THE ROLE OF TOURISM IN ISLAND ECONOMIC GROWTH AND RESILIENCE: A PANEL ANALYSIS FOR THE EUROPEAN MEDITERRANEAN COUNTRIES (2000-2015)

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Abstract

Purpose – The paper aims at verifying the economic resilience of islands and, in particular, the role of the tourism sector in the reaction to the most recent economic crisis. The analysis concerns insular contexts, such as the greater island regions in the Mediterranean basin.

Design/methodology/approach – Static and dynamic panel data techniques are used for a sample of 13 island economies over a period of 16 years.

Findings – Results show that the growth factors for regional islands are similar to the ones usually considered for other regions but the tourism-led growth hypothesis is highly supported. Tourism demand more than supply plays a role together with accessibility. The crisis has reduced the importance of tourism supply while tourism demand and accessibility have remained crucial for growth together with other traditional engines of growth.

Originality/value –To the best of authors' knowledge, none of the current works has considered territorial determinants and tourism indicators inside the same framework analyzing growth in island economies by considering the changes occurred during the crisis explicitly.

Keywords: Islands, Tourism, Growth, Resilience, Mediterranean

Paper type: Research paper

JEL: O15, P52, L83, R11

1. Introduction

Local growth and development are increasingly dependent on the tourism sector especially in fragile contexts, such as islands. The growth pattern of these territories is often very dissimilar from the one related to the mainland. The obstacles to development and economic growth faced by insular contexts can be summarized under different categories related to small size, insularity/remoteness, environmental vulnerability, and specific socio-economic factors (Briguglio, 1995; Hampton and Christensen, 2007). Small size, in particular, often implies limited natural resources and high propensity to import since most goods and services consumed by domestic population and tourists cannot be produced locally in either sufficient quality or quantity (Sharpley and Ussi, 2014). It also implies the existence of a small market for domestic products and hence dependency on export markets, since domestic industries cannot take advantage of economies of scale and suffer high transportation costs.

Tourism may appear the main policy option to overcome the structural constraints imposed by the small size of island economies and by the physical insular condition determining their backwardness. We expect that, besides the traditional determinants of growth, tourism will play a major role in driving growth and bringing economic opportunities for small island destinations which require a different consideration from mainland regions. Tourism development in these contexts is an opportunity, for the local population, to increase income and employment or to improve basic infrastructures and utilities.

The potential of tourism for the economic growth of islands has been widely documented in international literature (i.e., Croes and Rivera, 2010; Croes, 2011; Bojanic and Lo, 2016; Deidda, 2016; Ridderstaat et al. 2016; Couto et al., 2017). Many islands rely specifically on international tourism for their economic growth. Schubert et al. (2011) studied intensively the relationship between the development of the tourism industry and economic growth. They found that an increase of tourism demand leads to an increase in economic growth, a clear evidence of the so-called tourism-led growth hypothesis (Durbarry, 2004). Seetanah (2011) found a two-way relationship between tourism and growth. Very often tourism specialization in islands must rely on specific natural and cultural resources and the personal experience of tourists.

However, the issue of how islands behave in economic downturns and, in particular, of how they have reacted to the recent economic crisis has not been sufficiently analyzed, in the light of a well-documented interest for resilience in recent international literature (Martin, 2012; Cellini and Cuccia, 2015; Angulo et al., 2018), with particular reference to the Great Recession.

In this paper we explore whether tourism-based economies, such as islands, have shown good resilience in the recent crisis. Some literature postulates that the crowding-out effect of excessive

specialization in the tourism sector (Crescenzi et al., 2016) and the apparent small long-run effect of this sector (Croes, 2011) may prevent sustainable growth. By contrast, other studies (Psycharis et al., 2014) offer descriptive evidence that, in some countries (i.e., Greece), most islands specialized in tourism were more resilient to the recent crisis while specialization on manufacturing, trade and less vulnerability also played an important role. Unlike previous studies, we consider territorial determinants and tourism indicators within the same framework analyzing growth in island economies by considering the changes occurred during the crisis explicitly.

Given their characteristics and limitations, islands need to be resilient in order not to increase the gap with other territories. The need to study resilience in insular contexts is therefore, at the same time, preliminary and supplemental to analyze their growth patterns. We focus our attention on specific insular contexts, such as the greater island regions belonging to the European Mediterranean countries. We confine our analysis to *economic* resilience, namely the ability to adapt and react to a negative event such as the Great Recession. Within this framework, we look at the role of tourism in helping insular contexts to maintain positive performances.

The paper will start by identifying specific factors of growth in islands of the European Mediterranean countries including tourism as well as other determinants of growth identified by the literature on small economies. The conceptual framework will be the conditional convergence equation considered both in terms of GDP per capita and in terms of employment. We will then consider the effects of the Great Recession on the growth relationship by assessing the intensity to which specific factors of growth have been affected by the crisis. Section 2 will review the relevant literature and section 3 will refer to the description of the data and the methodology used. We estimate fixed and random effects panel specifications and evaluate the dynamics through GMM estimation. Section 4 deals with the discussion of the results and section 5 concludes with some policy considerations.

2. Literature background

Existing literature has mainly focused on analyzing the link between tourism and economic growth in islands. They tend to rely more on tourism to boost economic growth because they are lagging behind in terms of production and technological expertise.

Both from the theoretical and empirical points of views there is a lack of consensus on whether tourism promotes economic activity or, conversely, whether economic activity leads to tourism growth. Empirical literature has recognized four regularities that underpin just as many hypotheses (Antonakakis et al., 2015). The tourism-led economic growth hypothesis (TLGH) assumes a unidirectional causality between the two variables and postulates that tourism development causes

long-term economic growth. Tourism expenditure is seen as an alternative to exports that can improve a country's balance of payments and stimulate income and employment growth. Conversely, according to the economic-driven tourism growth hypothesis (EDTG) the unidirectional causality is reversed, and it is economic growth that stimulates tourism expansion. The other two hypotheses instead support the existence of a bidirectional relationship between tourism and economic growth (BC), or no relationship at all (NC). Looking at the European Mediterranean countries, the TLGH is more evident for Italy, while EDTG is found for Greece and Cyprus and the BC hypothesis characterizes Spain and Portugal. In addition, the authors observed a structural break after the crisis in many countries.

Examples not limited to island economies that support the TLGH are Balaguer and Cantavella-Jorda (2002) for Spain, Dritsakis (2004) for Greece, Durbarry (2004) for Mauritius, Louca (2006) for Cyprus, Narayan et al. (2010) for Pacific islands, and Schubert et al. (2011) for selected Caribbean islands[1]. Conversely, Oh (2005) claimed that the hypothesis of tourism-led economic growth does not apply to the Korean economy in favor of the economic-driven tourism growth. Similar results have been found by Narayan (2004) for Fiji, and Tang and Jang (2009) for the USA. Finally, Seetanah (2011) found a two-way relationship between tourism growth and economic growth in a study of 19 island economies, using panel data from 1990 to 2007.

Efforts have also been made to analyze the stability of the relationship over time and the risks arising from overreliance on tourism to the detriment of other sectors such as manufacturing, construction and agriculture. As for the former, Antonakakis et al. (2015), found that the relationship is time-dependent and is sensitive to major economic events (i.e., the Great Recession) at the national level. Instead, Bojanic and Lo (2016) observed the existence of a significant negative (moderating) impact on economic activity for countries that rely heavily on tourism, especially at lower levels of economic development.

Cortés-Jiménez (2008) analyzed the effect of tourism on economic growth in Italy and Spain from 1990 to 2004 from a regional point of view by distinguishing three types of regions: coastal, inland and Mediterranean. In coastal and Mediterranean regions both national and international tourism were important factors for regional economic convergence while in inland regions only domestic tourism mattered.

Recently, Pablo-Romero and Molina (2013), Brida et al. (2016) and Chingarande and Saayman (2018) have provided assessments of the existing literature in terms of econometric methods

[1] Further evidence concerning the stimulating role of tourism on economic growth is the contribution by Proença and Soukiazis (2008) who analyzed the role of tourism in affecting the economic convergence of several Southern European countries. They found a significant contribution of tourism as a conditioning growth factor. On this point, see also Paci and Marrocu (2014).

used and results obtained and concluded that, with some exceptions, the empirical findings suggest the predominance of the tourism-led economic growth hypothesis.

Although the role of tourism demand and tourism expenditure in affecting economic growth has been extensively analyzed, in the case of small islands less attention has been paid to the role of other territorial determinants and of the different characteristics of the tourism industry (demand, supply and accessibility indicators) in a unified context. Moreover, the interplay of these factors in a period of crisis has been often overlooked.

This is due primarily to the fact that the existing literature on the determinants of growth in islands has mainly focused on the so-called "small island developing states" (SIDS) context[2], which emphasizes macroeconomic rather than local determinants. Examples are the paper by Seetanah (2011) who considered trade openness and economic freedom in addition to tourism demand and the study by Seetanah et al. (2009), who analyzed the contribution of financial development in promoting the economic growth of 20 island economies.

On the other hand, the relationship between territorial factors and growth has recently regained importance in the wake of the recent global crisis. As pointed out by Martin et al. (2015), territorial-specific effects may play a very significant role in the ability of an area to resist and react to an economic shock. A growing body of empirical literature has analyzed specific determinants of regional and local resilience (see Martin and Gardiner (2019) for a broad review). Nevertheless, such literature has not looked at the special features of island economies. For example, Brakman et al. (2015) focused on regional urbanization, Martin et al. (2016) investigated the role of the economic structure, and Crescenzi et al. (2016) looked at several macroeconomic and regional factors that may have affected regional resilience in Europe. Instead, Fratesi and Perucca (2018), Mazzola et al. (2018), Lo Cascio et al. (2018) and Pizzuto (2019) have identified a number of local factors that may have affected sub-regional as well as regional resilience.

One of the first attempts to consider both territorial factors and tourism indicators within the same framework extended to the crisis period was the study by Romão and Nijkamp (2018). It found a positive impact on growth from gross value added by tourism while it detected no relevant impacts from tourism demand and negative correlation with the endowment in natural resources[3].

To the best of our knowledge, none of the current works has addressed the same issue for islands by evaluating the relative role of tourism *vis-à-vis* other growth factors during the crisis

[2] Such status was first recognized in 1992 at the United Nations Conference on Environment and Development (UNCED) held in Rio de Janeiro (Brazil).

[3] From a different perspective, Chingarande and Saayman (2018) analyzed a set of *critical success territorial factors* for tourism-led economic growth at country level. Their findings suggest that human capital, safety and security of tourists, financial and technological development, trade openness and environmental protection are critical success factors for tourism-led growth.

period. In fact, previous studies on the relationship between tourism and economic growth on islands have mainly used cointegration techniques and the Granger causality test, thus not controlling for a number of potential growth determinants. In the case of islands, territorial characteristics tend to be crucial to support economic growth in an age where globalization represents a significant threat to the sustainable development of many successful small islands (Read, 2004). These characteristics can be framed within the context of territorial capital defined as "the set of localized assets that constitute the competitive potential of a given territory" (Camagni and Capello, 2010). The existence and the interaction of different distinctive characteristics and conditions shape the competitiveness of each island and affect its possible growth trajectories.

In line with previous literature (i.e. Chang et al. 2012; Paci and Marrocu 2014; Romão and Nijkamp, 2018), our econometric analysis is based on a conditional convergence regression framework (Barro and Sala-I-Martin, 1991) derived from the augmented Cobb-Douglas production function underpinned on Solow's neoclassical growth theory (i.e. Mankiw et al. 1992). We specify the rate of GDP per capita growth as a function of selected standard right-hand side growth model variables (i.e., physical and human capital) as well as local characteristics and specific determinants of the tourism industry which are supposed to affect the economic performance of islands. We also include the initial period's level of per-capita GDP (or employment) to control for convergence dynamics.

The possible effects of private fixed capital endowment go back to the seminal papers on growth models (Solow 1956). The little evidence for islands (i.e., Seetanah et al., 2009; Seetanah, 2011) corroborates the traditional view ascribing positive effects of private investments on economic growth.

The positive effect of human capital on economic growth has been largely discussed. Starting from endogenous growth contributions (i.e., Romer, 1990), the traditional view is that a high qualified workforce is able to create, implement, and adopt new technologies, and thus to promote growth (see among others Crescenzi et al., 2016, Mazzola et al. 2018). However, some empirical studies have obtained ambiguous results depending on the outcome variable investigated (income *vs* employment growth) and the period analyzed (expansionary *vs* contractionary periods). Some examples are Di Liberto (2008), Fratesi and Perucca (2018) and Pizzuto (2019).

Human capital is identified as key factor for growth particularly for small islands. Globalization, indeed, has increased the role of human capital for island states and requires more efforts to contrast outmigration. However, overreliance on tourism may be detrimental to human capital accumulation (Kožić, 2019) since the shift of resources towards tourism-related industries

jeopardizes productivity gains obtained in other sectors, which require educated workers holding secondary or tertiary education qualifications (the so-called "*beach disease*").

Another strategic territorial element for island growth is proximity, which is identified as fundamental for cumulative growth processes. Agglomeration economies are considered one of the key factors for economic growth and development. They arise when people and firms are located together in industrial clusters and cities. This generally implies higher population or employment density as well as savings in transport costs and an increase in knowledge spillovers that promote a self-reinforcing accumulation in the local endowment of knowledge.

In comparison with non-island economies, islands have a higher population density and similar percentage of population living in non-urban areas (Bojanic and Lo, 2016). This may drive the phenomenon of over-tourism. Population density may be beneficial for agglomeration economies but can also increase congestion in a small-sized economy. The question is whether this phenomenon prevents or increases international tourist arrivals in islands. Sharpley (2003) found that mass tourism in Cyprus was more instrumental for growth than quality tourism. On the other hand, Chao et al. (2006) warns against the risk of small state islands overusing natural resources in the short run without considering long-term effects (a tourism version of the "*Dutch disease*").

The role of the economic structure in affecting island growth has been largely discussed (i.e., Pratt, 2015; Romão et al., 2016). In addition to heavy reliance on the tourism sector, islands tend to have underdeveloped construction and manufacturing sectors and high government spending on public administration. Islands may benefit from this condition since they could be more sheltered than other economies in case of external shocks, at least in terms of employment (Fratesi and Rodríguez-Pose, 2016). However, such a condition can crowd out investments of the private sector, especially investments in high-tech industries with higher value added, diminishing the prospects for sustainable economic growth (Kožić, 2019). Interestingly, the debate about the role of the economic structure in shaping the impact of exogenous shocks has recently increased in the light of the Great Crisis (Martin et al., 2016). Highly specialized economies may be more vulnerable to shocks than those with a diverse economic structure (Belke and Heine, 2006).

Besides the above-mentioned territorial elements, also the local characteristics of the tourism industry are crucial for the development of islands. The special features of islands make the role of the tourism industry structure strategic. In addition to the characteristics of the demand (i.e., arrivals, nights spent, receipts), we need to consider the supply structure (i.e., accommodation facilities, number of beds) as well as accessibility conditions.

Tourism supply pertains to appropriate forms of accommodation, variety of food service provisioning, entertainment and leisure activities. Empirically, the positive impact of supply factors

has been highlighted by McElroy and Parry (2010) and Kang et al. (2014). They find that the quality and variety of the local tourism supply affect local development positively. Particularly, the latter claimed that the regional development impact of tourism requires both the enhanced demand from visitors as well as an expanded supply of tourism infrastructure, and transport access to and within tourism destinations.

Indeed, the improvement in physical connections and the lowering of transportation costs increase local competitive advantage and stimulate economic growth by facilitating the movement of people, goods and information across space. The international literature reveals a wide range of studies concerning the analysis of the insular transport system, especially air transport and its connection with local development. For some studies, tourism is a driving factor and, in some cases, a stimulator of change in air transport (Bieger and Wittmer, 2006). Also, Pratt (2015) highlighted the importance of a well-developed infrastructure system. He analyzed the macroeconomic and sectoral impacts of increased tourism in seven "small island developing states" (SIDS) and he showed that tourism positively affects economic activity through the key role played by the transportation system. McElroy and Parry (2010), in their study concerning 39 islands, highlighted the positive link of local tourism development and air transport infrastructures, as well as the quality and variety of the local tourism supply.

3. Data and methodology

In order to analyze the effects of the different determinants on the performance of islands and evaluate the impact of the recent crisis on these effects, we consider a model specification which contrasts the change in the performance indicators with a set of explanatory variables capturing both the different territorial elements as well as the local characteristics of the tourism industry which are believed to affect the economic performance of islands.

In a first stage, we estimate a panel equation linking the performance variable (y) to a vector of explanatory variables ($\boldsymbol{X}$) using both fixed and random effects panel models with robust standard errors clustered at the island level. The correct specification of the model is selected by running the cluster-robust Hausman test. In fact, as claimed by Kaiser (2015), when robust standard errors are clustered at the cross-sectional level in the fixed effects estimations, the classical Hausman test has size distortions. The model for the fixed-effect specification is:

$$y_{i,t} = \alpha_i + \beta_i \boldsymbol{X_{i,t-1}} + \varepsilon_{i,t} \quad (1)$$

i= 1,…,13; t=1,…,16

where α_i are islands fixed effects and $\boldsymbol{X_{i,t-1}}$ is the vector of explanatory variables taken at the *t-1* period to take account of potential endogeneity. In the case of a random-effect model we have:

$$y_{i,t} = \gamma_i + \beta_i \boldsymbol{X_{i,t-1}} + \varepsilon_{i,t} \quad (2)$$

i= 1,…,13; t=1,…,16

with $\gamma_i = \lambda + \alpha_i$, where α_i is a stochastic variable with zero mean and constant variance uncorrelated with the error term in Eq. (2).

The dependent variables are, in turn, the annual percentage change in GDP per capita and employment. As key territorial factors, we consider the stock of physical capital as a share of the total gross value added (K), the share of the population aged 25-64 with higher educational attainment (HK), the ratio of population to area (population density) as an index of agglomeration (AGGL) and the ratio of public sector gross value added to total gross value added as an index of sectoral specialization (PUBLSPEC). Moreover, to capture the local characteristics of the tourism industry, we use the ratio of overnights to arrivals as an index of demand (occupancy) (TOURDEM)[4], the ratio of the number of available beds to the number of establishments as an index of supply (TOURSUP), and the number of aircraft movements as an index of accessibility (ACCESS)[5]. We also include the initial period's level of per-capita GDP (or employment) to control for convergence dynamics. Therefore, the model takes two functional forms:

$$\Delta GDP_{i,t} = \beta_0 + \beta_1 GDP_{i,t-1} + \beta_2 \mathrm{K}_{i,t-1} + \beta_3 HK_{i,t-1} + \beta_4 \mathrm{AGGL}_{i,t-1} + \beta_5 \mathrm{PUBLSPEC}_{i,t-1} + \beta_6 \mathrm{TOURDEM}_{i,t-1} + \beta_7 \mathrm{TOURSUP}_{i,t-1} + \beta_8 \mathrm{ACCESS}_{i,t-1} + \varepsilon_{i,t} \quad (3)$$

i= 1,…,13; t=1,…,16

$$\Delta EMP_{i,t} = \rho_0 + \rho_1 EMP_{i,t-1} + \rho_2 \mathrm{K}_{i,t-1} + \rho_3 HK_{i,t-1} + \rho_4 \mathrm{AGGL}_{i,t-1} + \rho_5 \mathrm{PUBLSPEC}_{i,t-1} + \rho_6 \mathrm{TOURDEM}_{i,t-1} + \rho_7 \mathrm{TOURSUP}_{i,t-1} + \rho_8 \mathrm{ACCESS}_{i,t-1} + \varepsilon_{i,t} \quad (4)$$

i= 1,…,13; t=1,…,16

[4] We preferred such index of tourism demand to more simpler ones (such as number of arrivals), because the length of stay captured by the number of overnights to arrivals reflects a more advanced pattern of tourist destination demand that goes beyond the "hit and run" attitude of (especially international) tourists.

[5] Table A1 in the appendix presents some descriptive statistics and related literature for the operational variables included in the analysis.

Since the results obtained using these models may be affected by endogeneity problems, we perform two exercises to address this issue and check for the robustness of our findings,. First, similarly to Chang et al. (2012), we adopt an IV approach, in which we instrument tourism demand with the number of UNESCO sites on each island. Second, we incorporate dynamics into the model estimating dynamic panel system GMM-models (Blundell and Bond 1998, Forbes, 2000). In this case, the growth model to estimate in the second stage becomes:

$$\Delta y_{i,t} = \alpha y_{i,t} + \beta \boldsymbol{X}_{i,t-1} + v_t + \delta_i + \epsilon_{i,t}, \quad (5)$$

i= 1,…,13; t=1,…,5

where y_{it} is our performance variable (GDP per capita or employment), $\Delta y_{i,t}$ is the three-year annual average growth, $\boldsymbol{X}_{i,t-1}$is a vector of explanatory variables calculated at the beginning of each sub-period that are treated as endogenous (in our case all variables), v_t are time-fixed effects, δ_i are unobserved island-specific effects. In particular, to avoid over-identification problems due to a large number of potential instruments in a small sample, we estimate a five-period model where the three-year average growth (of GDP per capita or employment) is regressed against the explanatory variables taken at the initial period *t*, using also "collapsed" instruments.[6]

The empirical analysis is based on 13 islands of Mediterranean countries at NUTS 2 level belonging to 7 European countries (Cyprus, Greece, Spain, France, Italy, Malta, and Portugal) for the period 2000-2015. Table 1 shows the list of the islands included in the analysis.

Our main data source is the Eurostat REGIO database. This dataset provides data on GDP per capita, employment and a set of explanatory variables capturing different strategic territorial elements as well as local characteristics of the tourism industry. For the tourism variables we integrated our database with information provided by national sources[7].

(TABLE 1 AROUND HERE)

4. Results

[6] Collapsing instruments consists in using one instrument for each variable and lag distance, rather than one for each time period, variable, and lag distance (on this point see Roodman 2009a, 2009b, for details).
[7] The integration concerned some Greek and Portuguese islands for the initial years of the sample.

In Table 2, we report the main results concerning the estimation of the model for the GDP per capita growth of islands in the period 2000-2015[8]. In column 1, we can observe that the coefficient of tourism demand is highly significant in line with the tourism-led growth hypothesis. Less important, and not significant at a 10% level, is the tourism supply indicator coefficient (average number of beds in hotels). Accessibility, as measured by aircraft flights, also appears to have a positive impact on the growth of islands in the period under analysis. Nevertheless, other economic and territorial factors of growth seem to also play an important role. These include human capital (positive effect) and specialization in the public sector (negative effect).

(TABLE 2 AROUND HERE)

An interesting result concerns the sign of the coefficient of the agglomeration variable. The positive sign (significant at 5%) indicates that higher population pressure seems to be beneficial to island growth. We may conclude that the advantages of urbanization economies may prevail over the risk of congestion effects. However, higher population density can also drive tourism activities beyond the island structural capacity. This conclusion should be better tested by including an indicator of sustainability in the model, but the characteristics of the available data prevented us from taking this path[9]. Finally, the negative coefficient for the lagged level of the dependent variable indicates the prevalence for a convergence pattern.[10] From the econometric point of view, the robust Hausman test clearly indicates the favor for the fixed versus the random effects specification.

Interestingly, our results are robust to two exercises. The first is the inclusion in the model of a seasonality index interacted with tourism demand.[11] As known, island sensitivity to seasonality in tourism demand may be detrimental to growth and its exclusion from the estimations may lead to biased results. We addressed this point by including a new variable in the model resulting from the interaction of tourism demand and a dummy variable that takes a value of 1 when the seasonality index is above the average, and zero otherwise. This way we were able to proxy islands' potential overreliance on seasonal tourism. This exercise (Table 2 – model 2) shows a non-significant coefficient for the interaction variable and very similar results for the other explanatory variables with respect to those presented in the baseline model, suggesting that tourism seasonality is not a concern

[8] To check for the presence of multicollinearity we performed the VIF test and results for each explanatory variable are well below the threshold value of 10. We detected a maximum value of 4.32 with an average VIF of 2.77. Therefore, multicollinearity appears to be not an issue for our model.
[9] In particular, the variability over time of most available indices of natural endowment is small.
[10] The inclusion of the lagged level of the depend variable causes the non-significance of the capital stock coefficient given the direct relationship between capital and production.
[11] The seasonality index is computed as the ratio of overnights maximum (across each year) to overnights average (of each year).

of our model. On the other hand, we performed an additional robustness exercise. Given that two of our islands (Malta and Cyprus) are state-islands, we excluded them from the sample to check whether their presence may have affected our results. Results are confirmed in the restricted sample (Table 2 – model 3), suggesting that the differences from the institutional point of view (regions vs countries) seem to not affect our main conclusions.

Since the period of analysis covers the years of the Great Recession, we tried to take into account the specific effects of the crisis by including a dummy for all the years between 2008 and 2014[12]. Our results were mostly confirmed. When we control for the crisis years (Table 2 – model 4), the coefficients for tourism demand and accessibility are still significant. In addition, the agglomeration economies coefficient increases its significance as well as the human capital coefficient. Conversely, we lose significance for specialization in the public sector (though close to 10% level). [13]

In order to further test the role of the crisis, we expanded the base model in Table 2 - column (1) by including a dummy crisis for the slope coefficient for each of the explanatory variables. The results are presented in Table 3.

(TABLE 3 AROUND HERE)

One can notice that, for all the explanatory variables, the role of the crisis seems to have been negative though for agglomeration economies the interaction coefficient is very low and significant only at 10%. Conversely, in most specifications the coefficients of the explanatory variables in non-crisis years are positive and significant (this happens for tourism demand, human capital, agglomeration economies and accessibility). We may conclude that the Great Recession has changed the relative importance of territorial and tourism factors. For some of them the overall effect (including the crisis years) is still positive and significant. For agglomeration economies, the effect of the crisis is not very relevant. In other cases (specialization in the public sector) the crisis had a bigger negative effect reinforcing the general trend observed outside the crisis period. [14]

[12] We chose 2014 as last year of crisis since, for our panel of islands, the annual average per capita income and employment growth rate turned to be positive in 2015 (i.e., 2014-2015 change). We also performed a sensitivity analysis using 2013 as last year, and the results appear very similar to those presented in the paper.

[13] Also in this case we checked for the influence of seasonality on tourism demand by obtaining in some models negative and significant coefficients (as expected). Results are available upon request from the authors.

[14] We must warn the reader that such conclusions about the relative effect of the crisis on the explanatory variables should be tested with an analysis separating the sample into two subsamples. Data limitations prevented us from following this path.

In Tables 4 and 5 we replicated the results of Tables 2 and 3 by using employment growth as a dependent variable.[15] It is well known (Fingleton et al. 2012) that employment resilience may differ considerably from GDP resilience both in the time response and in the intensity of the effects.

(TABLE 4 AROUND HERE)

It should be stressed that, in the case of employment growth, the random effect specification should be preferred given the results of the Hausman test. Therefore, we concentrate our comments on columns 3 and 4 of Table 4 that display the estimates of the random effects model. In this case, our framework seems to perform well only when we take into account the crisis period. Most variables (capital stock, human capital, agglomeration) show positive and significant coefficients while others (specialization in the public sector), as expected, have negative and significant ones. The coefficients of tourism indicators appear to be not significant and, in some cases, with the wrong sign. It can be concluded that, for islands, tourism demand and supply as well as accessibility are less important determinants for employment growth than they are for GDP per capita growth.

(TABLE 5 AROUND HERE)

The analysis of interactions with specific dummy crisis for each explanatory variable confirms this statement (Table 5). Indeed, for capital stock and human capital there appears to be a positive effect in non-crisis years while both tourism supply and tourism demand never show significant coefficients.

When we try to address the potential endogeneity, the results are confirmed. In particular, when we use the IV approach by instrumenting tourism demand with its lags and the number of UNESCO sites on each island, all the coefficients of the explanatory variables (except for capital stock and human capital) including tourism supply, display the expected sign in the specification for GDP per capita (Table 6 - model 1). The Kleibergen–Paap rk Wald F-statistic equal to 17.33 is well above Staiger and Stock's (1997) rule of thumb value of 10, and is the evidence against the risk of a weakly identified model. Furthermore, the instruments satisfy the rank condition, since the Kleibergen–Paap rk LM statistic rejects the null hypothesis that the equation is under-identified. On the contrary, the model does not seem to perform well in the case of employment growth (Table 6 - model 2).

[15] In this case too, results are robust for the exclusion of Malta and Cyprus. They are not reported for brevity and are available upon request from the authors.

Similarly, the results for GMM estimation in the case of GDP per capita confirm our findings (Table 6 - model 3). In this case only human capital and tourism supply display non-significant coefficients.

(TABLE 6 AROUND HERE)

Finally, the negative coefficients for the lagged dependent variable indicate the prevalence for a convergence pattern since the growth of both GDP per capita and employment is negatively correlated with the level of the same variable in the previous period.

5. Final summary and remarks

This paper tried to examine the main factors of growth for island economies at the regional level. Specifically, we asked if the importance of tourism for the economic growth of these economies was still in place when including other important economic and territorial factors highly mentioned in the literature (i.e., physical and human capital, agglomeration economies, economic structure). We also tested a distinct role for tourism demand and supply and a specific impact of accessibility by airline connections.

We investigated the effect of the Great Recession on each single factor of growth. For robustness, the analysis of the resilience of islands was conducted by considering both GDP per capita and employment growth since the two variables usually show different trends during crises.

The conclusion we can derive from our investigation is fourfold. First, the factors of growth for regional islands are very similar to the ones used for other regions (i.e., Crescenzi et al. 2016; Mazzola et al. 2018, Romão and Nijkamp 2018) but the hypothesis of high relevance of tourism for growth is strongly supported. Both tourism demand and accessibility are more important than tourism supply. The tourism factor does not necessarily prevail over other territorial elements. Indeed, agglomeration economies and favorable or adverse specialization are equally important. Second, almost all traditional engines of growth as well as territorial and tourism determinants were affected by the crisis, although agglomeration economies seemed to be almost unaffected by the Great Recession period.

Therefore, a third final comment concerns the specific role of population density for growth which may contrast with a sustainable approach for development. This results may depend on the nature of our sample, which is composed by large islands of Mediterranean countries or by the fact that a sustainable tourism approach is more appropriate in the long run. Indeed, pressure from tourism

activity on the environment downgrades the natural and cultural resources of islands, on which their sustainable development depends. But it is also true that, for instance, tourism is a major activity for islands, and that its development over recent decades has stopped the economic and demographic decline of the area (Spilanis and Vayanni, 2003). Some islands (Azores) have faced the dilemma between mass and sustainable tourism through the implementation of strategic plans for tourism including the selection of tourism products (Couto et al., 2017) or local cooperation among public and private operators (Jordan, 2007). Nevertheless, tourism has been the engine of growth of the Balearic economy for many decades (Polo and Valle, 2016), confirming the high contribution of tourism and population density for local growth that we found in our analysis.

A fourth consideration concerns the applicability of our framework to different resilience indicators. Though the model performs very well in explaining GDP per capita growth in the Mediterranean islands, it does not give convincing results in explaining employment growth. Therefore, the determinants of employment are quite different and specific measures must be considered. Employment policies for islands may include encouraging people to stay, measures to avoid a mismatch between demand and supply in the labor market, specific educational policies, the development of products for the local market, and the improvement of the population's ability to face risks and vulnerability (Bojanic, 2013).

Our work analyzes the growth and resilience of islands in Mediterranean countries without contrasting it with the growth determinants of other non-islands regions explicitly. In addition, the limitations concerning the availability of trade data series at the regional level and the use of sound indicators for natural endowments in islands prevented us from considering additional issues particularly relevant for islands. Among these, the investigation of the role played by the greater openness of islands or by agglomeration forces vs. natural endowment during the crisis, and therefore the dilemma between mass *vs.* sustainable (quality) tourism on islands. These are relevant issues to be addressed in further research.

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TABLES

Table 1 – List of islands included in the analysis by NUTS 2 code and country of origin.

NUTS 2 code	Island	Country
CY00	Cyprus	Cyprus
EL41	Voreio Aigaio	Greece
EL42	Notio Aigaio	Greece
EL43	Kriti	Greece
EL62	Ionia Nisia	Greece
ES53	Illes Balears	Spain
ES70	Canarias	Spain
FR83	Corse	France
ITG1	Sicily	Italy
ITG2	Sardinia	Italy
MT00	Malta	Malta
PT20	Região Autónoma dos Açores	Portugal
PT30	Região Autónoma da Madeira	Portugal

Table 2 – Determinants of GDP per capita growth (Fixed effects)

	(1)	(2)	(3)	(4)
GDP_PC	-0.002***	-0.002***	-0.002***	-0.001**
	(-4.439)	(-4.295)	(-5.810)	(-2.441)
K	-2.022	-2.585	-1.622	2.271
	(-1.125)	(-1.340)	(-1.185)	(1.193)
HK	0.468*	0.480*	0.637***	0.592***
	(2.037)	(1.992)	(4.239)	(3.180)
AGGL	0.073**	0.078***	0.053*	0.145***
	(2.847)	(3.328)	(1.951)	(5.751)
PUBLSPEC	-80.836***	-79.009***	-80.100***	-38.266
	(-3.921)	(-3.999)	(-3.842)	(-1.700)
TOURDEM	3.973***	3.757***	4.308***	2.763**
	(3.913)	(3.365)	(3.492)	(2.587)
TOURSUP	0.040	0.028	0.062	0.005
	(1.137)	(1.095)	(1.672)	(0.174)
ACCESS	0.090**	0.086**	0.108**	0.059*
	(2.834)	(2.826)	(2.974)	(1.980)
DUMMY_CRISIS				-7.281***
				(-5.649)
TOURDEM*DUMMY_SEASONALITY_INDEX		0.465		
		(1.180)		
Observations	159	159	133	159
R-squared	0.347	0.360	0.427	0.554
Number of Islands	13	13	11	13
Robust Hausman test	21.61	19.52	25.20	26.69
p-value Robust Hausman test	0.006	0.021	0.001	0.002

Note: Robust t-statistics in brackets.*** p<0.01, ** p<0.05, * p<0.1. Column (3) refers to the same model of column (1) estimated excluding Malta and Cyprus.

Table 3 – The determinants of GDP per capita growth and the crisis (Fixed effects)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
GDP_PC	-0.001***	-0.001***	-0.002***	-0.001**	-0.001*	-0.001***	-0.001***
	(-3.375)	(-3.277)	(-4.297)	(-2.898)	(-2.051)	(-3.142)	(-3.561)
K	0.903	3.027	-2.106	1.265	3.015	-0.787	-0.246
	(0.522)	(1.714)	(-1.116)	(0.743)	(1.350)	(-0.364)	(-0.127)
HK	0.670**	0.829***	0.514*	0.633***	0.488**	0.573**	0.298
	(2.780)	(7.536)	(2.067)	(3.118)	(2.701)	(2.803)	(1.210)
AGGL	0.124***	0.144***	0.121***	0.103***	0.192***	0.186***	0.139***
	(4.316)	(4.188)	(5.198)	(3.708)	(7.724)	(4.841)	(4.152)
PUBLSPEC	-57.285**	-24.528	-84.432***	-22.626	-31.696	-63.113**	-55.759*
	(-2.492)	(-1.037)	(-3.939)	(-0.901)	(-1.466)	(-2.783)	(-1.963)
TOURDEM	3.332***	2.498*	4.060***	3.640***	2.655**	3.108**	3.832***
	(3.273)	(2.096)	(4.069)	(3.591)	(2.605)	(2.912)	(3.334)
TOURSUP	0.010	0.042	0.039	0.016	-0.003	0.053	0.035
	(0.295)	(1.269)	(1.147)	(0.449)	(-0.103)	(1.440)	(0.928)
ACCESS	0.063*	0.062*	0.086**	0.069**	0.038	0.067*	0.088**
	(2.159)	(2.171)	(2.730)	(2.252)	(1.566)	(2.087)	(2.428)
K*CRISIS	-1.504***						
	(-4.830)						
HK*CRISIS		-0.415***					
		(-8.784)					
AGGL*CRISIS			-0.004*				
			(-2.035)				
PUBLSPEC*CRISIS				-25.018***			
				(-4.513)			
TOURDEM*CRISIS					-1.431***		
					(-7.342)		
TOURSUP*CRISIS						-0.044***	
						(-3.743)	
ACCESS*CRISIS							-0.021***
							(-4.067)
Observations	159	159	159	159	159	159	159
R-squared	0.471	0.555	0.365	0.498	0.594	0.471	0.393
Number of Islands	13	13	13	13	13	13	13
Robust Hausman test	20.24	17.76	28.75	19.68	41.09	30.50	22.52
p-value Robust Hausman test	0.017	0.038	0.001	0.020	0.000	0.000	0.007

Note: Robust t-statistics in brackets.*** p<0.01, ** p<0.05, * p<0.1.

Table 4 – Determinants of employment growth (Fixed and random effects)

	(1) FE	(2) FE	(3) RE	(4) RE
EMP	-0.055**	-0.066**	0.002	-0.000
	(-2.310)	(-2.745)	(1.394)	(-0.011)
K	-2.248	-1.750	0.297	0.983*
	(-1.529)	(-1.277)	(0.515)	(1.857)
HK	0.272	0.430*	-0.037	0.122**
	(1.163)	(2.048)	(-0.743)	(1.970)
AGGL	-0.023	0.025	0.001	0.004*
	(-0.640)	(1.134)	(0.492)	(1.673)
PUBLSPEC	-45.530*	-14.997	-13.146	-15.804**
	(-2.116)	(-0.702)	(-1.305)	(-2.269)
TOURDEM	0.209	-0.788	0.420	-0.388
	(0.205)	(-0.923)	(1.097)	(-1.552)
TOURSUP	0.031	0.009	0.003	-0.012
	(1.709)	(0.715)	(0.182)	(-0.742)
ACCESS	0.054*	0.056**	-0.004	0.003
	(2.117)	(2.934)	(-0.765)	(0.548)
DUMMY_CRISIS		-4.222***		-3.865***
		(-4.694)		(-3.918)
Constant			-0.832	2.675
			(-0.286)	(1.392)
Observations	159	159	159	159
R-squared	0.196	0.290		
Number of Islands	13	13	13	13
Robust Hausman test	12.44	13.23		
p-value Robust Hausman test	0.133	0.153		

Note: Robust t-statistics in brackets.*** p<0.01, ** p<0.05, * p<0.1.

Table 5 – The determinants of employment growth and the crisis (Random effects).

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
EMP	0.000	0.001	0.002	0.000	0.000	0.001	0.002
	(0.264)	(0.802)	(1.340)	(0.431)	(0.162)	(0.689)	(1.355)
K	1.435**	1.029*	0.317	0.710	1.086*	0.537	0.528
	(2.344)	(1.882)	(0.538)	(1.458)	(1.894)	(0.948)	(0.936)
HK	0.110*	0.236***	-0.031	0.102	0.125**	0.069	0.016
	(1.816)	(2.795)	(-0.677)	(1.580)	(1.995)	(1.251)	(0.307)
AGGL	0.004	0.003	0.001	0.003	0.004	0.002	0.002
	(1.613)	(1.223)	(0.533)	(1.435)	(1.626)	(0.887)	(0.715)
PUBLSPEC	-15.671**	-17.402**	-13.090	-3.378	-16.983**	-13.980*	-15.021
	(-2.211)	(-1.966)	(-1.313)	(-0.455)	(-2.328)	(-1.732)	(-1.608)
TOURDEM	-0.260	-0.291	0.379	-0.106	-0.093	-0.238	0.173
	(-1.026)	(-0.825)	(1.026)	(-0.357)	(-0.386)	(-0.795)	(0.448)
TOURSUP	-0.012	-0.004	0.003	-0.007	-0.013	0.015	0.002
	(-0.769)	(-0.231)	(0.160)	(-0.449)	(-0.760)	(1.056)	(0.118)
ACCESS	0.002	-0.003	-0.004	0.001	0.002	-0.001	0.004
	(0.445)	(-0.640)	(-0.706)	(0.146)	(0.446)	(-0.210)	(0.566)
K*CRISIS	-1.043***						
	(-4.313)						
HK*CRISIS		-0.197***					
		(-4.626)					
AGGL*CRISIS			-0.000				
			(-0.160)				
PUBLSPEC*CRISIS				-15.144***			
				(-4.300)			
TOURDEM*CRISIS					-0.649***		
					(-3.691)		
TOURSUP*CRISIS						-0.023**	
						(-2.023)	
ACCESS*CRISIS							-0.017***
							(-4.030)
Observations	159	159	159	159	159	159	159
Number of Islands	13	13	13	13	13	13	13
Robust Hausman test	16.24	11.70	14.06	14.61	12.69	13.52	7.922
p-value Robust Hausman test	0.062	0.231	0.120	0.102	0.177	0.140	0.542

Note: Robust z-statistics in brackets.*** p<0.01, ** p<0.05, * p<0.1.

Table 6 – Instrumental Variables and dynamic panel data (GMM first step estimator) estimations.

	IV		GMM	
	(1)	(2)	(3)	(4)
	GDP	Employment	GDP	Employment
GDP_PC	-0.001**		-0.001	
	(-2.567)		(-0.117)	
EMP		-0.064***		-0.321***
		(-3.226)		(-4.669)
K	0.534	-2.073	25.193*	9.541
	(0.263)	(-1.498)	(1.853)	(1.554)
HK	-0.036	0.432	0.241	1.336
	(-0.196)	(1.369)	(0.140)	(1.396)
AGGL	0.103***	-0.016	0.435*	0.526***
	(3.517)	(-0.366)	(1.822)	(3.042)
PUBLSPEC	-66.038***	17.563	-392.578**	87.110
	(-3.212)	(0.699)	(-2.111)	(0.798)
TOURDEM	3.051***	-3.477*	13.104**	2.890
	(2.640)	(-1.941)	(2.436)	(0.725)
TOURSUP	0.051**	0.030	0.108	0.157*
	(2.449)	(1.330)	(0.718)	(1.844)
ACCESS	0.055**	0.028	0.317*	0.930***
	(2.105)	(0.886)	(1.955)	(3.030)
Observations	145	145	47	47
Number of Islands	13	13	13	13
R-squared	0.749	0.523		
Kleibergen-Paap rk LM statistic	30.57	25.63		
p-value	0.000	0.000		
Kleibergen-Paap rk Wald F-statistic	17.33	17.35		
Hansen J-statistic	2.003	9.396		
p-value	0.849	0.094		
Number of instruments (GMM)			16	16
Sargan test [a]			5.510	0.531
p-value Sargan test			0.138	0.912
AR(1) p-value			0.092	0.142
AR(2) p-value [b]			0.636	0.280

Note: Robust z-statistics in brackets *** p<0.01, ** p<0.05, * p<0.1. For IV: lags 1 to 3 of TOURDEM and the number of UNESCO sites and are used as instruments for tourism demand (TOURDEM). The Kleibergen– Paap rk LM-statistic tests the null hypothesis that the excluded instruments are not correlated with the endogenous regressor; the Kleibergen– Paap rk Wald F-statistic tests for weak identification. The Hansen test of overidentifying restrictions tests the null hypothesis that the instruments are uncorrelated with the error term. For GMM: Lags 1 and 2 of each variable are used as instruments. Instruments are "collapsed" (see Roodman 2009a, 2009b, for details). Time fixed effects included but not reported. [a] The null hypothesis of the Sargan test is that the instruments used are not correlated with the residuals. [b] The null hypothesis is that the errors in the difference regression exhibit no second-order serial correlation.

APPENDIX

Table A1 - Descriptive statistics

Variable	Description	Obs	Mean	Min	Max	Std. Dev.	Related literature using the same or similar operational variables
GDP_PC Growth	Annual GDP per capita growth rate	195	1.54	-13.78	11.62	4.49	Paci and Marrocu (2014)
EMPL Growth	Annual employment growth rate	195	0.65	-21.44	40.15	5.59	Fingleton et al. (2012)
K	Stock of physical capital/total gross value added	208	3.35	2.22	6.17	0.88	Chang et al. (2012), Paci and Marrocu (2014), Mazzola et al. (2018)
HK	Share of the population aged 25-64 with higher educational attainment (ISCED levels 5-8)	208	16.76	3.60	40.50	7.45	Paci and Marrocu (2014), Romão and Nijkamp (2018)
AGGL	Population/area	208	218.30	30.32	1395.84	323.73	Paci and Marrocu (2014)
PUBLSPEC	Public sector gross value added/ total gross value added	208	0.22	0.13	0.34	0.06	Fratesi and Rodríguez-Pose, (2016)
TOURDEM	Number of overnights/ number of arrivals	208	5.72	2.94	8.76	1.54	Cortés-Jiménez, I. (2008), Mazzola et al. (2018), Romão and Nijkamp (2018), Psycharis et al., 2014
TOURSUP	Number of available beds/number of establishment	204	116.10	24.47	256.09	63.57	Rey et al. (2011)
ACCESS	Number of aircraft movements (flights)	176	91.60	14.04	376.51	89.98	Cuccia et al. (2016)

Note: The stock of physical capita is obtained from gross fixed investments by means of the perpetual inventory method with a depreciation coefficient of 0.05.