 2002) and the regression-based model tends to generate superior forecasts only in case of truly deterministic seasonality (Kim & Moosa, 2001). However, recent studies have found that seasonality in international tourist arrivals is more likely to be stochastic than deterministic (Kim & Moosa, 2001).

The impact of exchange rates on tourism demand

The exchange rate between domestic and foreign currencies is one of the most important factors of the economic environment and can have a significant impact on international economic relationships, including tourism (Chaudhary, Hashmi & Khan, 2016). The study of exchange rates and its relationship with different variables has gained considerable importance over the last few decades (Chaudhary et al., 2016; Cheng, Kim & Thompson, 2013; Lee & Jang, 2011; Meng, 2015). It becomes a critical issue for professionals as well as researchers, especially in developing countries, because many developing countries brought a shift in their exchange rate policy from a fixed to a floating exchange rate system.

Tourism is very vulnerable to external economic factors, such as GDP growth, unemployment, price levels or exchange rates. This vulnerability causes complexity and challenges at the destination management level and policy implications (Ghadban, 2014; Nasir, Junjie & Guerrero, 2015). If a country's currency devalues, international tourism for its residents becomes more expensive, but for foreign visitors the holidays or business trips become cheaper. From an international point of view, devaluation should result in increased inbound tourism and decreased outbound tourism (De Vita & Kyaw, 2013; Cheng et al., 2013; Nasir et al., 2015), as well as preference of locals choosing domestic tourism (Yap, 2013). The significant impact of exchange rate on tourism was confirmed especially on the survival of businesses in this sector (Ghadban, 2014).

Nasir et al. (2015) take into account that being a member of the Eurozone neutralises the effect of exchange rates when considering tourism from other Eurozone countries. However, belonging to the Eurozone and using the Euro as the national currency, would help countries to sustain their economic situation in the tourism market (Ghadban, 2014).

Exchange rates are significant determinants of tourism demand. There are two main approaches on how the impact of exchange rates on tourism demand has been examined in previous research. The first approach aims at examining the volatility of exchange rates and its impact on the travel and tourism industry (Agiomirgianakis, Serenis & Tsounis, 2015; De Vita & Kyaw, 2013; Dincer, Dincer & Ustaoglu, 2015; Chang et al., 2013). The second approach focuses on the long-term impact of exchange rates on domestic and international tourism flows (De Vita, 2014; Gil-Pareja, Llorca-Vivero & Martínez-Serrano, 2007; Yap, 2013). However, De Vita and Kyaw (2013) claim that the inclusion of exchange rates into equations of tourism demand is fairly intuitive.

Recent studies use different approaches for including exchange rates in relation to how destination price levels can be recognized in. A number of these studies modelled the effect of exchange rates on demand separately from the effect of destination prices (Kim & Lee, 2017), but as other authors conclude (De Vita & Kyaw, 2013; Dogru, Sirakaya-Turk & Crouch, 2017; Witt & Witt, 1995), the inclusion of exchange rates and prices into the tourism demand equation as exclusive components can be misleading. The reason for modelling the effect of exchange rate separately is based on the fact that tourists may respond differently. The basis for this reasoning is that tourists are more aware of exchange rates when selecting a destination than they are of local currency prices in the destination (Crouch, 1995). Another approach takes into account that both exchange rates and price level should

be considered as one 'exchange rate effective price variable' (De Vita & Kyaw, 2013) which measures price competitiveness (Dwyer, Forsyth & Rao, 2000).

Studies of the impact of the exchange rates on the tourism demand are essentially based on regression models or autoregressive modelling. These approaches are used to examine exchange rates as an economic factor which may affect tourist flows in domestic and international tourism (Agiomirgianakis et al., 2015; De Vita, 2014; De Vita & Kyaw, 2013; Dincer et al., 2015; Yap, 2013).

For example, Yap (2013) used panel generalized least squares models. An empirical methodology used by Agiomirgianakis et al. (2015) relies upon the theory of cointegration, error correction representation of the exchange rate volatility measures using the autoregressive distributed lags (ARDL) modelling.

De Vita (2014) used system generalized methods of moments (SYS-GMM) estimation for tourist arrivals and Dincer et al. (2015) examined real effective exchange rate volatilities impact on tourism using a simple regression model, ADF unit root test and Johansen co-integration analysis.

A reliable simple regression model requires a high R-squared value with no serial correlation and no heteroscedasticity in the residuals, showing a normal distribution of residuals. To assess whether the results are robust against heteroscedasticity (unequal variances of errors) and auto-correlation, proper diagnostic tests before and after running the regression analysis should be carried out (Nasir et al., 2015).

For instance, De Vita and Kyaw (2013) tested alternative exchange rate volatility measures by the standard deviation, in a first step, whereas they used a generalised autoregressive conditional heteroscedasticity (GARCH) model, in the second step. Finally, they tested for a variance volatility measure. The standard deviation volatility measure appeared to exert a positive effect on tourism, which was not meaningful. The sign of the relative cost variable turned positive in the regression model that includes the GARCH measure, and the estimated coefficient was not significant. The regression including the variance volatility measure, on the other hand, indicated a statistically significant and intuitively coherent unfavourable effect.

Yap (2013) investigated whether exchange rates have significant impacts on domestic travel demand. From the empirical findings, she has shown that exchange rates influenced Australian residents' decisions about travelling. In fact, she has found that the appreciation of the Australian dollar had significant impact on numbers of business and outbound travellers.

Agiomirgianakis et al. (2015) found that exchange rate volatility is a contributing factor to tourist arrivals. Both the moving average and the high and low measures of volatility have been proven to have a significant effect on tourist arrivals. According to these results the authors conclude that not only researchers, but also policy makers, should pay attention to exchange rates when implementing policies designed to stimulate tourism.

Other interesting results reported by De Vita (2014) indicate a significant effect of exchange rate regimes on inbound tourism flows in OECD and non-OECD countries. The findings are of considerable significance since they identify multiple exchange rate regime effects and support the importance of maintaining a relatively stable exchange rate to attract tourist arrivals. According to De Vita (2014) the effect of a common currency has significant impact on the volume of international tourist arrivals. Membership in a currency union also promotes tourist arrivals from countries fixing or floating their currency.

Lee and Jang (2011) found out that exchange rate exposure for tourism-related firms is nonlinear, asymmetric and lagged. The evidence of their research implied that several tourism-related firms are passive regarding their exchange rate exposure and may face financial burdens caused by demand fluctuations.

Crouch (1995) claims that the exchange rate elasticity of demand for travel to Northern Europe is significantly lower than that for Southern Europe/Mediterranean, that is, the demand for 'sea and sun destinations' is likely to be more price sensitive.

Most of the above mentioned studies show that exchange rates have a significant impact on the travel and tourism industry and a variety of different methodological approaches can be applied to analyse the impact. The findings also show that we can observe the impact not only in international tourism, but that the depreciation of a domestic currency can also support domestic tourism within the home country.

Tourism destination marketing

We can consider the tourism destination from many points of view - a geographical unit, an open dynamic system or a product in the tourism market. If we take into account the marketing point of view, the tourism destination as a product is composed of wide range of other products and services (Buhalis, 2000).

Tourism destinations represent products over which the producers have not the total control. The product is made up of a combination of government, large and small enterprises and natural environment (Bennett, 1999). The following tools can be applied for successful destination marketing in the 21st century: (1) work in partnership, (2) remove any bureaucratic ethos, (3) bring environmental and social development responsibility to the product, (4) ensure a strong linkage between the message and the product (Bennett, 1999). In connection to the abovementioned tools, it is important to point out one another contemporary trend. Nowadays, nearly all destinations are facing new challenges and can easily end up in such a crisis caused by e.g. natural disasters, wars, epidemics or economic situation, which can have an impact on their marketability (Beirman, 2002).

Based on the requirements of today's tourist, destinations should also focus more on the market and respond quickly to customer needs. Destination marketing should include a clear positioning of a destination based on available resources and core competencies to offer the visitor an authentic and unique experience (Pechlaner, Fischer, Hammann & Adam, 2006).

Destination marketing is increasingly becoming extremely competitive worldwide. Approaching the right target market and providing the most appropriate combination of local tourism products and services is key to becoming a successful destination (Buhalis, 2000).

Marketing oriented approaches typically distinguish between the macro and micro environments (Ritchie & Crouch, 2003). In this regard, currency exchange rates represent an important economic factor of marketing within the macro-environment of many tourism destinations.

Methodology

The main goal of this research study is to compare the impact of changes of nominal exchange rate on the number of visitors from present Eurozone countries in two specific destinations – Croatia, representing Southern Europe/Mediterranean predominantly 'sun and sea' destination, and the Czech Republic, as a Central and Eastern European (CEE) country and a typical cultural destination.

The following hypotheses, drawn from general economics and existing literature theories are tested in this paper:

H1: With the appreciation of Czech Crown (CZK) and Croatian Kuna (HRK), international tourism demand from the Eurozone in both countries decreases.

H2: The sensitivity of international tourism demand from Eurozone to changes of exchange rate is lower in the Czech Republic (as a cultural destination) than in Croatia (as a 'sun and sea' destination).

H3: The impact of average changes in monthly exchange rate on the number of guests from the Eurozone is lagged.

H4: The lag of the impact of changes of monthly exchange rates on the number of guests from Eurozone differs between the Czech Republic (as a cultural destination) and Croatia (as a 'sun and sea' destination).

Hypothesis H1 was derived from empirical research studies (De Vita & Kyaw, 2013; Cheng et al., 2013; Nasir et al., 2015) that claimed if a country's currency devalues, the holidays or business trips become cheaper for foreign visitors, and vice versa, but according to Crouch (1995) in less developed countries, changes of the exchange rate could have only little impact on demand (Crouch, 1995). For the purpose of this research we regarded the Czech Republic and Croatia as developed countries, which is why we expected significant impact of exchange rates on international tourism demand.

Hypothesis H2 was derived from the assumption that exchange rate elasticity of demand for travel to Northern Europe is significantly lower than that for Southern Europe/Mediterranean, as according to Crouch (1995) the exchange rate elasticity of demand for 'sea and sun destinations' seems to be more price sensitive. In our case this is even more likely because there are other existing competitive destinations for Eurozone tourists within the Eurozone (Italy, Spain etc.) that are easily available and without any exchange rate influence due to the use of the Euro. From that perspective, the difference between sensitivities of demand to exchange rates can assist in filling in the gap in current knowledge within this area of research. To the best of the authors' knowledge, there is no evidence of similar recent analyses and comparisons in the Czech Republic and Croatia.

We expected that the reaction of potential visitors to changes in exchange rates would be lagged (H3) due to the need for holidays to be planned in advance, either by individuals or by tour operators. Because tourists are making their decisions based on the typical length of a holiday, the type of destination and the proportion of individual tourism differs for both countries, differences in the lag (H4) may also be expected.

To answer the research question and hypotheses, the following methodology has been used. At first, we collected data about incoming tourists from Eurozone to the Czech Republic (Czech Statistical Office, 2017) and Croatia (Republic of Croatia-Croatian Bureau of Statistics, 2006-2015). The data for both countries are available in monthly periods and a reliable time series commences in January 2012 and finishes in December 2016. Then, for the one year longer period starting in January 2011, average monthly exchange rates CZK/EUR (Czech National Bank, 2003-2017) and HRK/EUR (OANDA Corporation, 1996-2017) were collected to supplement the time series.

Because each month has a different number of days, the average numbers of incoming tourists per day were subsequently calculated for each month.

Both time series of numbers of incoming tourists from Eurozone as well as exchange rates were further transformed to get unitless proportional changes between consecutive months using the following formula:

$$\frac{V_t}{V_{t-1}} - 1 \quad (1)$$

where V means value and t means a particular time period, that is, a month. As is clear from the formula, this calculation reduces the overall time series length by one. This was not a problem with the exchange rates because the time series was 12 months longer, but for the time series of changes in incoming tourist numbers the first value from January 2013 was used also for January 2012 to compensate for missing data. We checked that the values due to high seasonality were very similar and thus the overall error could be ignored. This transformation ensured that the time series became stationary as was also statistically tested by augmented Dickey-Fuller test and KPSS test.

The next step was to remove seasonality from the time series of incoming tourists. We used a robust method of seasonal decomposition of time series by Loess (Cleveland, Cleveland, McRae & Terpenning, 1990) and only the resulting cleaned time series were used for the following calculations.

To find out whether time series of incoming tourists is autocorrelated, ACF and PACF graphs were used. In both cases they showed significant autocorrelation and thus also one month lagged value was used later in analysing relationships.

For the analysis and hypothesis testing, generalized linear model (GLM) was used. We wanted to identify the relationship between seasonally cleaned change in number of incoming tourists from Eurozone and the average nominal monthly exchange rate changes lagged between one and twelve months. Because the autocorrelation was present in the incoming tourists time series, also one month lagged value was also included in the GLM formula.

Both GLMs used the same structure of equation:

$$\begin{aligned} \Delta SAIT_t \sim & \text{Intercept} + \Delta ER_{t-1} + \Delta ER_{t-2} + \Delta ER_{t-3} + \Delta ER_{t-4} + \Delta ER_{t-5} \\ & + \Delta ER_{t-6} + \Delta ER_{t-7} + \Delta ER_{t-8} + \Delta ER_{t-9} + \Delta ER_{t-10} + \Delta ER_{t-11} \\ & + \Delta ER_{t-12} + \Delta SAIT_{t-1} \end{aligned} \quad (2)$$

where $\Delta SAIT$ represents the change of seasonally adjusted incoming tourists number, ΔER means the change of exchange rate and t is time, that is, a month.

The results of the GLM were further tested for heteroscedasticity (Breusch-Pagan test) and in the case of the Czech Republic, more robust inference statistics using White-corrected covariance matrix had to be used to compensate for that. Further test showed no problems with autocorrelation in the resulted model (Breusch-Godfrey test) and also value inflation factors were, in all cases, below 2. All the calculations were made in R Statistical Package 3.4.1 (R Core Team, 2017).

Empirical data and analysis

The final generalized linear models for the Czech Republic and Croatia and the comparison of the results of both models are provided in the next section. Eurozone guests create a significant part of international tourism demand in both countries. Later in the paper we present the impact of change of nominal exchange rates to the number of Eurozone guests in both the Czech Republic and Croatia.

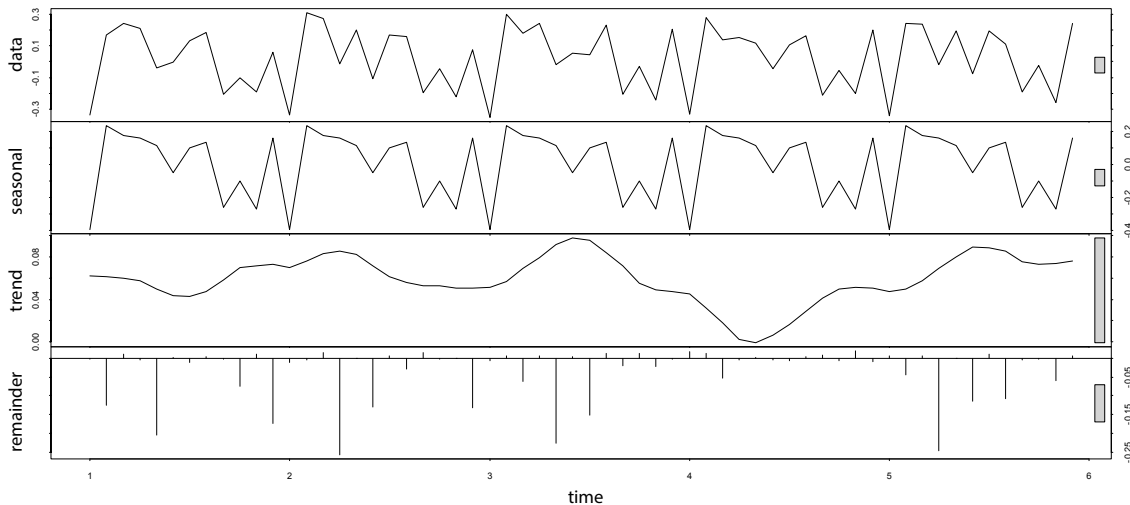
Eurozone guests in the Czech Republic

As a source market the Eurozone represented nearly 24% of all international guests in the Czech accommodation establishments in 2016 (Czech Statistical Office, 2017). Although the Eurozone countries are quite diverse – from several neighbouring countries to more distant ones, from economic perspective some countries are more developed than others – we can assume that due to the same currency exchange rates would play a similar role.

International guests generally travel to the Czech Republic individually (89%). Only 11% of international guests travel to the Czech Republic through organized visits via foreign tour operator (STEM-MARK, 2017). We consider the Czech Republic as a cultural destination, that is, the main reason for international guests' visits is a connection with cultural and historical heritage, sightseeing and cultural events. The average length of stay of foreign guests in the Czech accommodation establishments is 2.6 nights in 2016 (Czech Statistical Office, 2017). These facts can further explain some of the results.

For the analysis, time series of change in number of guests incoming from Eurozone was first broken up to the seasonal, trend and remainder components as shown at Figure 1. The seasonal component clearly explains a lot of this time series variation but it is mainly related to other than exchange rate factors. So, for the further analysis, only seasonally adjusted time series was used (i.e. sum of trend and remainder components).

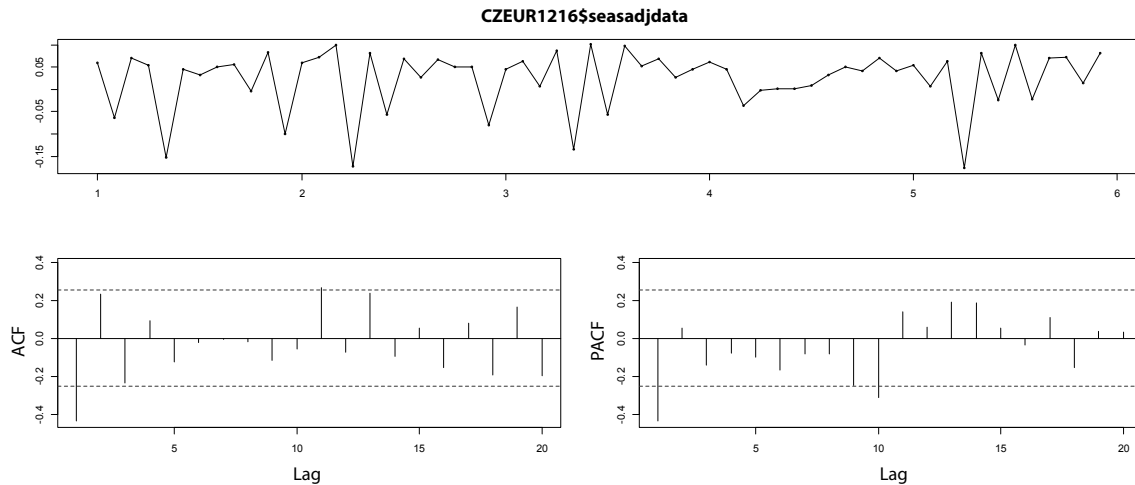
Figure 1
Change in number of guests in accommodation establishments, seasonal effect, trend and remainders (Czech Republic)



Source: Authors' calculations

The seasonally adjusted data and the results of the autocorrelation test are shown at Figure 2. Negative significant autocorrelation is visible for lags 1 and 10 which means that the change in number of guests is dependent on previous values of the same variable.

Figure 2
Seasonally adjusted data and autocorrelation test ACF, PACF (Czech Republic)



Source: Authors' calculations

After these data adjustments and preliminary analysis, it was possible to use the generalized linear model to calculate estimated effect of different lagged exchange rate changes on the number of incoming tourists from Eurozone.

As can be observed in Table 1, from all the examined exchange rate lagged effects, the highest estimated statistically significant effect has been found for the % change CZK/EUR_{t-2}, that is, the change in the exchange rate between months 2 and 1 prior to the visit. We can thus assume that the majority of prospective Eurozone guests to the Czech Republic would plan and decide about their trips 2 months ahead. The effect of 1% appreciation of CZK/EUR exchange rate is within 95% confidence interval between -3.167% and -0.222% with the middle value of -1.694%. In other words, we can expect that in response to an exchange rate appreciation, the change in numbers of incoming tourists will consequently decrease by factor of 0.222 to 3.167.

Table 1
The effects of exchange rate (ER) appreciation by 1% on the change in number of incoming guests from Eurozone (Czech Republic)

GLM coefficients	Estimated effect of 1% exchange rate appreciation	Standard error of the estimate	Statistical significance (p-value)
Intercept	0.0364895	0.0092631	8.175e-05 ***
% Change CZK/EUR _{t-1}	0.3597625	0.7267499	0.62058
% Change CZK/EUR _{t-2}	-1.6942518	0.7512050	0.02411 *
% Change CZK/EUR _{t-3}	0.3587233	0.8243339	0.66344
% Change CZK/EUR _{t-4}	-0.3550336	1.2035229	0.76800
% Change CZK/EUR _{t-5}	0.2908389	0.7747507	0.70737
% Change CZK/EUR _{t-6}	-0.4488556	1.1156345	0.68744
% Change CZK/EUR _{t-7}	-1.5431356	1.0855485	0.15516
% Change CZK/EUR _{t-8}	0.1386484	0.8519206	0.87072
% Change CZK/EUR _{t-9}	-1.0045296	0.7150546	0.16007
% Change CZK/EUR _{t-10}	1.2468714	0.7260573	0.08592 .

Table 1 Continued

GLM coefficients	Estimated effect of 1% exchange rate appreciation	Standard error of the estimate	Statistical significance (p-value)
% Change CZK/EUR _{t-11}	0.9468779	0.6322896	0.13425
% Change CZK/EUR _{t-12}	-0.1070328	0.6833324	0.87553
Seasonally adjusted lag 1	-0.4753030	0.1176565	5.351e-05 ***

Standard errors and p-values were estimated using White-corrected covariance matrix due to heteroskedasticity in the GLM. Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
Source: Authors' calculations

The % change CZK/EUR_{t-10}, that is, in the period of 10 months before the visit is also statistically significant, but only on $\alpha = 0.1$. Surprisingly, the model here shows the opposite estimated effect to what was expected, that is, an appreciation in the exchange rate leads to an increase in the change of number of incoming Eurozone guests. This finding could be explained in several ways. One explanation may be in the limitations of the model, because the estimate within 95% confidence interval would be between -0.176 and 2.667. Put differently, the time series could be insufficient and the real effect may be as well zero or negative as expected. Another possible explanation may be that an expectation of further future exchange rate appreciation could increase demand for the following year's holiday bought with present exchange rates and prices.

Amongst other statistically significant coefficients is the intercept showing a steady trend of increasing change in numbers of incoming Eurozone guests and a negative effect of seasonally adjusted lag of 1 month in the change in numbers of incoming Eurozone guests.

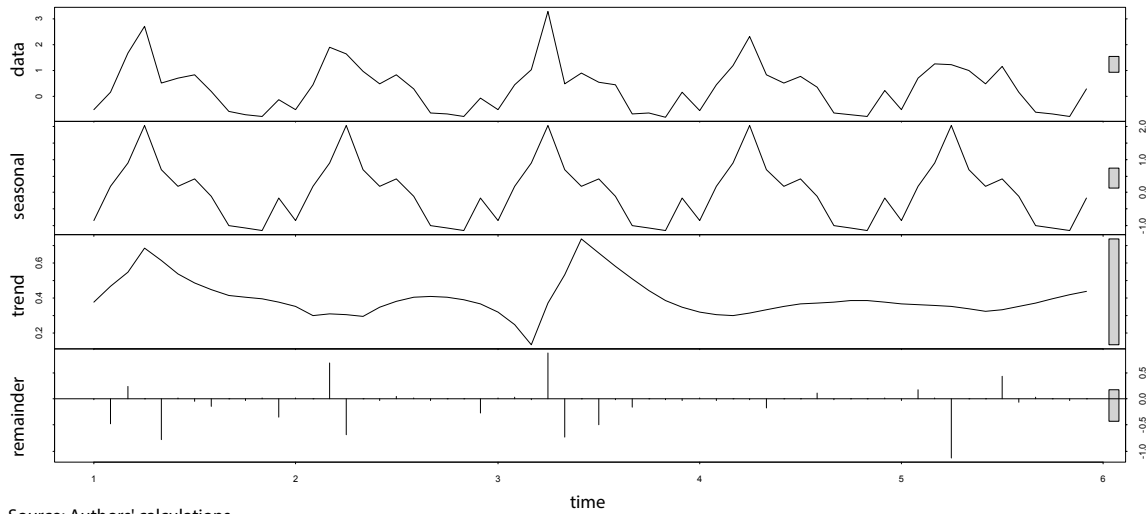
These results partially confirm our hypothesis H1 that with the appreciation of the Czech Crown, the number of guests of the Czech Republic from the Eurozone decreases. The results also show that in case of the Czech Republic, the impact of changes of the month-on-month exchange rate is shown on the resulting change in number of guests from the Eurozone with delayed effect. In the case of the Czech Republic this partially confirms hypothesis H3. The results show the statistically significant lag of the impact of exchange rate changes especially in the case of CZK/EUR_{t-2}.

Eurozone guests in Croatia

In the case of Croatia, Eurozone guests are a more significant source market than in the Czech Republic. In 2016, Eurozone guests represented more than 57% of international guests in Croatian accommodation establishments. International guests generally travel to Croatia individually (66%), but the ratio of individual travel is not as high as in the case of the Czech Republic. Altogether 34% of international guests travel to Croatia on organized visits via tour operators (Croatia Ministry of Tourism, 2016). We consider Croatia as a 'sun and sea' destination, that is, the main reason for the visit of international guests is connected with activities on the sea side, relaxation, water sports, yachting or cruising. The average length of stay of foreign guests in the Croatian accommodation establishments is 5.2 nights in 2016 (Republic of Croatia-Croatian Bureau of Statistics, 2006-2015). In the case of Croatia these facts can also further particularly explain the results.

Analogically as in the case of Czech Republic, time series of change in number of guests incoming from Eurozone was first broken up to the seasonal, trend and remainder components as shown at Figure 3. The seasonal component again clearly explains a lot of this time series variation but it is mainly related to other than exchange rate factors. So, for the further analysis, only seasonally adjusted time series was used (i.e. sum of trend and remainder components).

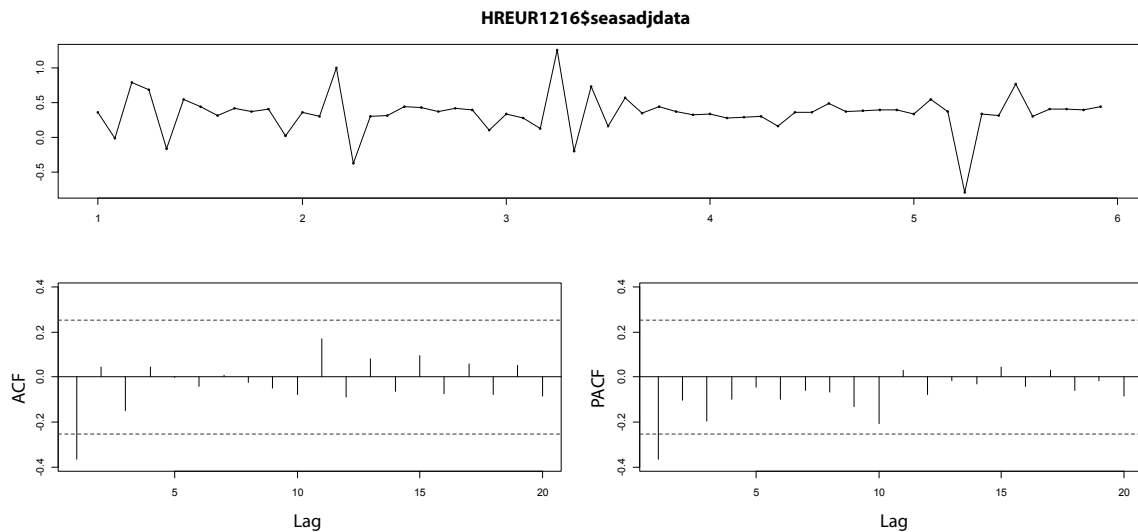
Figure 3
Change in number of guests in accommodation establishments, seasonal effect, trend and remainders (Croatia)



Source: Authors' calculations

The seasonally adjusted data and the results of the autocorrelation test are shown in Figure 4. Negative significant autocorrelation is visible for lag 1, only, which means that the change in number of guests is dependent on previous values of the same variable.

Figure 4
Seasonal adjusted data and autocorrelation test ACF, PACF (Croatia)



Source: Authors' calculations

After these data adjustments and preliminary analysis, it was possible to use the generalized linear model to calculate estimated effect of different lagged exchange rate changes on the number of incoming tourists from Eurozone.

From all the examined exchange rates, the highest estimated statistically significant effect has been found for the HRK/EUR_{t-7} , that is, seven months before the visit. One can thus assume that the majority of

prospective guests of Croatia would plan and decide about their trips 7 months ahead. The effect of 1% appreciation of HRK/EUR exchange rate is within the 95% confidence interval between -40.163% and -0.688% with the middle value of -20.426%. In other words, we can expect that in response to an exchange rate appreciation, the change in numbers of incoming tourists will consequently decrease by a factor of 0.688 to 40.163.

Table 2
The effects of exchange rate (ER) appreciation by 1% on the change in number of incoming guests from Eurozone (Croatia)

GLM coefficients	Estimated effect of 1% exchange rate appreciation	Standard error of the estimate	Statistical significance (p-value)
Intercept	0.48573	0.06027	2.83e-10 ***
% Change HRK/EUR _{t-1}	-0.31690	10.27483	0.97553
% Change HRK/EUR _{t-2}	13.65795	9.58610	0.16112
% Change HRK/EUR _{t-3}	13.83836	10.45266	0.19222
% Change HRK/EUR _{t-4}	-8.57863	10.08152	0.39932
% Change HRK/EUR _{t-5}	-14.00288	10.17152	0.17542
% Change HRK/EUR _{t-6}	11.34310	9.61410	0.24426
% Change HRK/EUR_{t-7}	-20.42573	10.07016	0.04847 *
% Change HRK/EUR _{t-8}	7.65157	10.58726	0.47359
% Change HRK/EUR _{t-9}	1.23012	10.24533	0.90497
% Change HRK/EUR _{t-10}	15.11195	9.82625	0.13107
% Change HRK/EUR _{t-11}	-8.10185	10.06177	0.42493
% Change HRK/EUR _{t-12}	-4.75441	10.69971	0.65892
Seasonally adjusted lag 1	-0.38752	0.14094	0.00856 **

Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Source: Authors' calculations

Other statistically significant coefficients are intercept showing a steady trend of increasing change in numbers of incoming Eurozone guests and the negative effect of seasonally adjusted lag of 1 month in change in numbers of incoming Eurozone guests.

These results partially confirm hypothesis H1 for the case of Croatia. The appreciation of the Croatian Kuna causes a slump in the number of international guests of Croatia from the Eurozone. The results also show that the impact of changes of the month-on-month exchange rates to the number of guests from the Eurozone lags in Croatia too. This partially confirms hypothesis H3 in case of Croatia. The results show statistically significant lag of the impact of exchange rates in case of HRK/EUR_{t-7}.

Results and discussion

Based on data from the Czech Republic and Croatia we have proven that the numbers of guests in accommodation establishments are dependent on the exchange rate and when the given currency appreciates, the numbers of incoming tourists decrease and vice versa. This result provides empirical evidence confirming *hypothesis H1* that with the appreciation of Czech Crown (CZK) and Croatian Kuna (HRK), international tourism demand from the Eurozone in both countries decreases. This generally supports the findings from previously cited studies by De Vita and Kyaw (2013) and Yap (2013), and is consistent with general economic theories.

Based on the generalized linear model, it is further possible to numerically estimate the effect of exchange rate appreciation by 1% on the change in number of incoming guests from the respective

source market in a month, as shown in Tables 1 and 2. The generalized linear model also provides 95% confidence intervals for the estimates which can provide a good guidance for decision-making of destination management organizations and scenario analysis.

Based on the data, it is, however, not possible to clearly confirm *hypothesis H2* that the sensitivity of international tourism demand from the Eurozone to changes of exchange rate is lower in the Czech Republic (as a cultural destination) than in Croatia (as a 'sun and sea' destination). By just comparing the estimated middle values and standard errors of both CZK/EUR_{t-2} and HRK/EUR_{t-7} effects, the hypothesis would be confirmed, but due to the fact that the 95% confidence intervals are overlapping, it is not possible to prove this with 95% statistical significance. In this case, it would be necessary to test this hypothesis with a larger dataset or with a different combination of countries in the future.

Hypothesis H3, which assumed that the impact of average changes in monthly exchange rate on the number of guests from the Eurozone is lagged, has been confirmed for both the Czech Republic and Croatia.

Likewise, the fourth and last *hypothesis H4*, that the lag of the impact of monthly exchange rates changes on the number of guests from the Eurozone differs between the Czech Republic (as a cultural destination) and Croatia (as a 'sun and sea' destination), has been confirmed.

The findings support those from previous studies (Chaudhary et al., 2016; Cheng, Kim & Thompson, 2013; De Vita & Kyaw, 2013; Lee & Jang, 2011; Meng, 2015, Yap, 2013), and show how the effect of exchange rate changes could be quantified. As this approach relies on secondary data about exchange rates and guests only, it is more convenient in comparison to primary data collection and can be very easily implemented and used by DMOs on different levels (national, regional, local) where these data are available.

Confirmation of the last two hypotheses may be helpful in destination management organizations' forecasting, planning and evaluation, especially on the national level for NTOs. The analysis reveals the time when decision making of prospective price sensitive guests from the Eurozone source market probably takes place and how strong the effect is. This can help in better understanding of macro environment effects on tourism demand for destination situation analysis, as well as for timing of marketing communication activities in these markets, and possibly in other comparable markets as well. Moreover, knowing the strength of these effects may be helpful in enhancing short-term forecasting of tourism demand and better evaluation of effects of marketing activities. By removing the effect of exchange rate, one may be able to more precisely evaluate the real impact and efficiency of various marketing activities, such as promotion.

By using the generalized linear model (GLM), this study further proved that this method can be useful in such analysis and further research of various effects on tourism demand, especially for extended datasets, other source markets, destinations and longer periods of time. GLM could also be used in the same way to analyze the impact on inbound tourism as well as the impact on outbound tourism where secondary data already exist.

It is acknowledged that this study has several limitations. Some of these limitations relate to the data used, with only two countries having been compared and a number of factors not been taken into consideration as they were assumed to be random. For example, accommodation prices were omitted because previous studies showed that these prices would be influencing the exchange rate in any case and no meaningful dataset was available. Nevertheless, all these factors can be easily added in future studies as additional GLM parameters, if the data exist.

Some of the authors of previous studies have focused specifically on the effects of exchange rates volatility, which was not explicitly included in our analysis. The main reason for this was that monthly data were used, whereas the monthly volatility of exchange rates was not as high as the yearly one in existing studies. Because of this, our findings are more oriented towards short term analysis and forecasting for destination planning and practical usage of the results for NTOs.

Finally, the methods of seasonal decomposition and generalized linear modelling have some limitations but their impact should be very minor. Although the data were carefully prepared and analyzed to minimize errors, nonlinearity and stochasticity of seasonality could be explored more thoroughly in future research.

Conclusions

Based on the results of tests, this study provides empirical evidence for that there is a different impact of exchange rate changes on the number of incoming tourists in the Czech Republic (as a typical cultural destination) and Croatia (as a predominantly 'sun and sea' destination) – with respect both to the strength and lag of that impact. These findings have implications both for tourism-related research about short-term exchange rate effects as well as for policy makers and practitioners in destination management organizations, especially on the national level.

As the results show, longer 'sun and sea' holidays are typically being planned more carefully and with a comparatively longer time prior to the trip (in case of Croatia) than in the case of shorter cultural trips (in case of Czech Republic). Also, there seems to be some support for the hypothesis that there is a higher sensitivity of tourism demand to exchange rate changes in 'sun and sea' than in cultural destinations.

Both the methods used here, as well as the numeric estimates of exchange rate changes impact, could help in tourism forecasting and planning within a time-horizon shorter than one year, scenario analysis and for filtering-out the effect of exchange rates when ex-post evaluating tourism policies (e.g. promotion campaigns).

There are also many opportunities for further research. For example, it would be interesting to include other currency combinations and destinations into the analysis, as well as to encompass factors such as e.g. safety, communication campaigns directed towards source markets, accommodation capacities or transport capacities to more distant markets.

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