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ECONOMÍA SOCIAL

4 VOL.

XXX JORNADAS
Luso - Espanholas
de **GESTÃO CIENTIFíCA**

'**cooperação transfronteiriça:**
desenvolvimento e coesão territorial'

5 a 8 FEV 2020 . Bragança

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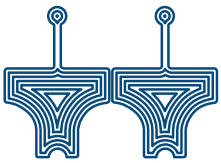

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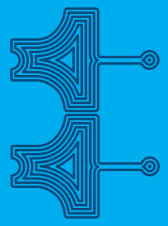

XXX

Título | Título
XXX Jornadas Luso-Espanholas de Gestão Científica.
Cooperação transfronteiriça: desenvolvimento e coesão territorial
Livro de Atas

XXX Jornadas Luso-Españolas de Gestión Científica.
Cooperación transfronteriza: desarrollo y cohesión territorial
Libro de Actas

Editores | Editores
Paula Odete Fernandes | UNIAG, Instituto Politécnico de Bragança
Alcina Maria Nunes | UNIAG, Instituto Politécnico de Bragança
Isabel Maria Lopes | UNIAG, Instituto Politécnico de Bragança
João Paulo Ribeiro Pereira | UNIAG, Instituto Politécnico de Bragança
João Paulo Ramos Teixeira | UNIAG, CeDRI, Instituto Politécnico de Bragança
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Antonio Navarro García | Universidad de Sevilla

Coordenação e Edição Gráfica | Coordinación y Edición Gráfica
Jacinta & Carlos Casimiro da Costa | Instituto Politécnico de Bragança

Publicação | Publisher
UNIAG | Instituto Politécnico de Bragança

Data de Edição | Fecha de Edición
dezembro | diciembre de 2020

Morada | Address
Campus de Santa Apolónia
5300-253 Bragança . Portugal
lusoespanholas2020.ipb.pt
jle2020@ipb.pt

VOLUME IV
ISBN: 978-972-745-280-4 | **URL:** http://hdl.handle.net/10198/23067

Comissão Organizadora | Comisión Organizadora

Paula Odete Fernandes (Chair)
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Financiado por UNIAG, unidade de I&D financiada pela FCT – Fundação para a ciência e a Tecnologia, Ministério da Ciência, Tecnologia e Ensino Superior, no âmbito do Projeto n.º UIDP/04752/2020.

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MEASURING NATURE TOURISM FIRMS' PRODUCTIVITY

Eleonora Santos, eleonora.santos@ipb.pt, Instituto Politécnico de Bragança, CeBER- Universidade de Coimbra
Alexandra I. Correia, acorreia@estg.ipvc.pt, UNIAG, Instituto Politécnico de Viana do Castelo
Fernanda A. Ferreira, faf@esht.ipp.pt, UNIAG, Instituto Politécnico do Porto
Alcina Maria Nunes, alcina@ipb.pt, UNIAG, Instituto Politécnico de Bragança
Cláudia Miranda Veloso, cmv@ua.pt, GOVCOPP, Universidade de Aveiro
Elvira Vieira, evieira@esce.ipvc.pt, Instituto Politécnico de Viana do Castelo
Goretti Silva, goretti@estg.ipvc.pt, Instituto Politécnico Viana do Castelo
Manuel Fonseca, manuelfonseca@esce.ipvc.pt, Instituto Politécnico de Viana do Castelo
Paulo Carrança, paulo.carranca@portoenorte.pt, Turismo Porto e Norte de Portugal
Paula Odete Fernandes, pof@ipb.pt, UNIAG, Instituto Politécnico de Bragança

ABSTRACT: Productivity measurement has been raising increasing interest in academia and recognized as critically important, since it is an important indicator for understanding the strengths and weaknesses of the tourism sector. This paper constructs two measures of productivity of nature tourism firms, i.e., labour productivity and total factor productivity, and compares firms' performance across NUTS II regions in mainland Portugal, during 2014-2017. Using data from SABI, Quadros do Pessoal, INE and the National Tourism Registry, the sample comprises 369 firms, representing 55% of firms operating in nature tourism in the mainland. Results show that the levels of TFP, contrary to labour productivity, are very uneven over time and space. In 2015, all regions experienced a negative increase in the TFP, except the Metropolitan Region of Lisbon, which seem to indicate that nature tourism firms in this region are more productive and resilient to external shocks.

KEYWORDS: Productivity, Tourism Industry, Regional Development.

1. INTRODUCTION

Tourism involves a growingly wide range of stakeholders, different activities, and types of enterprises, including, multinationals and small and medium enterprises (which constitute the majority of companies in the sector) and that are accounting for an important share of economic activity in most countries (WTO 2014; Turismo de Portugal 2018).

Considering the importance of Tourism to the world economy, productivity measurement has been raising increasing interest in academia and recognized as critically important, once it is an important indicator for understanding the strengths and weaknesses of the tourism sector.

According to Schreyer (2001, p. 11), productivity is commonly defined as a "ratio of a volume measure of output to a volume measure of input use". In tourism, productivity measures how efficiently and effectively certain production inputs are used in an economy to produce a given level of output, by relating the number of inputs, notably employment of labour and capital, to outputs (Blake et al., 2006). However, measuring productivity in tourism, a service-based sector where in many cases personal contact is required, is complex, given the different tools and measures of inputs and outputs.

Because increased productivity can lead to economic growth without any additional inputs, tourism firms aim at increasing their productivity to earn higher income through the generation of greater outputs; governments are interested in improving the productivity of their tourism markets to achieve higher levels of economic growth; and scholars are interested in how tourism productivity affects economic growth. Thus, the research agenda of the United Nations World Tourism Organization (UNWTO) has paid particular attention to tourism productivity (Assaf & Dwyer, 2013). However, Milio (2014) observed that, after the international crisis started in 2007, regions highly specialized in tourism have shown a lack of resilience with major difficulties to recover their trajectories of economic growth. Furthermore, European regions with high

specialization in tourism (measured by the share of the employment in this sector in the regional labour force) tend to exhibit lower levels of gross value added, along with lower levels of education (Romão & Neuts, 2017).

Tourism in Portugal has been critical for the national economy, and the results obtained in the last year confirm the growth trend, reinforcing the importance of the sector (Turismo de Portugal, 2018). In this context, the Amusement and Recreation Activities have been growing in importance, given the focus on the quality of the tourist experience, and their contribution to the establishment of visitors/tourists, job creation, and destination development (National Observatory of Tourist Animation, 2013, cited in Leite, 2018). Furthermore, Amusement and Recreation Activities play a decisive role in projecting local identities, underpinning the economic development of the regions (Leite, 2018).

Amusement and Recreation Activities refers to a set of activities aimed at transforming leisure into dynamic, participatory and creative activities, making it possible to reconcile tourism, sports, and nature, allowing tourists to enjoy the activities in the richness of the environment (Leite, 2018). According to the legislation in force (Decree-Law No. 186/2015 of 3 September, Amusement and Recreation Activities include recreational activities, sports or cultural activities, which are configured as outdoor tourism activities or cultural tourism and are of interest to tourism for the region in which they develop (Ministério da Economia, 2015).

As described in Ministério da Economia (2015),'open-air tourism activities', are also known as 'outdoor activities', 'active tourism' or 'adventure tourism' and they refer to activities that cumulatively: (i) predominantly take place in natural spaces, resulting in diversified experiences of enjoyment, experimentation and discovery of nature and landscape, whether or not if in physically equipped facilities; (ii) assume logistical organization and or supervision by the provider; iii) Implies a physical interaction of the recipients with the surroundings. In turn, 'cultural tourism activities' refer to pedestrian or transport activities, which promote contact with the cultural and natural heritage through mediation between the recipient of the service and the cultural good enjoyed, for knowledge sharing.

The before mentioned activities imply physical effort, to a greater or lesser extent and these activities range from passive (e.g. sitting, relaxing, enjoying a view) to active, (e.g. skiing, mountain biking, horse riding), and they can be undertaken by individuals alone, or in family and friends groups (Bell et al., 2007). When the focus is rather on adventure, it also involves challenge, and risk-taking (Houge et al., 2016). Based on Beedie & Hudson (2003), these activities can be distinguished between 'hard' and 'soft, where activities like rafting, scuba diving, mountain biking, rappelling, cliff jumping, river crossing, paragliding, rock climbing, and bouldering can be considered as 'hard', whereas 'soft' outdoor activities include walking, cycling camping, hiking, biking, animal watching, horseback riding, canoeing, and water skiing. In recent years, these activities have become increasingly important for visited regions given its economic implications, and therefore, different forms of tourism have grown in popularity, and have captured practitioners' interest (Bell et al., 2007). This recognition creates opportunities to extend the existing knowledge about the impacts of outdoor tourism activities by approach these activities from a supply perspective.

Therefore, the potential effect of tourism on productivity growth, particularly, the nature tourism activities, is yet to be uncovered. Given that, in 2015 and 2016, the North of Portugal was the second and first region that grew most regarding the number of guests, respectively, (see Figure A1 in the appendix), our goal is to assess how this translates into increases in productivity. Indeed, assuming underemployment, if firms' turnover increases due to increased demand and it is not necessary to increase the production factors in the short run, then total factor productivity will increase. Thus, using two productivity measures, this study examines the relative position of the NUTS II regions of mainland Portugal, in 2014-2017. Thus, this study contributes to an in-depth understanding of tourism firms' contribution to regional productivity in mainland Portugal that has not been fully revealed in the previous literature.

Following the introduction, a literature review on the tourism firms' productivity is performed. In section 3, information on the data source and methodology is provided. Section 4 presents and discusses the results; and section 5 concludes.

2. LITERATURE REVIEW

Tourism is a component of aggregate demand that generates domestic output (Lin et al., 2018) and is regarded as a form of export that can inject cash-flow into the economy (Chou, 2013). Accordingly, a considerable amount of the literature on Tourism has been focused on the macro-level issues.

Early studies that aimed to calculate the total economic impact of Tourism focused on estimating tourism's income or the expenditure multiplier effect (Archer 1984) through cost-benefit analysis (Dwyer & Forsyth 1998) and input–output analysis (Frechtling & Horváth, 2016). Subsequently, targeting more accurate measurements, authors used computable general equilibrium models (Inchausti-Sintes 2015; Njoya & Seetaram 2018). More recently, the majority of empirical studies test the tourism-led growth hypothesis (Zuo & Huang 2018; Carmignani & Moyle, 2018).

Although it is clear that tourism development is positively related to economic growth (Pablo-Romero & Molina, 2013; Brida et al., 2016), few studies have examined how tourism productivity affects the whole economy.

In tourism, the areas in which productivity has been studied are hotels (e.g. Barros & Alves, 2004; Cordero & Tzeremes, 2018; Liu & Tsai, 2018; Chatzimichael & Liasidou, 2019; Tzeremes, 2019), restaurants (Reynolds & Biel, 2007; Kukanja & Planinc, 2018; Kim & Jang, 2019) and travel agencies (Botti et al., 2010; Fuentes & Alvarez-Suarez, 2012; Díaz-Chao et al., 2016; Zuo & Li, 2018). However, to our knowledge, only one research (Kinfemichael & Morshed, 2019) included the Amusement and Recreation Activities in the analysis.

For example, Barros and Alves (2004) analysed the efficiency of a Portuguese public-owned hotel chain, observed in the sample of 126 observations, for the period 1999-2000. They used an output-oriented Malmquist-productivity index and data envelopment analysis (DEA), a nonparametric technique, to estimate the total factor productivity (TFP) change. This index allowed to broken down the TFP into a pure-efficient change index and scale-efficient change index. Barros and Alves (2004) found mixed results, i.e. some hotels obtained gains in both areas and others obtained gains in one area while experienced losses in the other. Only a small number of hotels achieved TFP improvements, with a larger fraction achieving improvements in technical efficiency and only a small fraction achieving improvements in technological change.

Using a sample of 820 Spanish hotels from Balearic and Canary Islands, Cordero and Tzeremes (2018) analyse hotels' labour productivity growth in 2007-2012. They decompose labour productivity into technological change, technological catch-up (efficiency improvement/convergence) and capital deepening. Their results suggest that hotels' labour productivity is resilient facing the financial crisis.

Using a Hicks–Moorsteen index approach, Liu and Tsai (2018) investigate the TFP growth, technological progress, pure technical efficiency change, scale efficiency change, and mix efficiency change of star-rated hotels in China, in 2001-2015. Their results show that the annual average growth rate of TFP was 13.11%, mainly attributed to an annual average growth rate of operational efficiency of 21.85% and a mix efficiency growth rate of 13.52%.

Chatzimichael and Liasidou (2019) decompose hotel-sector TFP growth into components attributable to changes in technical efficiency, scale effect, and technical change. The hotel-sector production Frontier is approximated parametrically using an approach that does not requires data on prices. They use a translog production function to estimate productivity growth and its components in a sample of 25 European countries, in 2008-2015.

In turn, Tzeremes (2019) applied the robust Luenberger productivity index (LPIs) alongside their main components to a sample of 176 hotels in the Canary Islands, Spain, from 2004 to 2013. The analysis was performed over several sub-periods concerning the Global Financial Crisis (GFC). The results indicated that hotels increased their productivity levels during the period and, also, they have demonstrated strong resilience during the global financial crisis. In their research, they obtained a contradiction when comparing the robust and original LPIs. Their findings suggest that the original LPIs underestimate hotel productivity levels due to the presence of outliers in the sample.

Reynolds and Biel (2007) suggest that productivity analysis through maximizing operational outcomes while minimizing expenses might be possible through the application of a holistic productivity metric that includes traditional operational variables (revenue, profit, food cost, and labour cost) and new variables such as guest

and employee satisfaction as well as retention equity. Through data from a chain's 36 corporate-owned restaurants located in the United States, they found that factors leading to maximum outputs such as controllable profit and retention equity include employee satisfaction in addition to expected variables such as cost of goods sold and number of seats.

Kukanja and Planinc (2018) used Data Envelopment Analysis (DEA), based on secondary-financial data provided by the national tax authorities, for 142 small and medium-sized Slovenian restaurants in 2017 to analyse their efficiency. Results showed that the average efficiency score is 85%, which indicates that, on average, restaurants have to increase their efficiency level by 15% in order to improve their efficiency according to the most efficient (best-performing) units under comparison.

Based on the equity theory and fair-wage hypothesis, Kim and Jang (2019) investigate the relationship between the minimum wage and restaurant productivity in the US, for 1980-2014. The sample OF 1926 firm-year panel data for 242 restaurants comes from the Department of Labour website and the COMPUSTAT annual database for the federal minimum wage rate and company financials, respectively. The results revealed that increasing the minimum wage enhances restaurant productivity for up to two years. The results further indicated that both full-service restaurants and low-wage restaurants benefit from the positive effect, while there is no significant effect on limited-service restaurants and high-wage restaurants.

Botti et al. (2010) use a procedure based on the Luenberger productivity indicator for estimating and decomposing productivity change into efficiency change and technological change in the Portuguese travel agency sector for 2000-2004. They use sales and profits as proxies of output; and wages, capital, total operational cost excluding wages and book value of premises as proxies of inputs. Nominal variables are deflated using the GDP deflator. Data are obtained from reports published annually by the newspaper, *Diário de Notícias*, on the 1,000 largest firms in Portugal. Their results show that productivity has increased for the majority of the travel agencies, almost always explained by an improvement of technological change.

Fuentes and Alvarez-Suarez (2012) analyse the productivity of 22 travel agencies located in Alicante (Spain), in 2004-2007, to obtain results on efficiency. They use Malmquist indices and the smoothed bootstrap method; and the Mann-Whitney U test has been adopted to study the relationships between levels of productivity, ownership type, location and experience. The results do not present an optimistic view regarding the evolution of the economic activity of the agencies.

Using survey data for 120 small and medium-sized travel agencies based in Catalonia (Spain) and partial least square–structural equation modelling (PLS-SEM) estimation techniques, Díaz-Chao et al. (2016) examine new co-innovative sources of firm labour productivity. They find that labour productivity is directly explained by those agencies' capacity to exploit their assets, to use local networks, and to make international transactions.

Co-innovation practices have a negative impact that may be related to difficulties in terms of securing productivity improvements in the short term.

Based on cross-sector, cross-regional panel data collected from, in 2001-2014, Zuo and Li (2018) focus the accommodations, travel agencies, and tourist attractions to study the relationship between resource reallocation and changes in sectoral productivity. They use a sequential data envelope analysis (DEA) model to measure the heterogeneous productivity changes. They find a deterioration of the allocative efficiency in China.

Kinfemichael and Morshed (2019) use disaggregated data for the period 1987–2015 from the US Bureau of Economic Analysis, to examine sectoral unconditional convergence in labour productivity in the US states. Their results show a general slowing down in the rate of convergence of labour productivity in the recent years. The authors uncovered a new catching-up process for some subsectors, such as accommodations, and amusement, gambling, and recreation services.

For the tourism industry, Pham (2019) developed a framework that integrates the principles of the growth accounting framework and tourism satellite account (TSA), to provide a holistic approach to calculate the largest three productivity measures: capital productivity, labour productivity, and multifactor productivity, for the Australian tourism industry. Using two sources of information, one of which provides three series: hours worked, capital services and real GVA indices for all conventional industries, three tourism indexes are calculated as the weighted sum of these series using the corresponding shares. The series of hours worked is

aggregated using the compensation of employees (COE) shares; capital services is aggregated using the gross operating surplus (GOS) shares and the gross value add (GVA) is aggregated by using the GVA shares. The shares were calculated based on nominal values to closely reflect the Laspeyres chain volume index. In his work, productivity measures capture around 80% of the entire tourism industry. The findings are that, in Australia, tourism is a reservoir to accommodate fluctuations in demand for labour in the economy.

From the above mentioned studies, among all possible types of productivity measures, the most commonly used are labour productivity (LP) which measures the growth in value-added output per unit of labour used, and the multi-factor productivity (MFP) calculated through a growth accounting framework. The inputs used are usually labour, raw materials, capital or a combination of all three; while the output is usually either: turnover, gross value added (GVA) or gross domestic product (GDP). The components of the tourism productivity may be the number of jobs directly attributable to tourism (tourism direct jobs), as the input; and the gross value added (GVA) directly attributable to tourism (tourism direct GVA (TDGVA)), as the output. The approaches to measuring tourism productivity are the Data Envelopment Analysis (DEA), the Stochastic Frontier Analysis (SFA), and occasionally the Malmquist index and Luenberger productivity indicators (LPIs). The LPI takes the value of 0 if there is not any productivity change among periods t and t + 1. However, positive values mean a progress of productivity levels; whereas negative values suggest a decline of productivity levels. These indicators can be estimated either by parametric or nonparametric methods. Also, growth regressions and Growth Accounting Frameworks are used.

Despite the recognised importance and the number of existing papers that provide an overview of productivity, its measurement and the tourism-specific challenges (Joppe & Li, 2016); productivity is still under-researched with regard to tourism firms (Blake et al., 2006; Joppe & Li, 2016), especially the attempt to address productivity within one of tourism's sub-sectors, such as the Amusement and recreation activities (code 93.2 NACE revision 2) in Portugal.

3. METHODOLOGY

3.1. DATA SOURCES

This paper constructs two measures of productivity of nature tourism firms, i.e., labour productivity and total factor productivity, and compares firms' performance across NUTS II regions in mainland Portugal, during 2014-2017. The identification of firms operating exclusively in nature tourism was obtained from the National Tourism Registry (RNAAT). The database from RNAAT showed 1023 touristic agents. Subsequently, there was a need to collect financial data from the SABI database financial reports. Bureau van Dijk (BvD) collects and harmonises the data from the mandated firm reports. In particular, in the Portuguese case, financial data come from *Informação Empresarial Simplificada* (IES).[1]

This information is collected in a massive way by Coface, BvD's partner for Portugal, that send it to BvD for consequent upload in SABI database. However, since SABI does not provide financial reports of entrepreneurs, 343 tourism agents were withdrawn. We obtained 428 firm reports via SABI database. Afterwards, we have withdrawn 14 firms that were located in the Islands (Madeira and Azores) because the published statistics of *Quadros do Pessoal* do not provide information on employees, according to qualification level, for the Islands. After cleaning data regarding firms with missing values for all years, the sample comprises 369 nature-based Amusement and Recreation Activities firms (code 93.2 NACE revision 2). Thus, the sample represents 55% of total firms operating in nature tourism in the mainland for 2014-2017 (see Table A2 in the Appendix). The sample size grants the reliability of conclusions at 95% level of confidence.

To calculate the variable human capital (w) for the estimation of the TFP, we have multiplied the number of employees of each firm by the regional coefficient (see Table A3 in the Appendix). This coefficient is the share of employees with at least a degree in total, by NUTSII regions, obtained from *Quadros do Pessoal* for

[1] Simplified Business Information.

2014 to 2017. Subsequently, the missing values in the sample were attempted to be filled through multiple imputation[2].

3.2. EMPIRICAL STRATEGY

We use two measures of productivity: labour productivity and total factor productivity, in order to assess the relative performance of nature tourism firms across NUTS II regions in mainland Portugal, during 2014-2017.
For this purpose, the labour productivity is calculated as the ratio between turnover and the number of employees.

We estimate the level of TFP, rather than the output per capita, using an augmented Solow Model type of equation. According to Griliches and Mairesse (1995), estimating growth equations with firm level panel data can lead to specification problems as well as the invalidity of instruments for capital and employment at the firm level. A way to address the issue of endogeneity in capital, and the possibility of productivity shocks is to use a two-step approach and estimate TFP using the Wooldridge (2009) modifications to the original Levinsohn-Petrin (LP) (2003) value added approach, according to equation (1):

$$Y_{it} = A_{it} K_{it}^{\beta k} L_{it}^{\beta l} M_{it}^{\beta m} \quad [1]$$

where Y_{it} represents physical output of firm *I* and period *t*, K_{it}, L_{it} and M_{it} are the inputs of capital, labour and materials, respectively. A_{it} is the Hicksian neutral efficiency level (our concept of total factor productivity – TFP) of firm *i* in period *t*. For a given level of A, higher output levels demand higher inputs (K, L and M) levels.

It is assumed that $L = L^{P} + L^{NP}$, where L^{P} stands for production worker (unskilled) labour and L^{NP} stands for non-production worker (skilled) labour. L^{NP} is constructed as explained in 3.1, since we do not possess information for individual firms.

Although we can observe Y_{it}, K_{it}, L_{it} and M_{it}, A_{it} is not observable and hence, needs to be estimated.

The estimation of $A_{it,}$ depends on several different components such as skills, knowledge and firm-level capabilities, including managerial and organisational competences. We assume that A_{it} or TFP in logs is given by:

$$ln\ (A_{it}) = \beta_0 + \varepsilon_{it} \quad [2]$$

where β_0 measures the mean efficiency level across firms over time; ε_{it} is the time- and producer-specific deviation from that mean.

Taking natural logs of equation (1) and inserting equation (2) we obtain a linear production function

$$y_{it} = \beta_0 + \beta_k k_{it} + \beta_{lP} l^{P}{}_{it} + \beta_{lNP} l^{NP}{}_{it} + \beta_m m_{it} + \varepsilon_{it} \quad [3]$$

where lower-case letters refer to natural logarithms. The error term ε_{it} can be further decomposed into an observable (or at least predictable); and an unobservable i.i.d. component, representing unexpected deviations from the mean due to measurement error, unexpected delays or other external circumstances, i.e, $\varepsilon_{it} = v_i + u^{q}_{it}$. Hence, equation (3) becomes

$$y_{it} = \beta_0 + \beta_k k_{it} + \beta_{lP} l^{P}{}_{it} + \beta_{lNP} l^{NP}{}_{it} + \beta_m m_{it} + v_{it} + u^{q}{}_{it} \quad [4]$$

Since the firm-level productivity[3] is $tfp_{it} = \beta_0 + v_{it}$ and rearranging the terms of equation (2) we obtain

[2] Multiple imputation is an iterative method to address missing data and fittingly reproduce the variance/covariance matrix one would have observed. In this process, the distribution of the observed data is used to estimate multiple values that reflect the uncertainty around the true value. These values are then used in a OLS model, and the results combined.

$$tfp_{it=}y_{it} - (\beta_k k_{it} + \beta_{lP} l^{P}{}_{it} + \beta_{lNP} l^{NP}{}_{it} + \beta_m m_{it}) - u^{q}{}_{it} \quad [5]$$

And the estimated productivity is

$$\hat{tfp} = tfp_{it} + u_{it}^{q} \quad [6]$$

This empirical model allows us to address the simultaneity bias in traditional OLS regression techniques to estimate the TFP when unobserved productivity or TFP shocks, *I* and *t*, are correlated to the choice of inputs. Since the Olley-Pakes (1996) and Levinsohn-Petrin (LP) (2003) techniques, while controlling for the simultaneity bias, suffer from collinearity problems (Ackerberg et al., 2007), and later, Wooldridge (2009) suggested modifications to the original LP approach aiming to correct the collinearity issue.
Defining the value added as $va_{it}=y_{it}-\beta_m m_{it}$, then it can be estimated through equation (4) as a residual

$$\hat{tfp}_{it} = va_{it} - (\hat{\varepsilon}_P l_{it}^{P} + \hat{\varepsilon}_{NP} l_{it}^{NP} + \hat{\varepsilon}_K K_{it}) \quad [7]$$

4. RESULTS

Results, shown in Figure 1, reveal that the labour productivity of firms operating nature-based activities in the Metropolitan region of Lisbon is higher, followed by the one from firms in Alentejo and Algarve. The Northern region ranked in the fourth position in 2014 but dropped to last position in the following years.

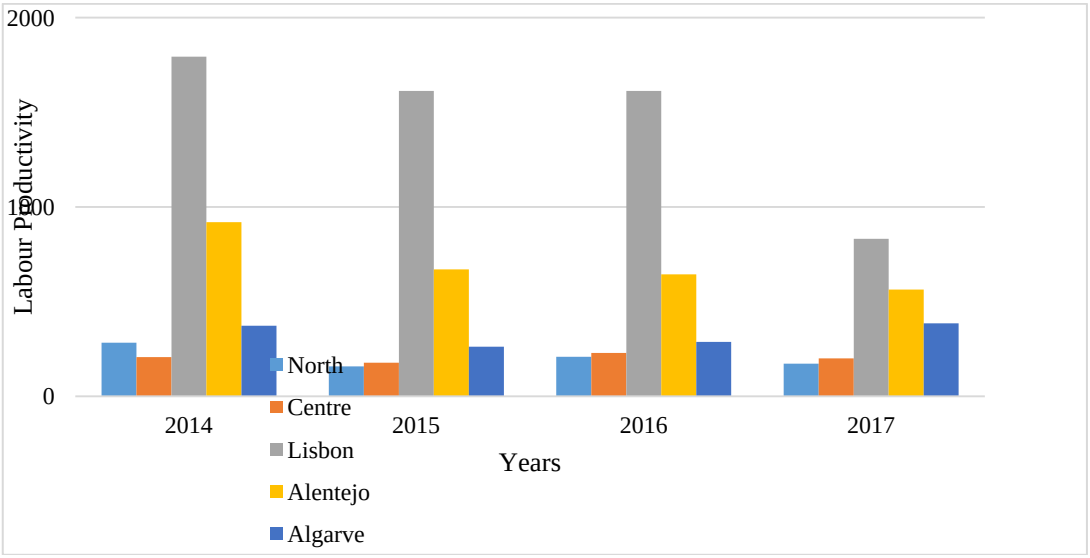

Figure 1: Labour productivity across NUTS II regions, 2014-2017
Source: Own elaboration

Regarding the TFP, according to Figure 2, the higher level was recorded in firms operating in Algarve in 2014; and in the Metropolitan region of Lisbon in the following years. Firms in the Northern region and *Alentejo* ranked in the third position in 2014. In 2015, the Northern region ranked in last position but in 2016 ranked in the third position. This may be explained by the annual increases in tourism demand (guests) in 2015 and 2016 (see Figure A1 in the Appendix). Surprisingly, firms in *Algarve* show the worst position regarding the TFP in 2016, although they have recovered in 2017, rising to the third position. Although the central region shows the worst performance regarding the TFP; in 2016 firms ranked in second, once again this can be explained by the annual increases in tourism demand (guests) in 2015 and 2016. However, in the following year those firms recorded levels of TFP in line with those recorded in 2014-2015.

[3] The productivity term is identified assuming that tfp_{it} is a state variable in the firm's decision problem (i.e. it is a determinant of both firm selection and input demand decisions), although $u^{q}{}_{it}$ is either the measurement error or a non-predictable productivity shock (Olley and Pakes, 1996).

These results seem to indicate that the levels of TFP, contrary to labour productivity, are very uneven over time and space. The exception is the Metropolitan region of Lisbon. This can be explained from the fact that the calculation of the TFP requires a greater number of production factors other than labour, that can suffer impacts from various internal and external factors to the firms. However, these results should be read with caution since the calculation of the TFP did not account for the real human capital in each firm but an estimate of the amount of *w*, considering that firms operating in Amusement and recreation activities hire the exact amount of skilled labour (measured as employees with at least a degree) as the mean for the whole region.

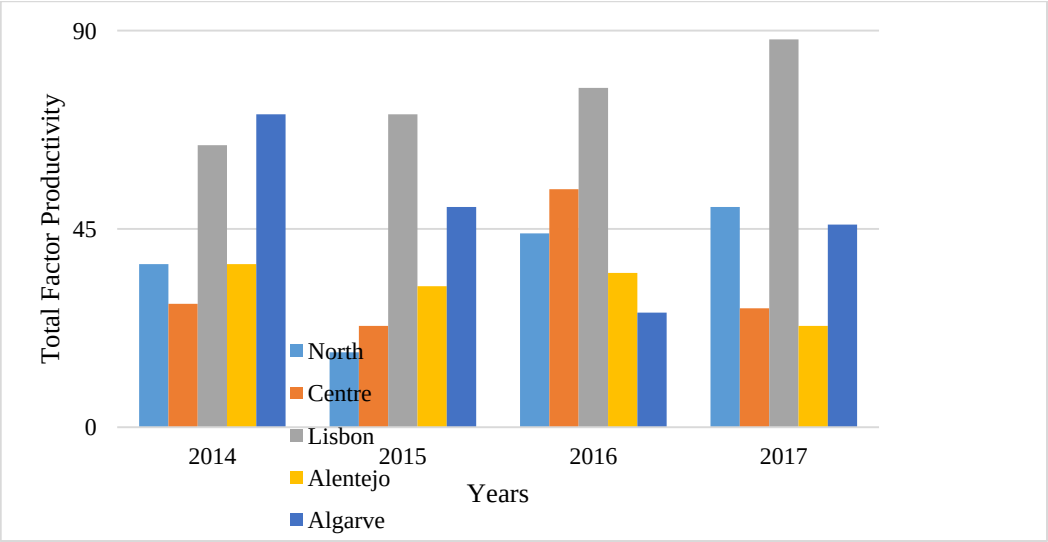

Figure 2: Total Factor Productivity across NUTS II regions, 2014-2017
Source: Own elaboration

Next, we analysed the labour productivity and TFP growth (see Figures 3 and 4, respectively). Results in terms of labour productivity growth (Figure 3) show that labour productivity increases in 2015-2017 were generally negative, except in 2016 for the Northern and Central regions (which grew 32% and 29% respectively) and in 2016-2017 for the Algarve region (10% and 34%, respectively).

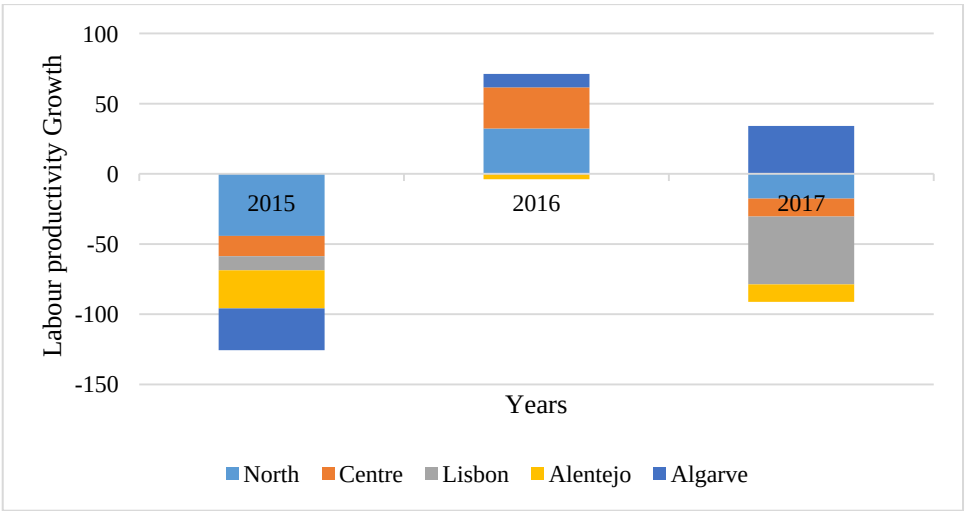

Figure 3: Growth of Labour productivity across NUTS II regions, 2015-2017
Source: Own elaboration

The results on TFP growth (Figure 4) show, once again, that 2016 was favourable for the productivity of nature tourism firms operating in the Northern and Central Portugal, with TFP increases of 159% and 135% respectively.

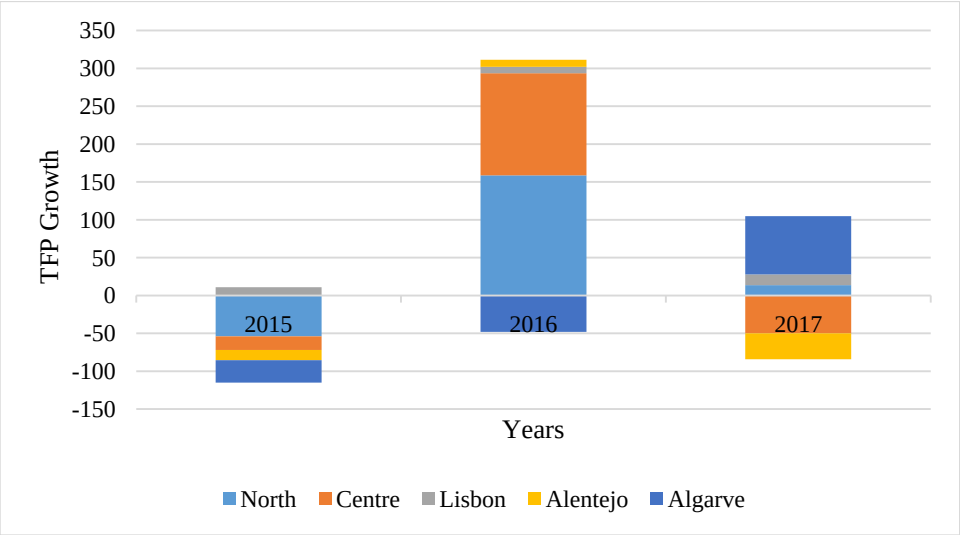

Figure 4: TFP growth across NUTS II regions, 2015-2017
Source: Own elaboration

The Metropolitan Region of Lisbon recorded increases in the TFP during the whole period, although they were not uniform. Indeed, the TFP grew more in 2015 and 2017. Firms in *Alentejo* only experienced positive TFP growth in 2016 (9%), while firms in Algarve only recorded positive TFP growth in 2017, albeit of great magnitude (77%). It should be noted that in 2015, all regions experienced a negative increase in the TFP, except the Metropolitan Region of Lisbon, which seem to indicate that nature tourism firms in this region are more productive and resilient to external shocks.

5. CONCLUSION

In 2018, with nearly 25 million guests, Portugal presented historical results for national tourism in the following indicators: overnight stays, revenues, guests, employment and exports, and tourism was considered the largest export economic activity in the country with 8,2% contribution to GDP (Tourism of Portugal, 2018). Based on the Travel & Tourism Competitiveness Index 2017 and UNWTO World Tourism Barometer, Portugal is considered the 14th most competitive destination in the world (Tourism of Portugal, 2018).

Tourism is characterised by including intangibility, simultaneous production and consumption, perishability, and heterogeneity, which compound the complexity of capturing productivity in services (Joppe & Li, 2016). Also, and apart from the specific features of the sector, the combination of other measures considered as inputs and outputs than expected ones (e.g. costs) has already been highlighted. For example, the involvement of consumers in the value creation process, service quality, value-added to services through experiences, innovations, human capital (Joppe & Li, 2016), employee satisfaction, and controllable profit and retention equity (Reynolds & Biel, 2007). Furthermore, contributing the complexity of measuring productivity in tourism, is the recognition the volume and structure of tourism sector are defined on the basis of consumption generated by tourists, and not by residents, isolating and distinguishing consumption by tourists from that of non- tourists (e.g., residents) or those who are not final consumers (e.g., tour operators), is not an easy task (Joppe & Li, 2016).

Productivity improvement in the tourism industry is more related to service innovations that improve the experiences of tourists, unlike the manufacturing industry that can improve productivity by introducing new technology into the production process (Chen & Soo, 2007). In addition, because productivity is not exogenous, New growth theory suggests that it can be assisted by knowledge spillover effects in human capital and public investment (Romer, 1986), which is more consistent with the more labour-intensive and less physical capital-intensive features of the tourism sector.

Tourism can absorb underemployed labour to increase the overall economic productivity due to its strong forward and backward sectorial linkages (Blake et al. 2006). When labour and other production factors move from a less productive sector such as agriculture to a more productive service sector like tourism, this

structural change process with productivity growth may represent a mechanism through which tourism can generate domestic output and contribute to economic growth.
In Portugal, more and more tourism entertainment/animation companies are emerging and organizing recreational, recreational, sports and/or cultural activities, which are directed to visitors/tourists (Turismo de Portugal, 2013). These activities are becoming increasingly important in meeting the needs of people looking for participatory and active tourism, with various emotions, experiences, and fun. Thus, these tourist activities contributing to increasing visitors' satisfaction level. In 2018, Portugal reached a record for the creation of tourist animation/entertainment companies, with 2.107. In total, and considering the last ten years, there is a total of 8,952 businesses registered in Portugal (Turismo de Portugal, 2019).

Empirically, the overall results confirm that the levels of TFP of nature-based firms, contrary to labour productivity, are very uneven over time and space. The exception is the Metropolitan region of Lisbon. In addition, labor productivity analysis reveals that Lisbon companies have higher productivity rates. Furthermore, firms' performance in this region in 2015, regarding the TFP growth, seems to indicate that nature tourism firms are more productive and resilient to external shocks.

The results from crossing the data on changes in tourism demand (number of guest) with firms' performance regarding productivity, especially for the northern and central regions, seem to indicate that increased tourism demand is immediately and directly reflected on the levels of labor productivity; while this relationship is confirmed with the levels and the TFP growth with one-year lag.

In terms of regional development, these results imply that policy measures to increase Tourism and the productivity of tourism firms in the Northern region as well as in the other regions, other than the Metropolitan region of Lisbon, are required. How well firms react to challenges in their operating environments depends on the capability of their employees and the systems that support them. Thus, investment in human capital development is important to innovation and the associated productivity increases. The demands of the 'information age' entail higher level skills via formal education and training. However, the innovations that are prone to increase firms' productivity commonly arise from the absorption and application of knowledge generated externally (Santos & Khan, 2019). Hence, policy measures aiming at increase firms' productivity may include supporting partnerships between firms. This can be attained by several ways: providing linkage information in seminars, exhibitions and missions; sponsoring fairs and conferences; organising meetings; promoting associations; and providing advice on deals. Other measures include the regulatory regimes for business and foreign investment as vehicles of knowledge transfer.

AKNOWLEDGMENTS

This research is a part of a project title "TURNOUT: Desenvolvimento do Turismo Outdoor da Região Norte de Portugal", with the reference POCI-01-0145-FEDER-032289; funded by the European Regional Development Fund (FEDER) (through the Operational Programme 'Innovation and competitiveness') and by the Portuguese Foundation for the Development of Science and Technology (FCT), of the Ministry of Science, Technology and Higher Education. This work is, also, funded by National Funds through the Foundation for Science and Technology under the project UID/GES/04752/2019.
The SABI database was made available by the Applied Management Research Unit (UNIAG), according to the protocol between UNIAG and COFACE.

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APPENDIX

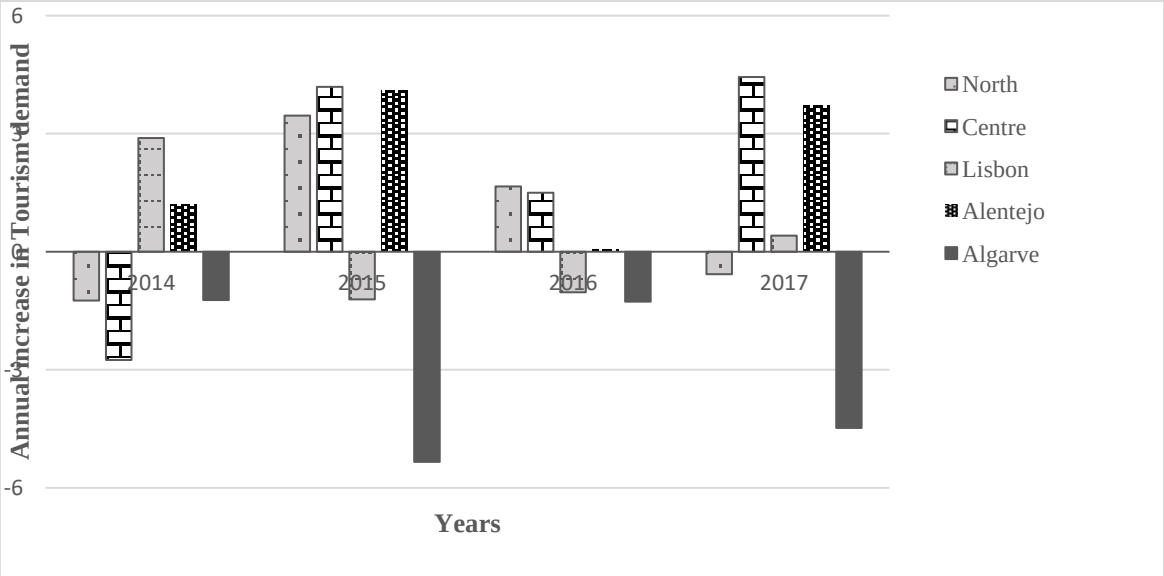

Figure A1: Annual increase in Tourism demand (guests) across NUTS II regions, 2014-2017
Source: Estatísticas do Turismo 2013-2017, INE.

Table A1- Regions' code

Region	Code
North	1
Centre	2
Lisbon	3
Alentejo	4
Algarve	5

Source: Own elaboration

Table A2- Representation of the sample, by nuts II region

NUTS II region	RNAAT	Sample	Representation of the sample
North	135	79	59
Centre	116	64	55
Lisbon	200	101	51
Alentejo	70	45	64
Algarve	145	80	55
Total	**666**	**369**	55

Source: Own elaboration

Table A3- Regional coefficients for the calculation of human capital (variable *w*)

NUTS II region	2014	2015	2016	2017
1	13.47	14.05	14.69	15.07
2	13.33	14.00	14.53	14.95
3	23.43	24.14	24.33	24.97
4	11.69	12.36	12.51	12.72
5	11.20	11.61	11.69	11.99

Source: Own elaboration

Table A4- Basic statistics of database

Variable	Obs	Mean	Std. Dev.	Min	Max
lnb	1316	0.80	0.93	0	4.66
lnw	504	0.24	0.51	0	2.56
lnk	1272	2.90	2.10	0	9.64
lnva	1224	2.93	1.76	0	8.67
lnm	1420	3.19	1.87	0	10.47
lnprod	1082	3.27	1.79	0	7.49
ltw	464	1.91	1.11	-5.88	4.48

Notes- variables in logs, b is the unskilled labour; w is the human capital; k is the net physical capital, i.e, after depreciation; va is the value added; m is the materials; prod is the labour productivity; ltw is the log of the TFP. Materials are calculated as the difference between turnover and the value added. Nominal values are deflated by the consumer price index in leisure, recreation & culture services, by NUTS II regions, obtained from PORDATA / National Statistical Office (INE).

Source: Own elaboration