Effects of political instability in consolidated destinations: The case of Catalonia (Spain)

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ABSTRACT

Catalonia is one of the most successful tourist regions in Spain. This article analyses the immediate impact that the instability associated to the recent political situation in Catalonia has had on the arrivals and spending of international tourists in the region using the classical Box-Jenkins method (ARIMA) and the more recent Bayesian Structural Time-Series Models. The results obtained indicate that during the final quarter of 2017, political events led to a reduction in the arrivals and spending of tourists in the region, although whether this impact reached statistical significance depends on the estimation method used.

1. Introduction

Crises and their management constitute a topic of interest for tourism researchers and many studies analyse the characteristics of the different crises and the actions required to overcome them (Henderson, 1999). Hall (2010) examines the different types of crises in the sector, highlighting that, in tourism, crises are usually accompanied by economic, political or social events or elements related to natural and energy resources.

The tourism industry is tremendously dependent on political stability, peace and safety (Al-Hamarneh & Steiner, 2004) and its success is threatened by the feeling of insecurity generated by violent protests, social instability and, in the most extreme cases, terrorist acts or civil wars (Hall & O’Sullivan, 1996). Together with the valuable theoretical contributions, a vast number of empirical studies have been conducted on the negative effects of terrorist activities, almost all of which concerning that instability leads to a reduction of tourist arrivals and spending in the destinations affected. See, for example, Enders and Sandler (1991) for the case of Spain, Pizam (1999) for Northern Ireland, Wahab (1996) for Egypt, Gartner and Shen (1992) for China, etc. Apart from articles referring to the immediate effects, other studies have been carried out on the prolonged impact over time, or the lagged effect, for example, Enders and Sandler (1991) and Enders, Sandler, and Parise (1992), although it is generally accepted that the tourism industry is resilient and recovers relatively quickly after the end of the conflict (Fisher, 2003).

Furthermore, many studies highlight that instability affects neighbouring destinations, either through a replacement effect which benefits competitors (Mansfeld & Kliot, 1996; Zheng & Martin, 1992; Alonso & Santana, 2018), or through a spillover, damaging the affected region as a whole (Mansfeld, 1996; Ryan, 1991). Once the destination has been affected, its recovery is based on the intervention of all the stakeholders (Paraskevas & Arendell, 2007) who must design and implement a marketing strategy which restores the image of the destination and guarantees the safety of the visitors (Sönmez, Apostolopoulos, & Tarlow, 1999).

Catalonia is a firmly consolidated destination, enjoying national and international prominence. The statistics place it as Spain’s leading tourist destination. Its capital, Barcelona, leads the ranking of Urbantur, the tourism competitiveness monitor of Spanish urban destinations carried out by Exceltur (2017). According to the Spanish National Statistical Office, the Tourist Movement at Borders (Frontur) statistics record 19,046,720 international tourists in 2017, representing 23.28% of the total international arrivals to Spain in that year. This places Catalonia as the leading Spanish region, before the Canary Islands (17.37%), the Balearic Islands (16.86%), Andalusia (14.09%) and the Region of Valencia (10.90%). The Tourist Expenditure Survey (EGATUR) also highlights that with 19,151.87 million euros in 2017,
Catalonia was ranked first in terms of tourist spending in Spain, representing 22.05% of total tourist expenditure, followed by the Canary Islands (19.32%), the Balearic Islands (16.80%), Andalusia (14.57%) and Madrid (10.17%).

This leadership position has recently been threatened by the increasing overcrowding of some emblematic areas of Barcelona and the negative reaction of part of the local society which has come to be known as turismofobia (tourism phobia) and, most of all, by the political and social instability derived from the Catalan sovereignty process, which hit the headlines on a daily basis in national and international media during the month of September 2017.

In very general terms, although the political tension derived from the sovereign aspirations of a considerable part of the Catalan society had been a recurring theme for many years, the reaction to the Sentence of the Constitutional Tribunal of 28 June 2010 which modified substantial aspects of the Statute of Autonomy of Catalonia, passed in 2006 and the lack of agreement with respect to the so called “Fiscal Pact”, approved by the Catalanian Parliament on 25 July 2012, detonated an unprecedented escalation in the conflict. This led to the organisation of a first consultation (participatory process) on 9th November 2014 and a referendum on 1st October 2017 with the objective of declaring independence of the region, neither of which were covered or recognised by the Spanish legal framework. In response to the measures implemented by the Generalitat (Regional Government of Catalonia), the Spanish government, with the approval of the Senate, pushed for the application of Article 155 of the Spanish Constitution which was formalised on 27th October 2017. The autonomous government was taken over, the regional parliament was dissolved and regional elections were convened for the 21st December 2017. The results of these elections have not been able to completely ease the situation which is still characterised by constant media attention, principally in Spain, and which continues to transmit a feeling of instability.

With respect to the economic consequences, the media has been reporting two basic effects: first, the relocation of the headquarters of some emblematic companies of the region during the most critical moments of the crisis; and second, a certain impact on the tourism sector, with a decrease in the tourist attractiveness of the region and a reduction in the number of tourists and the amount spent by them in Table 1

<table>
<thead>
<tr>
<th>Arrivals</th>
<th>Tourist expenditure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Catalonia</td>
<td>All except Catalonia</td>
</tr>
<tr>
<td>E</td>
<td>865,842</td>
</tr>
<tr>
<td>F</td>
<td>930,354</td>
</tr>
<tr>
<td>M</td>
<td>1,076,431</td>
</tr>
<tr>
<td>A</td>
<td>1,483,021</td>
</tr>
<tr>
<td>M</td>
<td>1,630,433</td>
</tr>
<tr>
<td>J</td>
<td>1,850,823</td>
</tr>
<tr>
<td>J</td>
<td>2,394,803</td>
</tr>
<tr>
<td>A</td>
<td>2,501,193</td>
</tr>
<tr>
<td>S</td>
<td>1,876,937</td>
</tr>
<tr>
<td>D</td>
<td>1,156,897</td>
</tr>
<tr>
<td>N</td>
<td>1,009,971</td>
</tr>
<tr>
<td>D</td>
<td>956,468</td>
</tr>
</tbody>
</table>

Fig. 1. Tourist arrivals and expenditure in Catalonia. ARIMA models.

Source: Authors’ own elaboration.
field in which the Bayesian methods are more widespread is causal analysis, where observational data are used in addition to experimental data (Pearl, Glymour, & Jewell, 2016), and where, through probabilistic graphical models and the design of counterfactuals, the effects that different interventions in variables of interest have on a target variable are analysed using estimation methods based on artificial intelligence (machine learning) and prediction algorithms (Bellot, 2016; Koller & Friedman, 2009).

Another field in which the Bayesian methods have developed considerably is in the analysis of time series, where, through Monte Carlo simulations, results are obtained which enable the definition of the optimisation of complicated expressions due to the multivariate nature of the analysis and the non-linearity which characterises many of these series (Teräsvita, TjØstheim, & Granger, 2010). In these cases, the principal use of these models is either prediction or the inference of causal impacts which is the purpose of this article.

In short, Bayesian Structural Time Series is the application of the Bayesian estimation methods for analysing structural time series. Structural time series are defined in terms of a pair of equations:

\[
y_t = Z_t^T \alpha_t + \varepsilon_t \\
\alpha_{t+1} = T_t \alpha_t + R_t \eta_t
\]

where \( y_t \) is a scalar observation, \( Z_t \) an output vector of dimension \( d \), \( T_t \) is a transition matrix of dimensions \( d \times d \), \( R_t \) is a control matrix of dimensions \( d \times q \), \( \varepsilon_t \sim N(0, \sigma^2) \) is a scalar error term with variance \( \sigma \) and \( \eta_t \sim N(0, Q_t) \) is an error term of \( q \) dimensions with a state-diffusion matrix of dimension \( q \times q \), where \( q \leq d \). Equation (1) is called the observation equation and links the observed data \( y_t \) with a latent evolution vector of the state vector \( \alpha_t \). Equation (2) is the state equation which governs the evolution of the state vector \( \alpha_t \) over time (Perles, Ramón, Moreno, & Torregrosa, 2016).

The structural time series models are flexible and constitute an advance with respect to the traditional study of intervention using univariate ARIMA models. In this way, the structural time series models make predictions which constitute a counterfactual to the facts observed by way of a synthetic control created through combinations of markets which have not been affected by the phenomenon studied (markets or unconsidered series). This is not possible using the ARIMA methodology which only considers the evolution of the series (country or region, in this case) object of the study before and after the event of interest without contemplating any type of control or reference (Brodersen et al., 2015).

As already mentioned, in the case of Bayesian Structural Time Series Analysis, Bayesian techniques are used to estimate the parameters and carry out the inference. Without going into the technical issues, the Bayesian version of this model has three basic parts: the use of the Kalman filter - for decomposing the series and adding different components to the state such as trend, seasonality and regression variables, among others; a method for selecting explanatory variables (predictors) known as the spike-and-slab method and a Bayesian model in order to carry out the combination of results and predictions, grouping and weighting the different scenarios obtained (Scott & Varian, 2014).

Perles, Ramón, and Ortúño (2018) suggest that within the field of the programming language R, there are two basic packages for estimating these types of models, one is the BSTS (Scott, 2017) and the other is Causal Impact (Brodersen et al., 2015). The latter is recommended when a causal analysis is made estimating the impact of

Table 2

<table>
<thead>
<tr>
<th></th>
<th>Descriptive comparative impact 2017/2016</th>
<th>Impact estimated by ARIMA model</th>
<th>Impact estimated by CausalImpact methodology</th>
</tr>
</thead>
<tbody>
<tr>
<td>International arrivals (number of tourists)</td>
<td>229,327</td>
<td>415,355</td>
<td>306,837</td>
</tr>
<tr>
<td>Tourist expenditure (millions of euros)</td>
<td>32</td>
<td>261.48</td>
<td>63.35</td>
</tr>
</tbody>
</table>

Catalonia.

This article focuses on the second effect, seeking to determine the impact that the events have had on tourist arrivals and spending in Catalonia during the months of October and November 2017. The study uses a methodology based on Bayesian Structural Time-Series Models in accordance with the framework proposed by Brodersen, Galluser, Koehler, Remy, and Scott (2015), and implements the statistical package CausalImpact using the programming language R (R Core Team, 2017).

2. Methodology and data

The origin of the Bayesian methods dates back to the mid eighteenth century, although their use in the field of statistics and econometrics became widespread with the development of computers which has enabled an increase in computation capacity (Gelman et al., 2013). A
the event by calculating the difference between the prediction obtained for the response variable through a subsequent semiparametric Bayesian estimation and the reality observed of the series under study during the post-intervention process (Brodersen et al., 2015); in our case, the latest period of instability in Catalonia.

The Bayesian methods are applied across the board in all scientific fields. Recent applications of these methods in tourism can be found in the field of forecasting tourism demand (Wong, Song, & Chon, 2006; Wu, Song, & Shen, 2017) or measuring the efficiency of destinations, infrastructures and tourism companies (Assaf, 2010; Assaf, Oh, & Tsions, 2016; Tsionas & Assaf, 2014). A specific application of the Bayesian structural time series models are that of Perles et al. (2016) in the study of the impact of instability derived from the Arab Spring in tourist destinations on the shores of the Mediterranean and that of Perles et al. (2018) on the impact of Brexit announcement on British tourism in Spain.

In this study, in order to establish the robustness of the results obtained, and together with the descriptive analysis of the data, before the estimation of the impact is made using the methodology proposed by Brodersen et al. (2015), a classic analysis using the Box-Jenkins methodology (ARIMA) is conducted. The estimates are carried out using the automated procedures of the forecast 9.1 library (Hyndman, 2017) for the programming language R 3.4.1 (R Core Team, 2017).

In order to estimate the impact of the instability on international tourism in Catalonia, monthly data provided by the Spanish Statistical Office (INE, 2018a, b) and the Institute of Tourism Studies (Turespaña) have been used. Specifically, the data of the FRONTUR (Tourist Movements at Borders Statistics) survey on the number of arrivals and the EGATUR survey (Tourist Spending Survey) tourist expenditure (in millions of euros) have been used for the period between January 2014 and December 2017. Two objectives have oriented the selection of this timeframe. First, with respect to the final period, the aim was to capture the entire period of instability which took place during the second half of 2017 and, specifically from the month of September. Therefore, we decided to use all of the available data for this year in order to include a significant post-intervention period (October to December 2017). On the other hand, in order to isolate the phenomenon observed to the cause that is the object of the study, January 2014 has been selected as the initial period so as not to include other structural shocks that have affected tourism such as the Spanish property crisis in 2008–2013 (Perles, Ramón, Rubia, & Moreno, 2013) and the disturbing effects of the problems of the competing destinations in North Africa during 2011; events which occurred prior to the selected period.

The composition and size of the sample varies a little from the recommendations of Brodersen (2016) who indicates that when using this methodology a pre-intervention period of approximately two or three times the length of the post-intervention period is advisable. Following this recommendation and considering that the post-intervention period is only three months (October, November and December 2017), the maximum pre-intervention period to be considered should be nine months (January to September 2017). However, we believe that selecting such a short pre-intervention period would exclude the seasonal nature of the phenomenon studied, the consideration of which is fundamentally understood by an analysis of these characteristics. According to this reasoning, the break point has been established in the 44th observation (September 2017) prior to the referendum of the 1st October. In order to temper the variance of the series, the logarithmic transformation of the arrivals and expenditure series has been contemplated.

It should be noted that a difficulty associated to using these arrivals and expenditure series from January 2014 is the rupture of the series due to methodological changes introduced by the INE in October 2015 when it became responsible for these statistical operations (INE, 2015). However, the INE has provided growth rates and a detailed procedure for linking the two series, which enables us to establish a continuous series of arrivals and expenditure (INE, 2015). This linking procedure described by the INE is used in this article.

Following the recommendations of Brodersen et al. (2015), all Spanish regions, except the Region of Valencia, are used to establish the prediction which serves as a counterfactual control. The exclusion of the Region of Valencia is due to the fact that this region could have directly benefited from the Catalan events through a deviation of tourism as it is a bordering region. This has been the case in the relocation of the headquarters of some companies. With respect to the rest of the regions, it is assumed that they have not experienced the instability of Catalonia or have benefited from a deviation of tourists from this region, which makes them better control markets.

3. Results

Table 1 shows the comparison of the tourist arrivals and expenditure series, comparing Catalonia and the rest of Spain excluding Catalonia. When we consider the quarter October–December 2017 as a whole, we can observe the differential behaviour between Catalonia and the rest of Spain in terms of both arrivals and tourist spending. Therefore, in terms of arrivals, while Catalonia experienced a reduction of 6.49% during the quarter (from 3,529,336 tourists received in the last quarter of 2016 to 3,300,009 during the same period in 2017), the rest of the regions experienced an increase of 5.56%. Similarly, in terms of expenditure, while Catalonia experienced a reduction of 0.95% (from 3385 million euros in the third quarter of 2016 to 3353 in the same period in 2017), the rest of the regions experienced an increase of 7.08%. In short, according to the official statistics used, the reality observed is that during the period of instability analysed (final quarter of 2017), international tourism should have fallen by 229,327 tourists which would have represented a reduction in expenditure of 32 million euros. This would be the size of the impact observed in conformance with the exploratory analysis of the existing data.

Fig. 1 shows the estimation of the impact of instability according to the univariate analysis for the natural logarithm of the series of arrivals and expenditure using the ARIMA methodology. For each of the series analysed (arrivals and tourist expenditure) an optimum model has been estimated based on the data corresponding to the period between January 2014 and September 2017. Using this optimum model, a prediction of each series has been made for the period between October and December 2017. This prediction constitutes the non instability counterfactual scenario.

For each series, the graph reflects its effective behaviour (continuous line), the point prediction of the optimum model (dashed line) and the confidence intervals at 95% of the prediction (dotted lines), for the period between October and December 2017. The optimum model – based on a variation of the Hyndman and Khandakar algorithm which combines unit root tests, minimization of the AICc and MLE to obtain an ARIMA model (Hyndman, 2017)- which adjusts the arrivals series is ARIMA (0,0,0) (0,1,0) with drift. Meanwhile, the optimum model for the case of expenditures is ARIMA (1,0,0) (1,1,0) with drift. As we can see in the graph on the left, the effective arrivals are, in general, lower than the point predictions estimated by the model, and even though in October and November the effective behaviour of the series is on the lower boundary of the estimated prediction interval, during the month of December it is clearly below it. Therefore the impact of the instability, at least in the case of December 2017, would be statistically significant according to this methodology. In the case of expenditure, the graph on the right shows that the effective behaviour of the series is below the point estimate calculated by the optimum model, although in this case it always lies within the lower boundary of the prediction. Therefore, this impact would not reach statistical significance.

If the accumulated impact is calculated for the whole quarter (October to December 2017), the effective tourist arrivals would represent a relative fall of 11.17% with respect to those predicted by the optimum model, which, in absolute terms is 415,355 tourists during the
period. In terms of tourism expenditure, the instability would have represented a relative fall of 7.23% with respect to that estimated by the optimum model which would represent an absolute overall amount for the quarter of 261.48 million euros.

Finally, the impact of the instability is estimated using the methodology proposed by Brodersen et al. (2015), using the rest of the regions, except for the Region of Valencia, as control series. Fig. 2 reflects the results obtained in terms of arrivals and Fig. 3 in terms of tourist expenditure. The upper graph shows the data analysed and the counterfactual prediction for the post-intervention period (October to December 2017). The middle graph shows the difference between the data observed and the counterfactual prediction of the model. As the point estimate of the prediction is used, we could say that this effect would be the pointwise causal effect. The bottom graph shows the sum of the point impact of the middle graph to calculate the accumulative effect of the intervention, (in our case, the instability), on the post-intervention period analysed (Brodersen et al., 2015).

Own elaboration. Natural logarithm of the arrivals. Examining the final quarter of 2017 as a whole, we can observe that the estimation of the arrivals series has reached a real value of 41.64 (in logarithmic terms), while the counterfactual - scenario in the case of non-instability - estimates a value of 41.93 with a prediction interval of [41.40, 42.47]. Therefore, the estimated impact would not be significant from a statistical point of view - the probability of obtaining this value randomly is $p = 0.132$. When the logarithm transformation is undone, we can observe an absolute reduction of 306,837 tourists with respect to the optimum prediction of the model for the whole of the post-intervention period which, in relative terms, represents a difference of 8.50% with respect to that expected.

Own elaboration. Natural logarithm of expenditure. With respect to tourist expenditure, we can observe that the estimation of the arrivals series during the final quarter has reached a real value of 20.96 (in logarithmic terms), while the counterfactual - scenario in the case of non-instability - estimates a value of 21.02 with a prediction interval of [20.41, 21.64] within which the real value may be found. Therefore, the estimated impact would not be significant from a statistical point of view - the probability of obtaining this value randomly is $p = 0.403$. When the logarithm transformation is undone, we can observe an absolute reduction of 63.35 million euros with respect to the optimum prediction of the model for the whole of the post-intervention period which, in relative terms, represents a difference of 1.85% with respect to that expected.

Table 2 summarises the results obtained for the reality of the series and the estimates made. As we can observe in the last column, the Brodersen et al. (2015) method represents an intermediate point between the mere comparison of the values found in the official statistics for the period and the calculation of the impact through the classical ARIMA univariate methodology.

Own elaboration. Descriptive comparative results, comparisons of the official figures provided by INE during the post-intervention period. ARIMA and CausalImpact estimated impact, difference between pointwise estimate of the optimal model and real figure during the post-intervention period. 4. Conclusions

This article analyses the initial impact of the political instability in Catalonia during the final months of 2017 on the international tourist arrivals and expenditure in the region. Determining this impact could be relevant for adopting tourism policy measures given that the media is constantly referring to the negative repercussion of this instability and the corresponding need to make decisions accordingly. The main result obtained is that all of the estimation methods used indicate that, in accordance with the existing literature on these effects, the instability has translated into a reduction in the arrivals and spending of tourists in the region. Therefore, it can be considered that instability generates negative effects even in the most consolidated tourist destinations. This impact reaches statistical significance when the classical ARIMA univariate analysis is used for the arrivals case - which estimates the most relevant impact - and does not reach significance in the case of the methodology proposed by Brodersen et al. (2015), based on Bayesian estimation methods.

The lack of statistical significance associated to the estimates carried out with this latter method may reflect either the short period of time analysed (only three months) for the post-intervention period or the lack of power of the Brodersen et al. (2015) method to obtain significant results in the absence of a large effect size. Only with the passing of time and by observing the evolution of the events will we be able to clarify whether these impacts persist over time or, as is usually the case in the characteristically resilient tourism sector, there is a fast recovery in the industry shortly after the existing instability diminishes.

For management and policy implication, it is important to be aware that the analysis of the impact is not comparable to other processes that generate instability. The reaction of tourism to the Arab Spring uprisings has been greater, showing the different sensitivities of tourism demand to political instability in tourist destinations. It is worth pointing out that the responses are different and the elasticity of tourism demand to these events is greater in developing countries than in developed countries. The perception of instability may have different consequences for the safety of tourists. The principal countries of origin of the tourists visiting the Catalan market are European and Europe is not perceived as a high-risk destination by Europeans. Undoubtedly, the European integration process confers stability and safety to the management of tourist flows.

In any event, the results obtained in this article should not be an obstacle to obtaining different conclusions through alternative estimation models. Furthermore, as a future line of research, it would be interesting for policy makers to observe how the instability affects the different sectors of demand (for example, business trips, holidays, visits to friends and family). In the same way, one way to improve the article would be to analyse the impact of this instability on domestic tourism (understood in this case as that originating in Spain as a whole), given that we have only studied the international market. In this way, the differences between the two markets may be tested in terms of elasticity or sensitivity to political instability.

References
The author's research is focused in tourism services, destination competitiveness as well as the innovation and new technologies applied to the tourism sector. On these fields they have published several articles in prestigious international journals such as Tourism Management, Tourism Economics and Current Issues in Tourism as well as several monographs and book chapters.