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Tourism Destinations Vulnerable to Climate Changes: An Econometric Approach on Predeal Resort

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Abstract

Climate change represents a real threat for the mountain ski resorts, especially for those situated at low altitudes (below 1500 m). Various studies carried out by the researchers indicated that there are a significant number of ski resorts vulnerable to climate change. In the present paper, the authors use the regressions to analyse the relation between climate variability and tourism activity in Predeal resort, one of the most representative ski destination in Romania. The regressions indicated that tourism activity expressed through occupancy rate or tourist arrivals became vulnerable to meteorological parameters (temperature and thickness of snow cover).

Key words: *climate change, tourism, regression, economic effects*

JEL Classification: *C22, C32, L83, Q54*

Introduction

Global climate change is probably one of the most severe environmental threats that we will face in the 21st century. Despite the global economic significance of tourism and the important influence of climate on tourism patterns and vital tourism resources, the vulnerability of the tourism sector to climate change remains to be adequately assessed (Perry, 2000).

A largely debated topic worldwide as well as in Europe is the economic impact of climate changes with particular regard on winter tourism industry. Winter sports and especially ski tourism seems to be one of the most dependent economic sector on climatic conditions as resorts and entire regions which rely on this economic domain became sensitive to the snow cover thickness and duration as essential conditions for ski practicing. Moreover this "sensitivity" made possible the use of the regression as a relevant method to show the relation between climate variability and tourism activity. Quantitative studies on this topic refer to the activity of ski lifts and also to economic figures of GDP, overnight-stays, average staying related to the quantity and the quality of snow cover (König, Abegg, 1997; Breiling, 1998; Bigano et al., 2005).

Mountain regions are extensively used for recreation purposes as they are considered the main sites of the European winter sports industry. Unfortunately, the tourism activity of such sites is based on snow resources that are significantly vulnerable to climate change. Climate impact

research on the European winter tourism industry has previously been undertaken mostly in the Alpine countries: Austria (e.g. Koch and Rudel, 1990; Breiling, 1993a, 1993b), France (e.g. Guilpart, 2006), Italy (e.g. Bigano and Bosello, 2007) and Switzerland (e.g. Bultot *et al*., 1994; Abegg, 1996; Abegg and Froech, 1994; Koenig, 1994; Koening and Abegg, 1997; Burki, 2002; Mohnl, 1996; Meier, 1998). Studies also exist for Scotland (e.g. Smith, 1991), the Czech Republic (e.g. Sebek, 1990) and Turkey (e.g. Wall and Badke, 1994; Harrison and Winterbottom, 2001). In general, most of these studies show severe consequences for the winter tourism industry if climate change occurs: while some regions may be able to maintain their winter tourism with suitable adaptation strategies, others would lose their winter tourism industry due to a rising snowline.

Studies focused mostly on the Alps region (particularly in countries like Austria, Switzerland, France which have one of the most ski dependent winter tourism industry) and recently, on other European mountain systems too (e.g. Carpathians, Balkans), as the European Union has enlarged. Consequently one of the most recent European projects on this topic focuses also on mountain ski resorts from Romania and Bulgaria[1].

Tourism Activity and Climate in Predeal Resort: General Context

Predeal resort is one of the main tourism destinations in Prahova Valley – Poiana Braşov area, on its turn the most important regional cluster of winter tourism resorts in Romania. Having an important part of the ski domain situated at medium and low altitudes, all the significant ski resorts in the area, among which Predeal is also considered, will confront, according to the scenarios of the climate variability, snow-deficient winters in the future, a reality already in place.

The vulnerability of a tourism destination can be defined as a function of exposure, economic sensitivity and adaptive capacity (www.clavier-eu.org). Accordingly, the dimensions of the economic impact in Predeal would reflect the balance between exposure and sensitivity of the resort on the one hand and of its adaptive capacity on the other. The general economic context shows an important tradition in developing tourism activities in Predeal, the resort having a high dependency on tourism sector reflected by the highest percentage of tourism within services sector (38% in 2002) among the resorts in the area. A corresponding higher degree of vulnerability could be also attributed for economy of this resort in the light of estimated climate changes. Predeal has also the highest percentage of employment in services (79% in 2002 increased with 10% in comparison to 1992) the important proportion owned by other services being though a competitive advantage as the adaptive capacity is higher for service than for industry based economies. However, vulnerability of Predeal winter sports industry to climate change would be also related to the way in which the area still preserves its traditional profile of winter tourism recreation. In this respect it might be stated that tourism market faced changes in the post-communist period by orientation of accommodation units profile towards different forms of tourism (i.e. business tourism). Such situations also characterize the largest and the most modern 4-3 stars units in Predeal resort even during winter sports season. In this context the sensitivity of tourism industry to climate variations may differ in time (due to structural changes and marketing orientations) and from one unit to another.

Considering the general evolution of tourism activities in Predeal during winter tourism season (November - April), in the period 2002 – 2006 two relevant indicators such as overnight stays and occupancy rate were analyzed.

The trend of overnight stays showed an obvious increase for each month from one year to another. The period of February - April made an exception in 2004. This gradual rise in the total of overnight stays from one season to the other is a result of the fairly dynamic changes in the

[1] http://www.clavier-eu.org

accommodation infrastructure over the past few years (greater accommodation capacity and structural modification of the type of accommodation units) that is why we considered in this case the occupancy rate as a relevant index.

Within the winter season for this resort there is no doubt that February is the month with the utmost demand for overnights, overlapping the demand for winter sports to pupils and students holiday. This winter month is also preferred by MICE (Meetings, Incentives, Conferences, Events) tourism during the cold season. However, many overnight stays registered also in January.

In terms of monthly occupancy rate index variation, an obvious secondary winter season peak appeared in February 2006, against January (except for 2003). February 2003 was also a clear peak winter season at Predeal. The January-February interval would be though more relevant for our analysis than the month of December (when the demand for Christmas and New Year's Eve tourism packages interferes). This winter interval is the one which registers a higher demand generally in ski resorts.

Exposure of Predeal Resort to Climate Change Variations

Romanian ski domain is currently found at altitudes of 800-2,000 m, but the best conditions for practicing this sport are found above 1,500 m altitude. The ski domain of Predeal resort is situated below 800-1,500 m altitude and appears to be particularly sensitive to winter temperature and precipitation variations given by an ongoing warming process of mountain climate. For Alpine region, a ski resort is considered to be viable if in 7 out of 10 winters there is a 30-50 cm snow cover at least for 100 days between December 1 and April 15 (Bürki, 2000; Elsasser and Bürki, 2002). For Romania, INCDT (2003) mentioned several main conditions for ski practicing such as: average snow cover duration of >120 days/year; snow depth of >20 cm and high frequency of air frost days ensuring snow cover persistence. For Predeal resort the mean number of days with snow depth >20 cm registered during November-April interval reaches of 88 days (less than other high altitude weather stations in the area – i.e. Vf. Omu and Sinaia 1,500 m), whereas the mean number of air frost days count for 154 days over the same interval. The conditions characterizing the winter air flow dynamics seems to be more favorable for winter sports in Predeal than in other locations of Prahova Valley, in terms of the frequency of snowstorm and strong winds days (wind speed $\geq$16 m/s) which reach values of 6 days respectively 3 days, at the weather station in the area.

The thermal factor exerts restrictions on winter tourism, due to both the high frequency of positive deviations (maximum frequency of 60-80%, during the 1970s) and particularly, to their amplitude. High positive deviation values were recorded especially after 2000 at all weather stations in Prahova Valley - Poiana Braşov area. Among the most striking positive deviations over the studied climate period (1961-2007), a remarkable very warm winter was registered at Predeal (i.e. 2006-2007), when temperature deviations exceeded 2ºC particularly in January. To compensate the effects of the warming winter climate, artificial snow devices are considered a good alternative solution for the "hot spots" of the ski tracks (i.e. down-slopes and junction areas). However, temperature increase limits their functionality, as they become operational only at air temperatures values of 3-5ºC below freezing point. During the warmest winters in the area (i.e. 2000-2001 and 2006-2007), these installations failed to function due to high temperature deviations of 1-2ºC from the multiannual mean.

The precipitation factor is essential in forming the snow cover, indispensable for winter tourism. The number of snow days is an overriding importance in analyzing climate variability during the ski season. After 1989, this climate variable showed a visible falling trend from November through April within the entire Prahova – Braşov region. Variation rates were an indicator of significantly deficient snowfalls, especially at low-altitude ski tracks (-11.7 days/decade at Predeal station). The 1961-2007 period was marked by a significant inter-

decennial variability, suggesting a visible drop in snowfall frequency in the 1990s against previous decades by 26-41% (Predeal). The number of snow cover days over the November-April interval would generally stay within multiannual values.

By number of days with snow depth >20 cm, most ski tracks in the forest belt (<1,800 m) experienced a particularly warm winter in 2000-2001, which came second in the classification of snow-deficient years. Hence snow cover unsuitable conditions for winter sports activities were experienced (i.e. 24 days at Predeal over the November 2000 – April 2001 interval). Variation trends over 1961-2007 were very much significant in statistics. According to previous studies of snow cover variability in Romania (e.g. Bojariu and Dinu, 2007) which showed a general downward trend of the sum of snow cover thickness throughout mid and late winter, these tendencies were statistically significant only for the Western and the Eastern Carpathians. In the authors' opinion no notable variations were revealed for Southern Carpathians. Still there are some suggestive signals of incipient changes in the variation of the snow cover regime within the Prahova Valley-Poiana Braşov mountain area towards a slightly decrease annual snow cover duration at Sinaia and Predeal (at a rate of 5.8-6.5 days/decade). Nevertheless, the presence of a snow cover able to sustain winter sports was seriously affected by the statistically decreasing trends showed by the seasonal number of snowfall days (November-April).

For all that, the winter 2006-2007 was a very warm one, of reference for our study, in terms of correlations with the tourist indicators specific to Predeal resort. That winter being warm (deviations by some 2ºC from the multiannual mean) and coupled with a belated snow cover onset and with its melting much earlier than usual, in all the Prahova Valley – Poiana Braşov tourist resorts entailed significant losses for tourism operators.

Description of the Methodology

This section is aimed to analyse the relation between climatic parameters (air temperature, thickness of snow cover) and tourism indicators (tourist arrivals, overnight stays, accommodation capacity in function, occupancy rate) in Predeal, located in Brasov county. The analysis will be carried out for the winter sport season, which runs from November to April, for the period 2002-2007. For this purpose, an econometric analysis will be carried out, aiming at the identification of the connection between climate and tourism. Some aspects regarding the co-integration, causality and correlation will be revealed.

The climate change scenarios used in this analysis were obtained from the CLAVIER project Climate Change and Variability: Impact on Central and Eastern Europe, analyzing the ongoing and future climate change on Hungary, Romania and Bulgaria, based on existing data and on climate projections.

In the second part of the section, the regression analysis was finished and the results explained. Multiple linear regressions proved to be more suitable and significant for the analysis. In the case of Predeal resort, the use of the occupancy rate as dependent variable in simple linear regression offered good results for the understanding of climate influence on tourism activities. In Predeal, snow depth proved to be an important factor in attracting tourists and increasing occupancy rate figures. Also, multiple linear regressions were developed using the arrivals as predictive variable.

Data Analysis

The purpose of this analysis is to investigate the relation between the meteorological parameters such as: mean air temperature (ºC) and thickness of snow cover (mm) in Predeal (temp_p, snow_p) and the tourism indicators, namely tourist arrivals (no. persons), arrival_p, overnight stays (no. tourists-days), overnight_p, and occupancy rate (%),occupancy_p, in the winter sport

season November-April. Various test and analysis will be finished like the cointegration analysis through the ADF test, and Pearson simple correlation and Granger causality test.

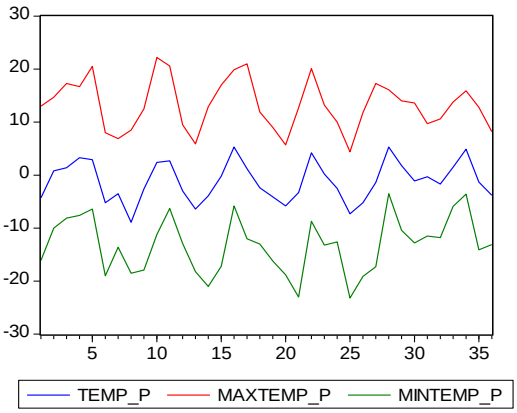

Fig. 1. Mean, Max and Min air temperature in Predeal: November-April 2002-2007 (°C)

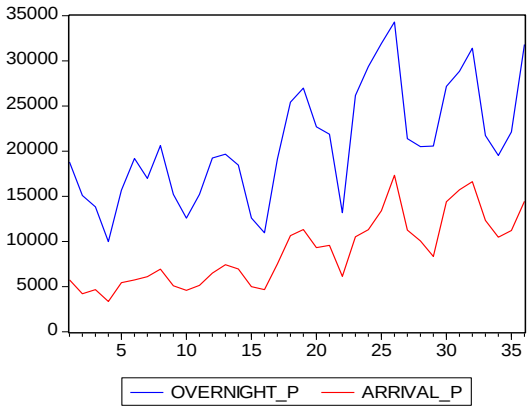

Fig. 2. Overnight stays and arrivals in Predeal: November-April 2002-2007

Since the computed ADF test-statistics (-3.166) for overnight stays in Predeal available for the period November-April 2002-2007, is greater than the critical values (-4.262, -3.552 and -3.209 at 1%, 5% and 10% significant level, respectively), we cannot conclude to reject null hypothesis. That means the overnight_p series has a unit root problem and the series is non-stationary. Regarding the air temperature parameters, the ADF-test indicates that the data series are stationary, having an intercept term.

Table 1. ADF test statistic for Predeal for the period November-April 2002-2007

temp_p	t-Statistic	-5.448857	Test critical values	1% level	-3.639407
				5% level	-2.951125
				10% level	-2.614300
	R^2=0.492, R^2 adj.= 0.459, Durbin Watson = 2.46				
snow_p	t-Statistic	-6.038500	Test critical values	1% level	-3.646342
				5% level	-2.954021
				10% level	-2.615817
	R^2=0.633, R^2 adj.= 0.595, Durbin Watson = 2.05				
arrival_p	t-Statistic	-6.694227	Test critical values	1% level	-4.262735
				5% level	-3.552973
				10% level	-3.209642
	R^2= 0.621, R^2 adj.= 0.567, Durbin Watson = 1.97				
overnight_p	t-Statistic	-3.166393	Test critical values	1% level	-4.323979
				5% level	-3.580623
				10% level	-3.225334
	R^2=0.825, R^2 adj.= 0.737, Durbin Watson = 2.099				
occupancy_p	t-Statistic	-5.109768	Test critical values	1% level	-3.646342
				5% level	-2.954021
				10% level	-2.615817
	R^2=0.504, R^2 adj.= 0.453, Durbin Watson = 2.09				

The rest of the tourism parameters available for Predeal resort, namely arrivals and occupancy rate, do not have a unit root problem. The arrivals are trend-stationary and the overnight stays stationary including an intercept but not a trend. The second climate parameter used in the regression analysis: snow depth is stationary.

The data for arrivals and thickness of snow cover in Predeal is stationary and thus Granger causality test can be performed. Granger-causality test presumes the use of covariance stationary data (Arize, 1993). This test is a technique for determining whether one time series is

useful in forecasting another. Using this technique for the thickness of snow cover on one hand and arrivals one the other hand it resulted that we cannot reject the hypothesis that thickness of snow cover does not Granger cause arrivals. Therefore, it appears that Granger causality runs one-way from meteorological parameters to tourism indicators. The concept of Granger causality, by which we actually understand precedence, is based on the idea that a cause cannot come after its effect (Konya, 2004). More precisely, the variable snow depth is said to Granger-cause the tourism variable, namely arrivals, because the current value of arrivals is conditional on the past values of snow depth. The results of the Granger causality test indicate that the history of mean air temperature in Predeal is likely to help predict the occupancy rate in the resort.

Table 2. Granger Causality Test for Predeal: November–April 2002-2007

Null Hypothesis:	F-Statistic	Probability
temp_p does not Granger Cause occupancy_p	2.58978	0.09229
occupancy_p does not Granger Cause temp_p	1.24765	0.30214

Using the Chow Test (Chow, 1960) in simple linear regression analyses using data series on overnight stays and arrivals as output variables as well as two meteorological parameters, namely air temperature and thickness of snow cover as input variables, the results did not show any structural breaks for Predeal resort.

To analyze the correlation (linear dependence) between climate variables, namely mean air temperature (temp), maximum temperature (maxtemp), minimum temperature (mintemp) and tourism indicators arrivals and overnight stays in Predeal, the Pearson correlation coefficient was used. It is very widely used in sciences as a measure of the strength of linear dependence between two variables, giving a value somewhere between +1 and -1 inclusive.

In Predeal, Pearson coefficient between mean air temperature and occupancy rate is -0.76 that should underline a relation of strong intensity between variables and an increase of the mean temperature in Predeal would reduce the overnight stays in the resort. The correlation coefficients between occupancy rates and max/min air temperatures are -0.70 and respectively -0.55 indicating a negative medium intensity. The use of changed tourism parameters and of the arrivals highlighted that in Predeal the relation between air temperature (mean, max and min) and tourists is indirect and weak (Pearson coefficient being -0.27, -0.42 and respectively -0.17). At the same time using the thickness of snow cover in relation to occupancy rate and arrivals, the correlation coefficients of +0.45 and +0.24 indicate a direct link, meaning an increased thickness will attract more tourists and lead to longer stays in the resort.

Regression Analysis

In the present analysis, the multiple linear regressions were preferred for Predeal resort due to the fact that some other parameters like accommodation capacity exercised a higher influence on the arrivals and overnight stays than the climate. In some cases, using the simple linear regression between meteorological parameters and tourism indicators would mislead the results and thus, not obtain any trustable results of regression functions. In any case, the introduction of an additional explanatory variable will improve the significance of the regression. The general purpose of multiple regressions is to learn more about the link between several independent or predictor variables and a dependent or criterion variable.

Secondly, the data for Predeal resort was processed by simple linear regressions between occupancy rate and air temperatures (mean, max, min) and thickness of snow cover. Good results were obtained for the linear regression using arrivals as responding variable and minimum air temperatures as exposure variable. For the good fit of the results two multiple linear regressions equations were carried out using accommodation capacity in function (accommodation_p) as the second predictor. Part of the variance of the arrivals could be

explained using the max air temperature.

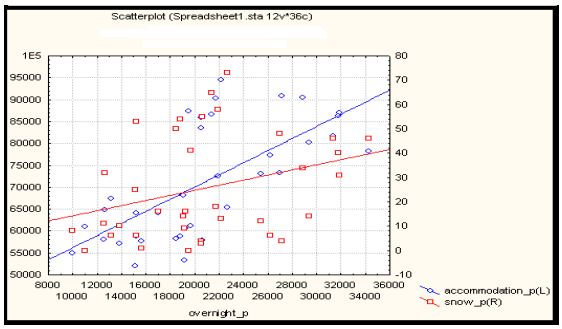

Fig. 3. Scatter plot over overnight_p vs. snow_p and accommodation_p

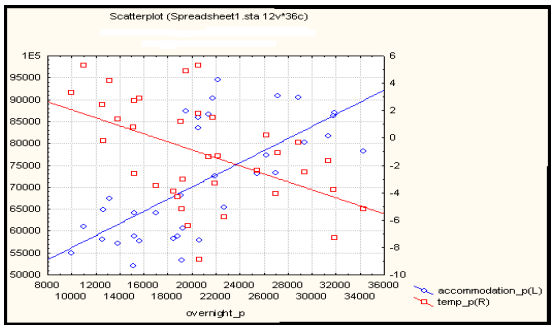

Fig. 4. Scatter plot over overnight_p vs. temp_p and accommodation_p

Regression Results and Summary

For the case of Predeal resort, various regression models were tested to better underline the relation between tourism parameters and meteorological ones. The best fit was obtained in the case of multiple linear regressions, but also good results and a better understanding of the influences resulted in the case of simple linear regressions.

Using the occupancy rate as outcome variable and air temperature (mean, max, min) as manipulated variables it resulted first, that the relation among them is negative. Secondly, for the case of mean temperature, this variable explains 57.5% from the variation of the occupancy rate. An increase of 1ºC in the temperature will generate a decrease of 1.33% of the occupancy rate in the tourism establishments functioning in Predeal. In the regression model, the maxtemp_p explanatory variable accounts 49.4% from the variation of occupancy_p and furthermore an increase in the input variable by 1ºC leads to a decrease in output variable of 0.96%. Also, if the mintemp_p decreases by 1º C the occupancy rate increases by 0.68%. All four-regression equations were validated: the regression coefficients are significant (see t-statistic values), the F-value indicates that the results are true and not the consequence of a chance, the coefficient of determination is significant, the Durbin Watson statistics does not indicate autocorrelation of the residuals (the results are displayed in Table 3).

Table 3. Simple linear regression results for Predeal using occupancy rate as dependent variables

Dependent Variable: OCCUPANCY_P							
Sample: November-April 2002-2007 Method: Least Squares							
Independent Variable	Coefficient	Std. Error	t-Statistic	Independent Variable	Coefficient	Std. Error	t-Statistic
temp_p	-1.33	0.196	-6.781	mintemp_p	-0.68	0.175	-3.852
C	27.80	0.747	37.22	C	20.40	2.481	8.222
N=36, R^2=0.575, R^2 adj.=0.562, Durbin-Watson stat=1.775, F-statistic=45.98				N=36, R^2=0.304, R^2 adj.=0.283, Durbin-Watson stat=1.67, F-statistic=14.84			
Independent Variable	Coefficient	Std. Error	t-Statistic	Independent Variable	Coefficient	Std. Error	t-Statistic
maxtemp_p	-0.96	0.167	-5.761	snow_p	0.134	0.046	2.904
C	42.02	2.344	17.925	C	25.85	1.54	16.817
N=36, R^2=0.494, R^2 adj.=0.479, Durbin-Watson stat=2.20, F-statistic=33.186				N=36, R^2=0.20, R^2 adj.=0.18, Durbin-Watson stat=1.54, F-statistic=8.43			

Changing the meteorological parameters, the meaning of the dependency changes and thus an increase in the thickness of snow cover generates an increase of the occupancy rate in the resort. The regression equation can be written as:

$$occupancy\_p = 25.85 + 0.134*snow\_p$$
$$(1.54)\ (0.046)$$

If the thickness of snow cover increases by 1 cm, then the occupancy rate will increase by 0.13%. Nevertheless this relation should be looked carefully, because the link between arrivals and thickness of snow cover stabilizes and after a certain snow layer depth is reached, the tourism demand will not be influenced by this parameter any more.

The LM Test suggests no serial correlation existing in the residuals from the previous regression functions presented in the Table 3.

The second tourism parameter tested in the regression applications refers to arrivals analysed in relation with air temperature. The results showed that the negative impact of the temperature upon overnights was maintained. The variation of the arrivals is determined by the mean temperature and accommodation capacity in function in proportion of 79%. If the mean temperature increases by 1ºC the arrivals number will decrease by 322 tourists. Similarly, the increase in the max temperature of 1ºC will generate a decrease of 217 tourists. For the minimum temperature the decrease would be lower with approximately 162 tourists. If the thickness of snow cover is used as the second predictor in the regression, the results reveal the fact that each centimetre increase in the snow depth will increase the tourists' number with 46 persons.

Table 4. Multiple linear regression results for Predeal using arrivals as dependent variables

Dependent Variable: ARRIVALS_P							
Sample: November-April 2002-2007							
Method: Least Squares							
Independent Variable	Coefficient	Std. Error	t-Statistic	Independent Variable	Coefficient	Std. Error	t-Statistic
temp_p	-321.985	83.155	-3.872	mintemp_p	-162.36	64.346	-2.523
accommodation_p	0.25	0.024	10.598	accommodation_p	0.2498	0.0260	9.579
C	-9287.96	1714.3	-5.418	C	-11040.97	2112.96	-5.225
N=36, R^2=0.79, R^2 adj.=0.78, Durbin-Watson stat=2.09, F-statistic=61.87125				N=36, R^2=0.74, R^2 adj.=0.73, Durbin-Watson stat=2.06, F-statistic=47.78430			
Independent Variable	Coefficient	Std. Error	t-Statistic	Independent Variable	Coefficient	Std. Error	t-Statistic
maxtemp_p	-217.43	70.11	-3.10	snow_p	46.028	15.267	3.015
accommodation_p	0.23	0.026	9.038	accommodation_p	0.248	0.025	9.83
C	-4644.77	2218.8	-2.093	C	-9922.49	1871.66	-5.30
N=36, R^2=0.76, R^2 adj.=0.75, Durbin-Watson stat=2.02, F-statistic=53.09123				N=36, R^2=0.76, R^2 adj.=0.75, Durbin-Watson stat=2.03, F-statistic=52.22961			

The LM Test suggests no serial correlation existing in the residuals from the previous regression functions presented in the Table 4.

The Economic Impact of Climate Change

By transposing in monetary terms the changes effects in meteorological parameters for Predeal, we reflected increasing tendencies both in terms of mean air temperature and in terms of accommodation capacity in function. According to National Institute for Research and Development in Tourism (2005) the average spending per tourist in Predeal resort is around 353 Euro and the average stay in Predeal is 2.41 days/tourist. In constructing the scenarios, we assumed an accommodation capacity in function of 88,397 places-days for Predeal (the average for the last winter season November-December 2006, January-April 2007). For a better understanding of the effects of the temperature increase on tourist demand, three scenarios for

temperature, namely an increase of 1 ºC, 2 ºC and 4ºC and also three scenarios for the increase in accommodation capacity, namely increases by 0%, 1% and 5% in the number of places-days, were considered.

Table 5. The effect of air temperature variations in monetary terms

Increase in temperature	Increase in accommodation capacity in function		
	0%	**1%**	**5%**
1ºC	-322 arrivals (-113,666 €)	-110 arrivals (-38,830 €)	+783 arrivals (+276,399 €)
2 ºC	-644 arrivals (-227,332 €)	-423 arrivals (-149,320 €)	+461 arrivals (+162,733 €)
4ºC	-1,288 arrivals (-454,664 €)	-1,067 arrivals (-376,651 €)	-183 arrivals (-64,599 €)

It could be noticed that in case of 1ºC increase in air temperature and of no changes in the accommodation capacity in function, the losses for Predeal will reach 113,666 €. With a constant number of places/days and an increase in air temperature 4 ºC, the losses will be even higher of 454,664 € for Predeal. Losses in economic terms will diminish and in some cases will be transformed in gains if the accommodation capacity in function will increase which mean a diversification in the tourism offer. Thus, for a 5% increase in accommodation capacity in function and 1ºC increase in mean air temperature, Predeal will gain 276,399 €, and for 4ºC increase in mean air temperature, Predeal will lose around 64,600 €.

Conclusions

Climate change represents a challenge for the tourism activity in the 21 century and especially for the ski resorts located and low and medium to low altitudes, below 1,500m. The specialists using regression as a relevant method to show the relation between climate variability and tourism activity finished various researches. Researches regarding the climate impact on the winter tourism industry have been undertaken especially for the Alpine countries, indicating severe consequences for the winter tourism industry if climate change occurs. Other European mountain systems (e.g. Carpathians, Balkans) were included in various researchers to conclude on the influences that climate changes have on the ski tourism activity. The present paper focuses on the Predeal resort, one of the main ski tourism destinations in Romania. Various analyses were finished like co-integration and regression for a better understanding of the climate effects on the tourism flows. The regression results showed a negative relation between temperatures and tourism, which means that an increase in air temperature will generate a decrease in tourism parameters. If the temperature goes up the overnight stays go down.

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Destinații turistice vulnerabile la schimbările climatice: o abordare econometrică pentru stațiunea Predeal

Rezumat

Schimbările climatice reprezintă o provocare pentru industria turistică a secolului XXI, dar mai ales pentru turismul de schi. Cercetătorii au realizat numeroase studii prin care încearcă să cuantifice efectele schimbărilor climatice asupra activității de turism. Articolul de față își propune să studieze legătura existentă între parametrii climatici (temperatură şi grosimea stratului de zăpadă) şi cei turistici (capacitate de cazare, sosiri de turişti, rata de ocupare) utilizând diferite analize econometrice (cointegrare, testul Granger, regresii) pentru stațiunea Predeal. În finalul articolului, autorii au transpus în termeni monetari efectele unor creşteri de temperatură asupra activității turistice din Predeal.