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Air passengers during the economic crisis: The Spanish case

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ABSTRACT

This paper examines whether there is a relationship between the recent economic and financial crisis and air passengers in Spain. Static and dynamic models are estimated using data for the period 2004-2016. Initially, no relationship can be discerned between the variables; however, the estimates also show a possible dynamic relationship between the economic crisis and the number of passengers using Spanish airports, depending on the proportion of low-cost airlines at each airport.

Keywords: Economic crisis, Air passengers, Low-cost airlines

JEL Codes: L83, L93

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1. INTRODUCTION

The aim of this paper is to study the relationship between the last great economic crisis and the evolution of the number of passengers using Spanish airports. The effect of the recent economic crisis on several socio-economic and demographic variables has been examined in the economic literature (Bellido and Marcén, 2016; González-Val and Marcén, 2017, among others). In this case, we focus on the possible changes in patterns of behavior of air passengers in Spain, a country that is one of the most popular global tourist destinations (UNWTO, 2016). The existing literature suggests a heterogeneous response of tourists to economic crisis (Eugenio-Martín and Campos-Soria, 2014; Smeral, 2009). In addition, the severity of the crisis in Spain, with unemployment rates over 25%, could generate different patterns of migration that can also affect the number of passengers using Spanish airports. Thus, Spain is an attractive country in which to explore this issue, since the association between business cycle fluctuations and variations in air passenger numbers is not immediately clear.

In recent years, low-cost airlines, which represent an important part of all regular flights (Dobruszkes, 2013), have considerably increased the number of flights, specially to and from secondary Spanish airports (see figures 1 and 2). The literature suggests a possible effect of low-cost airlines on tourism (Reyet al. 2011). Then, in this framework, it could be argued that our work is capturing changes in the expansion of low-cost airlines instead of, or in addition to, the impact of the economic crisis on air passengers. For this reason, we extend our empirical analysis to study the variations in the relationship between the proportion of low-cost airlines and the number of air passengers during the economic crisis. Because of seasonal fluctuations, we have separately examined each quarter (from the first to the fourth quarter) to check the consistency of our findings.

2. DATA AND EMPIRICAL STRATEGY

Data on numbers of air passengers cover 43 Spanish airports, from 2004 to 2016. This information comes from the Spanish Airports and Air Navigation (AENA). Figure 3 shows the location of the Spanish airports with regular flights during our period of

study.¹ The majority of the airports are located at, or close to the coast, in Madrid, and in several provinces of the North of Spain; that is, close to the most touristic areas. Our sample contains 526 observations of the annual number of air passengers.²

In our empirical strategy, we first consider a static model. Formally, we estimate the following equation:

$$\mathbf{Passengers}_{e,c,t} = \beta \mathbf{Crisis}_{e,t} + \Sigma_c \mathbf{RegionFE}_c + [\Sigma_{c,t} \mathbf{Region}_c \times \mathbf{Time}_t + \Sigma_{c,t} \mathbf{Region}_c \times \mathbf{Time}_t^2] + \mathbf{u}_{e,c,t} \quad (1)$$

The dependent variable is the number of passengers using airport e , located in region c in year t ($\mathbf{Passengers}_{e,c,t}$).³ $\mathbf{Crisis}_{e,t}$ is a dummy variable that takes value “1” when airport e is affected by the economic crisis in year t , and “0” otherwise.⁴ Hence, the coefficient β is interpreted as the average change in the number of passengers that can be due to the economic crisis. From a theoretical point of view, it would be expected that the economic crisis, which has affected many countries, would have a negative impact on the number of passengers, because of a possible income effect. The economic crisis could also have a positive effect on the number of passengers, since there was an increase in the numbers of individuals going abroad, looking for better job opportunities, which can be considered as a migration effect. Opposite effects are operating and so the sign of this parameter β is not clear. In this equation, we also include region fixed effects, in addition to region-specific linear and quadratic trends, to control for evolving unobserved region attributes.

Previous methodology only identifies a discrete series break. Nevertheless, it is conceivable that the economic crisis can have very different short-run and long-run effects. To tackle this issue, we follow the proposal of Wolfers (2006), estimating the dynamic response of the number of passengers using Spanish airports to the economic crisis:

¹ Some of the airports do not have flights during the entire period considered in this work. We have excluded those airports and our results are unchanged.

² Departures and arrivals have been considered together. The analysis has been repeated separately for departures and arrivals and our results do not vary. This is not surprising, since there are no substantial differences between them.

³ This variable is measured in millions of passengers.

⁴ The year 2008 has been taken as the first year of the economic crisis.

$$Passengers_{e,c,t} = \sum_k \beta_k Crisis_{e,k,t} + \sum_c RegionFE_c + [\sum_{c,t} Region_c \times Time_t + \sum_{c,t} Region_c \times Time_t^2] + u_{e,c,t} \quad (2)$$

where $Crisis_{e,k,t}$ is a set of dummy variables that takes value “1” when airport e is affected by the economic crisis in year t for k periods, and “0” otherwise. These dummy variables are supposed to capture the entire dynamic response of the air passengers to the crisis, while the region-specific time trends identify pre-existing trends.

3. RESULTS

Table 1 shows the results. Column 1 reports the estimates of the static model presented in Eq. (1) and column 2 reports the dynamic model of Eq. (2). None of the estimated coefficients picking up the possible relationship between the economic crisis and the number of air passengers is statistically significant. Our results appear to indicate that the economic crisis does not have any static or dynamic effect on the number of passengers using Spanish airports in the period under consideration.⁵ It can also be suggested that the opposite effects that we have described above are compensating for each other.

As mentioned in the Introduction, we also run a supplementary analysis in order to study whether the changes in the low-cost airlines are driving previous findings. To tackle this issue, we repeat our estimates, including the proportion of low-cost airlines (*PLCA*), in addition to interactions between the proportion of low-cost airlines and the dummies capturing the dynamic effects of the economic crisis. After adding these variables, we can see the relationship between the proportion of low-cost airlines and the numbers of air passengers during the economic crisis. Our results do not vary when we include the proportion of low cost airlines, in columns 3 and 4 (static and dynamic analysis, respectively). We do not observe a relationship between the economic crisis and the number of air passengers in Spain. The more striking result is that the proportion of low-cost airlines appears to be negatively related to the number of passengers: the greater the proportion of low-cost airlines in a given airport, the lower the number of passengers. This can be due to the fact that, in the largest airports, with many passengers, the proportion of low-cost airlines is lower than in secondary airports,

⁵Our estimations do not change when we redefine the dependent variable in logarithms, or by using monthly data instead of annual data. All estimates have been repeated with/without controls. Results remain similar.

with fewer passengers per year. This may simply be capturing the differences between primary and secondary airports.

After the inclusion of the interactions between the proportion of low-cost airlines and the variables capturing the dynamic effect of the economic crisis (years after the beginning of the economic crisis: 1-2, 3-4, 5-6, and ≥ 7) in column 5, we detect statistically significant relationships (see F-test). The proportion of low-cost airlines appears to be negatively associated with the number of passengers, regardless of the period considered (pre-crisis or after the beginning of the crisis), but the sign of the coefficients of the interaction terms changes. We find that the number of air passengers using the airports with a high proportion of low-cost airlines is higher during years 1 to 4 since the beginning of the crisis, than the number of passengers using those airports in the pre-crisis years (the aggregate coefficients decrease in absolute value). This relationship changes after 5 years from the beginning of the crisis. In this setting, it is possible to suggest that the primary airports (with low proportions of low-cost airlines) lost more passengers during the initial period of the crisis than did the secondary airports (with high proportion of low-cost airlines). However, from the fifth year of crisis to the end of the period, the aggregate coefficients increase in absolute value, suggesting that those airports with high proportions of low-cost airlines have lower numbers of passengers than those airports with low proportions of low-cost airlines, relative to the pre-crisis period. This may be due to a decrease in the number of low-cost flights in secondary airports in those years. The same is observed when the dependent variable is defined by quarter, in columns 6 to 9. Although almost all of the coefficients are slightly larger (in absolute value) during the summer season (3rd quarter, in column 8), no differences in our findings may be inferred.

4. CONCLUSIONS

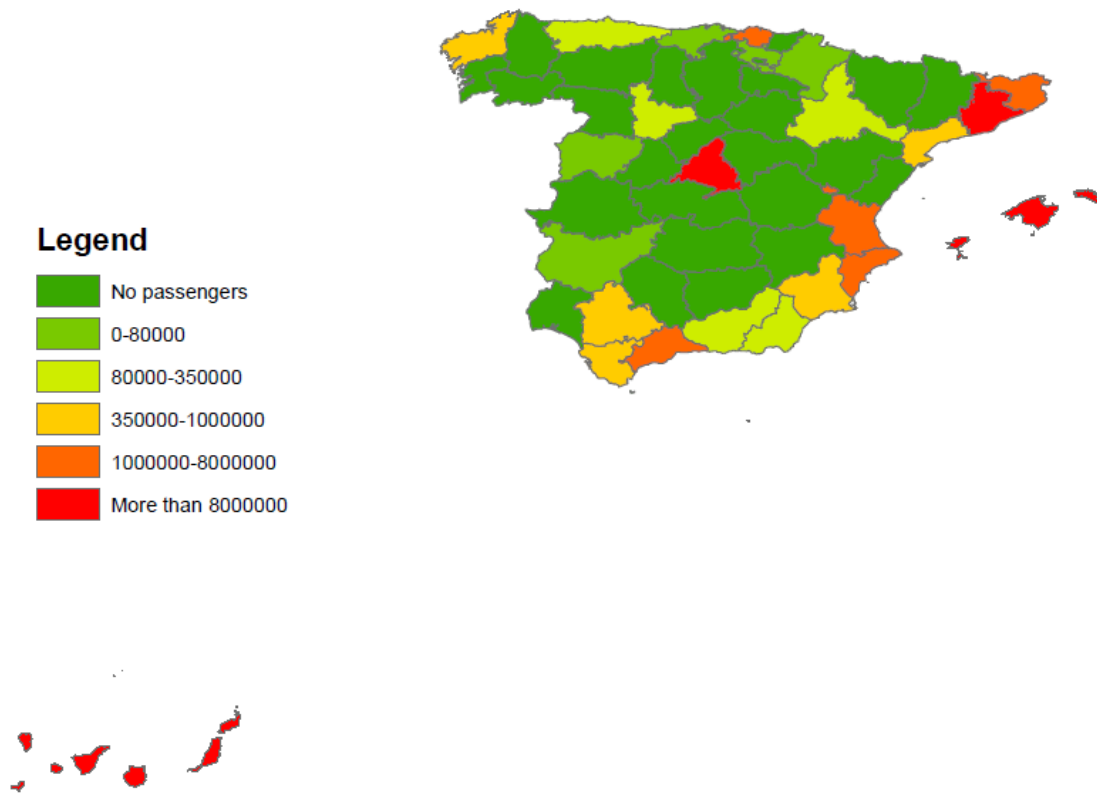
Our goal has been to explore the possible association between the economic and financial crisis and air passengers in Spain. No relationship appears to be found between both variables, although this can also be explained by the fact that the positive effects of the economic crisis on the number of passengers can be compensated for by the possible negative effects. Unfortunately, with the data available we cannot examine this issue further, since we do not have information on, for example, price fluctuations of plane tickets or changes in tourism patterns because of terrorism, among other factors.

However, since the use of low-cost airlines can be important in mitigating the negative effects of the economic crisis, we examine the relationship between the proportion of low-cost airlines and the number of passengers using Spanish airports during the economic crisis. Our results suggest that, until the fourth year after the onset of the economic crisis, low-cost airlines attracted passengers to the secondary airports, but this pattern changed from the fifth year onwards, when the primary airports are seen to be those attracting more passengers.

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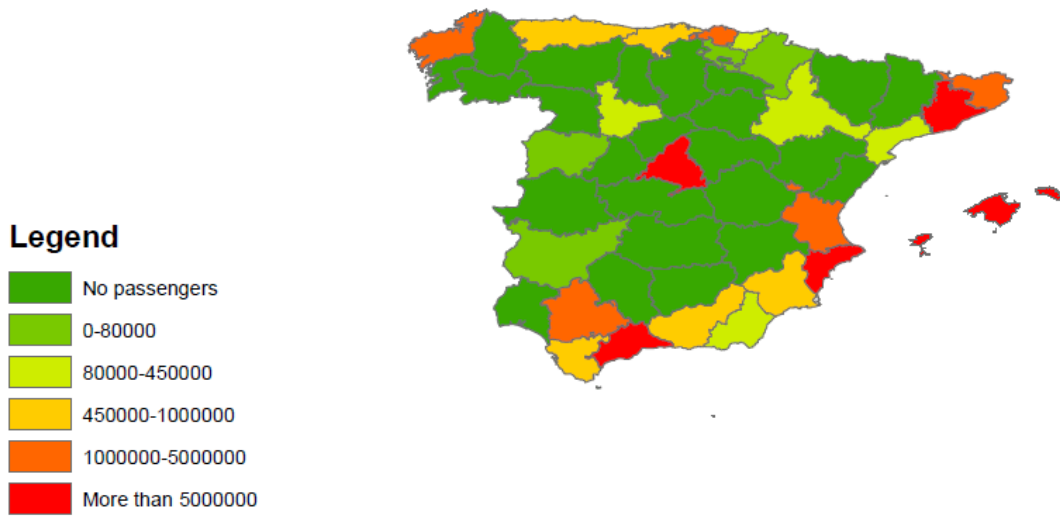
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Figure 1: Air passengers using low-cost airlines, by region, in 2004



Note: Data comes from AENA.

Figure 2: Air passengers using low-cost airlines, by region, in 2016



Note: Data comes from AENA.

Table 1: The relationship between the economic crisis and air passengers in Spain

| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) |
|--|----------------------|----------------------|-----------------------|-----------------------|-----------------------|---|---|---|--------------------------------------|
| Dependent variable: | Number of passengers | Number of passengers | Number of passengers | Number of passengers | Number of passengers | Number of passengers in the 1st quarter | Number of passengers in the 2nd quarter | Number of passengers in the 3rd quarter | Number of passengers in the 4th term |
| PLCA | | | -15.516*** (1.795) | -15.877*** (1.820) | -17.425*** (3.551) | -3.485*** (0.704) | -4.670*** (0.954) | -5.133*** (1.092) | -4.135*** (0.816) |
| Crisis | -0.651 (0.853) | | -0.867 (0.794) | | | | | | |
| Years since crisis 1-2 | | -0.102 (1.142) | | 0.078 (1.061) | -2.816 (2.588) | -0.469 (0.513) | -0.693 (0.695) | -0.758 (0.795) | -0.897 (0.595) |
| Years since crisis 3-4 | | -0.158 (1.249) | | -1.249 (1.166) | -3.186 (2.709) | -0.737 (0.537) | -0.864 (0.728) | -0.717 (0.833) | -0.869 (0.623) |
| Years since crisis 5-6 | | -0.494 (1.323) | | -1.428 (1.234) | -1.523 (3.020) | -0.557 (0.599) | -0.217 (0.812) | -0.016 (0.928) | -0.755 (0.694) |
| Years since crisis ≥ 7 | | 0.384 (1.409) | | -0.600 (1.313) | 0.930 (3.070) | -0.163 (0.609) | 0.415 (0.825) | 0.686 (0.944) | -0.010 (0.706) |
| PLCA x Years since crisis 1-2 | | | | | 5.779 (4.709) | 1.081 (0.934) | 1.479 (1.265) | 1.617 (1.448) | 1.601 (1.082) |
| PLCA x Years since crisis 3-4 | | | | | 4.151 (5.070) | 1.010 (1.005) | 1.137 (1.362) | 0.924 (1.559) | 1.077 (1.165) |
| PLCA x Years since crisis 5-6 | | | | | -0.021 (5.577) | 0.405 (1.106) | -0.268 (1.498) | -0.669 (1.714) | 0.574 (1.282) |
| PLCA x Years since crisis ≥ 7 | | | | | -3.220 (5.389) | -0.154 (1.069) | -1.054 (1.448) | -1.554 (1.657) | -0.456 (1.239) |
| Region FE | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Region*time | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Region*time ² | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| P-value (F-test of PLCA + PLCA x Crisis years 1-2 =0) | | | | | 0.0008 | 0.0005 | 0.0006 | 0.001 | 0.0015 |
| P-value (F-test of PLCA + PLCA x Crisis years 3-4 =0) | | | | | 0.0004 | 0.0008 | 0.0004 | 0.0002 | 0.0004 |
| P-value (F-test of PLCA + PLCA x Crisis years 5-6 =0) | | | | | 0.0001 | 0.0003 | 0 | 0 | 0.0003 |
| P-value (F-test of PLCA + PLCA x Crisis years ≥ 7 =0) | | | | | 0 | 0 | 0 | 0 | 0 |
| Observations | 526 | 526 | 526 | 526 | 526 | 526 | 526 | 526 | 526 |
| R ² | 0.668 | 0.668 | 0.713 | 0.714 | 0.717 | 0.752 | 0.702 | 0.687 | 0.733 |

Notes: Estimates are weighted using data on the population of each region. Robust standard errors are in parentheses. *** Significant at the 1% level, ** Significant at the 5% level, * Significant at the 10% level.