

# ANALYSIS OF THE SENSITIVITY OF SKI TOURISM DEMAND TO CLIMATE CHANGE IN SWITZERLAND



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## 1. OUTLINE

Impacts of climate change on winter tourism supply have attracted considerable interest in recent years. In comparison, only few studies have addressed so far the effects on demand. In this article, we analyze how snow and weather conditions currently impact the ski tourism demand using econometric models. These were estimated with two samples of respectively 74 and 92 Swiss ski resorts tracked over four winter seasons (2005/06 to 2008/09). Regression results emphasize the link between weather and snow conditions and the tourism demand (overnight stays, skier visits) at Swiss ski resorts.

## 2. OBJECTIVES

This article aims at answering the following questions:

- In recent winter seasons, what was the influence of snow conditions on skier visits at the different ski domains?
- How strong is the relationship between snow conditions and overnight stays?
- Does the lack of 'winter atmosphere' in the lowlands affect the number of skier visits?
- What do snowmaking capacities contribute in terms of ski resort visitation?

## 4. DATA AND METHOD

In order to illustrate tourism demand, two dependent variables were employed:

- the number of overnight stays in hotels located in the vicinity of ski areas
- the number of skier visits

In our attempt to model tourism demand, we considered different types of explanatory variables: meteorological variables (weather and snowpack conditions), tourism supply related variables (individual lifts' hourly capacity and difference in altitude, maximum and average lengths of ski runs artificially snowed, hotel accommodation supply), domain characteristics (accessibility which is viewed in this paper as the time taken by car to reach the ski resort from the nearest urban centre) and macroeconomic conditions (exchange rates).

### Overnight stays and skier visits model

The model is the following:

$$\ln Y_{iw} = \alpha_i + \beta \text{SnowDays}_{iw} + \gamma x_{iw} + \varepsilon_{iw}$$

Where:

$\ln Y_{iw}$ : dependent variable; respectively the natural logarithm of hotel overnight stays and the natural logarithm of skier visits  
 $\varepsilon_{iw}$ : idiosyncratic error term  
 $\alpha_i, \beta, \gamma$ : population regression coefficients, where  $\alpha_i$  is a fixed effect  
 $\text{SnowDays}_{iw}$ : number of days with at least 50 cm of natural snow in the upper part of the ski area  
 $i$ : ski resorts  
 $w$ : winter seasons  
 $x_{iw}$ : vector of control variables

Standard panel data estimators are used to estimate the two equations including Ordinary Least Squares, Random Effects, First-Difference, and Fixed Effects.

## 6. CONCLUSION

Both overnight stays and skier visits are shown to increase on average when the number of days with a sufficient snow cover for skiing increases by one unit. The estimation results also give some hints that the impact of snow conditions on skier visits is slightly bigger than on overnight stays (Figure 2). Moreover, results show that snowmaking helps strengthening ski area visitation though its marginal positive effect tends to vanish for large values of snow production. Using the skier visits database, it was also possible to test for the impact of weather conditions on day trippers. No significant impact of weather conditions at ski areas was found perhaps because of the inadequacy of the variable that we used. We also looked at the impact of weather conditions in the lowlands and concluded that the «lacking winter atmosphere» problem is essentially an issue for ski areas located near city agglomerations.

### Acknowledgements and Status of Research:

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## 3. THE CASE STUDY REGION

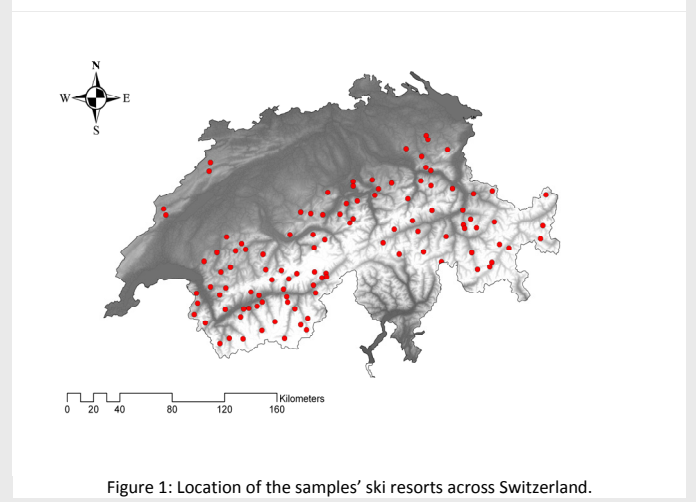


Figure 1: Location of the samples' ski resorts across Switzerland.

## 5. RESULTS

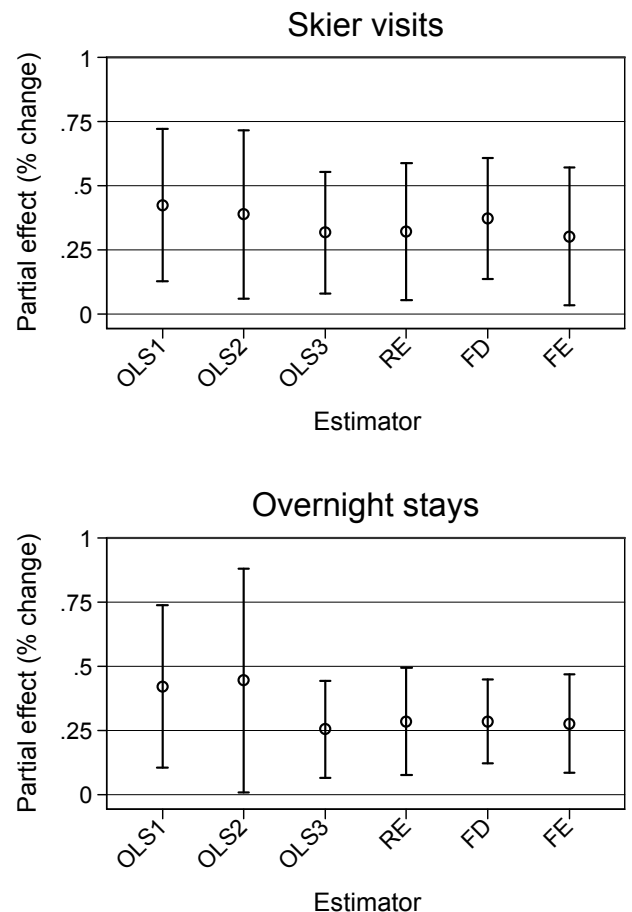


Figure 2: 95% confidence interval of the skier visits (above) and hotel overnight stays (below) sensitivity to the number of skiable days. Estimators used were the following: OLS=Ordinary Least Squares; RE=Random Effects; FD=First-Difference; and FE=Fixed Effects.