

2023

REVISTA PORTUGUESA DE ESTUDOS REGIONAIS

PORTUGUESE REVIEW OF REGIONAL STUDIES

1º Quadrimestre | nº 63 | Avulso €15

Diretor José Cadima Ribeiro

Co-Editores Conceição Rego e João Marques



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Revista Portuguesa de Estudos Regionais

Portuguese Review of Regional Studies

Nº 63, 2023, 1º Quadrimestre

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Indexação

A Revista Portuguesa de Estudos Regionais está indexada nas seguintes bases de dados bibliográficas:

EconLit e bases associadas (*JEL on CD*; *e-JEL*; *Journal of Economic Literature*), *Qualis* (Brasil), *Latindex*, *Dialnet*, *Google Scholar* e *Scopus* [Q3 (2021); SJR (2021) = 0,142; Cite Score (2021) = 0,5].

Patrocínio científico

NIPE (Núcleo de Investigação em Políticas Económicas e Empresariais)

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in Economics and
Management

Secretariado executivo Ana Luísa Ramos

Propriedade e Edição ©APDR

Associação Portuguesa para o Desenvolvimento Regional

Universidade dos Açores, Rua Capitão João D'Ávila

9700-042 – Angra do Heroísmo

rper.geral@gmail.com

<https://www.review-rper.com>

Periodicidade Quadrimestral (janeiro; maio; setembro)

Preço Avulso 15€ • Assinatura 30€ (Portugal) e 45€ (estrangeiro)

Impressão Studioprint • **Tiragem** 30 exemplares

Depósito legal 190875/03 • **ISSN** 1645-586X • **e-ISSN** 2184-9269

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Artigo submetido a 2 de Junho 2021; versão final aceite a 27 de Novembro de 2021
Paper submitted on June 2, 2021; final version accepted on November 27, 2021

House Price Indexes: An Empirical Exercise Using Spatial Econometrics

Índices de Preços Imobiliários: Um Exercício Empírico com Recurso à Econometria Espacial

Miguel Viegas

mlbv@ua.pt

Research Unit of Governance, Competitiveness and Public Policies, DEGEIT, Universidade de Aveiro

João Marques

jjmarques@ua.pt

Research Unit of Governance, Competitiveness and Public Policies, DCSPT, Universidade de Aveiro

Paulo Batista

pauloricardolb@ua.pt

Research Unit of Governance, Competitiveness and Public Policies, DCSPT, Universidade de Aveiro

Abstract

The housing market occupies a central place within any society. Residential property represents the essential parts of most families' wealth, as well as a substantial part of their monthly expenditure. It also represents a large fraction of private investment, generating significant earnings. However, and despite this importance, the compilation of reliable residential property price indexes (RPPI) is far from satisfactory in Portugal, revealing an important gap in the field of statistical information.

The construction of a residential property price index (RPPI) poses problems arising from the inherent nature of the object concerned. Considering the gap in Portugal regarding the lack of a sufficiently enlarged database allowing the compilation of reliable RPPIs, this article seeks to contribute to this area, proposing a methodology applied to the urban area of Aveiro and Ílhavo by means of a spatial data analysis.

Keywords: Residential property Indexes, dwelling, spatial dependence.

Códigos JEL: R31, R32, R15

Resumo

O mercado imobiliário ocupa um lugar central em qualquer sociedade. A propriedade imobiliária representa a parte essencial da riqueza da maioria das famílias, e origina uma parte substancial de suas despesas mensais. Também representa uma grande fração do investimento privado, gerando ganhos significativos. No entanto, e apesar desta importância, a compilação de índices fiáveis de preços de imóveis residenciais está longe de ser satisfatória em Portugal, revelando uma lacuna importante no domínio da informação estatística.

A construção de um Índice de Preços Residenciais apresenta problemas particulares decorrentes da natureza inerente do objeto em questão. Atendendo à lacuna existente em Portugal de uma base de dados suficientemente alargada que permita a compilação de Índice de Preços Residenciais

fiáveis, este artigo procura contribuir nesta área, propondo uma metodologia aplicada à área urbana de Aveiro e Ílhavo através de uma análise de dados espaciais.

Palavras-chave: índice de Preços Residenciais, habitação, dependência espacial.

JEL classification: R31, R32, R15

1. INTRODUCTION

Residential property represents the essential part of most families' wealth, as well as a substantial part of their monthly expenditure. It also represents a large fraction of private investment, generating significant earnings. The construction sector in Portugal currently employs about 10% of the workforce. It is also responsible for about half of the Gross Fixed Capital Formation (INE, 2011). Apart from its importance as an individualized sector, housing construction generates significant multiplier effects in several sectors. Moreover, house price risk has attracted much attention after the U.S. subprime crisis and the ensuing global financial crisis. It was the significant increases in house prices that enhanced the perceived lower risk and consequent lax lending criteria in mortgage markets. Housing and real estate have a decisive influence on the behavior of the global economy. Therefore, it is essential that agents have reliable information about house prices and their evolution, since these determine the value of important assets, the composition of the family budget as well as the profitability of real estate investments. Information quality and transparency are key attributes for the proper functioning of the markets. Good residential property price indexes (RPPI) have also numerous applications in various fields. They represent a good indicator of the macro-economic activity in a country or a region. They can also be used as an indicator for the monetary policy.¹ Good RPPIs are necessary to evaluate the wealth of families for whom, houses are, in many cases, the most valuable asset. They can, as well, make a valuable contribution in the measurement of inflation as key input for a basket of consumer prices. Finally, they give security and increase the efficiency of the housing market by introducing credible, independent, and timely information. However, and despite this importance, the compilation of reliable RPPIs is far from satisfactory in Portugal, which remains an important gap in the field of statistical information.

Given the need to improve the quality and reliability of RPPIs in Portugal, this article proposes to contribute to this area, using a Time Dummy hedonic price model inserted in a spatial econometric framework applied to the urban area of Aveiro and Ílhavo. Spatial correlation in the residuals of hedonic models has been reported in many empirical studies (Bourassa et al., 2007; Pace et al., 1998). However, from our knowledge, very few RPPIs include proper mechanism to deal with spatial dependence to offset omitted variable problems. Our model represents a compromise between completeness and parsimony that can be replicated in other localities, covering the various sub-markets, heterogeneity and geographical features and key attributes. Although hedonic models can incorporate effects of neighbourhood or proximity, the literature recognizes the complexity of these effects and the difficulty in finding variables capturing spatial effects (Basu & Thibodeau, 1998). Even in models including neighbourhood and accessibility variables, the residual produced by these hedonic models may exhibit patterns of autocorrelation by misspecification of the model, creating inconsistency and inefficiency in OLS estimators (Anselin, 1988). Therefore, our model processes the spatial dependence by a spatial data analysis, thus seeking to infer the extent to which the estimators calculated from a model of spatial dependence contribute to increasing the quality of our price index.

After the introduction, we proceed with a literature review in section 2. Section 3 describes the database as well as the methodology used in the construction of our RPPI emphasizing the spatial dependence framework. Section 4 is dedicated to the presentation of results and discussion, comparing the hedonic model with and without the spatial data analysis. The main findings and conclusion are presented in Section 4, in which a set of recommendations are made, paving the way for a new strategy for regular publication of qualified RPPIs by public authorities.

¹ The Macroeconomic Imbalance Procedure (MIP) is part of the EU's so-called 'six-pack' legislation, which aims to reinforce the monitoring and surveillance of macroeconomic policies in the EU and the euro area. The MIP is partially based on a scoreboard of fourteen indicators, which includes a House Price Index in order to detect real estate bubbles.

2. LITERATURE REVIEW

The construction of a RPPIs poses problems arising from the inherent nature of the good concerned. Each dwelling constitutes a unique and not reproducible asset with a long durability, which prevents the conceptualization of a fixed basket of goods whose prices are recorded over time. Indeed, in the case of housing, prices are rarely observed due to the sporadic nature of transactions. In fact, real estate assets are highly spread geographically and centralised market in which properties prices can easily be observed does not exist. Their durability makes the quality vary over time due to the depreciation or improvement and renovation activities. Considering these difficulties, it is not possible to construct a perfect index of housing prices. We can only aspire to build an approximation as accurate as possible to the theoretical RPPI (Baumont, 2009; Haurin & Hendershott, 1991).

2.1. The main methods of constructing RPPIs

The literature describes four main methods of constructing RPPIs: stratification or mix adjustment, repeat sales method, the use of property assessment information or appraisal-based method and the hedonic regression method (Hoffmann & Lorenz, 2006). The proper choice depends on the available database, and on the goals, we want to achieve. When the volume of data is large, allowing for sufficient homogeneous grouping of observations, the stratification or mix adjustment may be the most appropriate method. It only requires data about price and location to calculate central price tendency estimations such as average and median prices. This method is among the less data intensive methods and has also the advantage of being easily understood by market agents (Mark & Goldberg, 1984; McDonald & Smith, 2009). The repeat sales method consists in observing the evolution of the price of a specific type of housing over time. The scarcity of data naturally raised strong barriers to its implementation, leading often to biased results (Shiller, 1991; Wang & Zorn, 1997). The appraisal-based method becomes attractive in countries where the government conducts systematic reviews of all properties for tax purposes. Unfortunately, it is difficult to incorporate qualitative changes (depreciation or renovation) and always raises important questions about the reliability of the appraisal methodology.

The hedonic regression method is generally regarded as the most appropriate method for constructing price indexes for housing (Diewert et al., 2009). Assuming that all relevant variables are included, this method maximizes the use of available information and adjusts the RPPI to both sampling variation and qualitative changes of housing, be that a consequence of depreciation or renovation (Hill, 2004; Hill & Melser, 2008). The starting point of the hedonic method is simple and based on the assumption that certain goods are demanded in the market not by the good itself but rather by the intensity of the characteristics that define it. Thus, the search of a home is determined not by the house itself but by its attributes: location, rooms, equipment, garage etc. (Maleyre, 1997). The first hedonic regression is usually attributed to (Waugh, 1928) who had the idea of regressing the price of a bundle of asparagus based on three characteristics: the colour, the rode and tip size. Later works (Griliches, 1971; Lancaster, 1966; Rosen, 1974) generalized this approach to the social sciences and in particular to the economy. Concerning real estate and housing market, numerous attributes, attached to the property, have a significant influence on price determination. However, a significant proportion of house prices variability remains unexplained. Part of the unexplained variance may be related to a latent spatial component (Dubé & Legros, 2014). The presence of strong spatial autocorrelation on the hedonic price residuals confirms this hypothesis.

Recently, many applications of hedonic price models have included spatial analysis in order to control for spatial dependence and heterogeneity (Bajat et al., 2018). The presence of autocorrelation and spatial heterogeneity profoundly affects the quality of econometric models (Baumont, 2009) Housing prices are vulnerable to spatial effects for several reasons. The first one concerns the accessibility (to CBD or any other centrality or equipment). The second has to do with the effects of neighbourhood or how housing price capitalizes positive or negative externalities arising from urban dynamics. The third and final reason has to do with shared structural similarity to the scale of neighbourhood that are normally constructed as a whole and at the same time. As such, and considering the potential spatial autocorrelation, several criticisms may be pointed to classic OLS hedonic models, mostly related with the existence of multicollinearity, endogeneity, biasedness and the

existence of specification errors. These problems may seriously affect the robustness of the convergence coefficient and produce misleading outcomes (Anselin, 1988).

The hedonic equations incorporate in most cases a set of spatial variables designed to capture some of the spatial effects mentioned above. However, measurement of these spatial effects and the choice of appropriate variables, presents numerous and practical difficulties. In models for areal data or discrete spatial variation, two models widely used are the simultaneously autoregressive model (SAR) and the conditional autoregressive model (CAR). The SAR model use likelihood methods while the CAR model use hierarchical modelling with Bayesian methods (Banerjee et al., 2014). According to among others, the spatial data analysis with the introduction of the geographical dimension, namely in the presence of spatial autocorrelation, allows not only to capture the spatial effect, but also to improve the estimation and prevision since spatial dependence violates some of the Gauss-Markov assumptions of the OLS estimation (cross section observations are no longer independent) producing inefficient estimators. Two kinds of spatial effects are pointed out in the literature, namely: (i) spatial autocorrelation, revealing that contiguous regions may influence each other's performance through spillover effects and (ii) spatial heterogeneity, whenever the same functional form is erroneously considered for all regions (for comprehensive references about spatial econometric see for instance (Anselin, 1988; Le Gallo, 2002; LeSage & Pace, 2009) To capture the interdependence between locations, it is necessary to consider the relative positions of each location. For this, we must fix exogenously the topology of the space system, building a weight matrix (Le Gallo, 2002). The most widely type of matrix used is the contiguity matrix, in which the term $w_{i,j}$ equal to one if the two locations i and j are contiguous and zero otherwise. It is also possible to use Euclidian distances instead of a binary variable. The weights matrixes are usually normalized with each line sum equal to one.

Spatial econometric offers different possibilities to deal with spatial dependence. A first approach assumes that spatial dependence enters into the right-hand-side of the house price equation. This model, characterized by the presence of spatial lag dependent variable has been extensively used by (Elhorst & Vega, 2015; Gibbons & Overman, 2012; LeSage & Pace, 2009). According to (Elhorst & Vega, 2015; Gibbons & Overman, 2012), this model can be very useful in applied studies because of “its superiority in avoiding identification issues and its flexibility in measuring spillover effects”. House price spillovers can also arise from spatially correlated omitted variables. Empirical application using the spatial error model can be found in (Pesaran & Tosetti, 2011; Yang, 2020). Discussions on the best methodologies for choosing the appropriate spatial model can be consulted in (Elhorst, 2014b; Seya et al., 2020).

We found in the literature several methodologies used to address spatial autocorrelation and heterogeneity. (Francke & Van de Minne, 2020) use spatial random effects in hedonic price models to improve prediction accuracy. (Paredes, 2011) applies the quasi-experimental method to Chilean regions. In another article, (Iturra & Paredes, 2013) deals with endogeneity caused by omitted variables with a set of instruments using a generalized method of moments (GMM) procedure. (Chasco & Le Gallo, 2012) used multilevel models to fully capture spatial autocorrelation effects in the errors. They explored a three-level hierarchical model, more capable of explaining data heterogeneity, conclude, however, that more effort should be done to develop alternative tools to deal with spatial autocorrelation. Most authors converge on the need to address spatial dependence but few are the empirical researches. (Wilhelmsson, 2009) proposes a methodology for the construction of a real estate index for Stockholm with a general spatial model incorporates a spatial structure into both the dependent variable and the error term. Spatial dependency and property price index construction are examined by (Se Can & Megbolugbe, 1997). They conclude that the inclusion of a spatial structure is important for both parameter estimates and statistical inference. Trying to overcome the lack of good residential property price statistics (Brunauer et al., 2012) describe the setup of a new RPPI for Austria. However, instead of spatial data analysis, they use a semiparametric model that consider nonlinearity and spatial heterogeneity. More recently (Oust et al., 2019) argue that spatial analysis has been a long-neglected part in the studies of economics. They develop a model applied to residential property transactions in Oslo, Norway between August 2016, and December 2017, combining repeat sales and hedonic regression enhanced with spatial econometric tools. They conclude that this combination resulted in improved accuracy for all hedonic regressions on all metrics.

2.2. The price indices in Portugal

Unfortunately, there is no systematic collection of transaction price by the Portuguese national statistical system. The INE (National Statistics Institute) publishes the monthly "Survey on bank evaluation on housing" trying to build leading indicators of housing prices. The values collected in these surveys are not formal prices. They represent the intention of purchase, thus constituting a reasonable approximation. The information is provided by a set of credit institutions operating in Portugal, considered as the most representative of the market for granting housing loans. The information is transmitted monthly and is used to calculate basic indicators of the average property assessment for a particular typology, $\bar{Y}_{ti}$ in period t , and in the territorial unit i , using the following formula:

$$\bar{Y}_{ti} = \sqrt[n]{\prod_{j=1}^n Y_{tij} / A_{tij}}, \quad (1)$$

Being Y_{tij} the value of the assessment of the property j with the given typology j in period t in the territorial unit i ; A_{tij} the corresponding net area of the property j in period t , in the territorial unit i , and finally, n , the number of housing assessments.

The Confidencial Imobiliário (Ci) Price Index has been in place in Portugal since 1988. In 2006 it underwent a profound remodeling. It is based on transaction prices and includes a quality adjustment mechanism that responds to the heterogeneity of the data. In a first step, it estimates a hedonic model based on the prices advertised for each property. In a second step, it calculates the adjustment factor that corresponds to the value of the implicitly observed qualitative attributes. This value is calculated based on the difference between the real advertised price of the property and the estimated price in the model estimated in the first stage. In the third step, a new hedonic model with the same attributes is estimated, using the effective transaction prices as a dependent variable, and adding the adjustment factor calculated in the second step as another explanatory variable. The calculation of changes in the value of transactions is made using the Fisher index, with a regional weighting in the case of the national version of the index.

3. METHODOLOGY AND DATA

The construction of price indices for housing (RPPIs) raises several challenges due to the particularities of the real estate market. The first concerns the data source. The second is about methodological issues and seeks to answer important question as the need to stratify geographic units or to identify sub-markets of similar dwelling, or still, the choice of the most appropriate econometric techniques, the variables to select or the most appropriate functional form. A regular publication of RPPIS implies the existence of a solid and reliable organization capable of collecting the relevant information and building the indexes properly. There are several types of databases. Their distinctions depend on the time of collection which can be done at various stages of the process of buying and selling (advertised prices, banking appraisal or transaction prices).

3.1. Description of the data

The database used in this article covers a geographical area comprising two counties, Aveiro and Ílhavo, with approximately 110 000 inhabitants in an area of about 275 km². Our database was built from the National Real Estate Portal - Casa Sapo. We collected and further processed 14087 observations covering a period between 2003 and 2010. The database contains pricing announced (which may or may not correspond to a sale). The database covers houses (villas) as well as apartments, new and second-hand and in different locations. The two counties stand almost as an urban continuum. However, in this urban continuum, semi-urban territories coexist with agricultural activity as well as an area of ecological interest belonging to the Natura 2000 network.

The database contains a wide variety of attributes. Beside the price, we have access to the areas and number of rooms. Other attributes such as the presence of a garage, elevator or balconies complete the database giving us a wide range of possibilities to build our hedonic model. As can be seen

in Table 1 our sample contains more apartments than houses and is more concentrated in the years 2007 to 2010.

Table 2 and Table 3 contain information about some of the characteristics of the dwelling of our database: price, area, number of rooms etc. Many observations of the dwelling have been discarded due to the lack of adequately documented. The database contains 10428 observations for apartments and 3659 for houses.

Table 1: database description

Year	2003	2004	2005	2006	2007	2008	2009	2010
Houses	45	1	41	168	875	798	799	932
Apartments	164	17	189	571	2606	1899	2583	2399

Table 2: Descriptive Statistics (apartments).

	N	Minimum	Maximum	Average	S.Dev.
Price	10428	29999,99	480000,00	133010,76	49904,40
Price per m ²	10428	377,95	5272,73	1236,10	377,22
Area	10428	30,00	325,00	111,94	38,82
Rooms	10428	0	5	2,14	0,830

Table 3: Descriptive Statistics (houses).

	N	Minimum	Maximum	Average	S.Dev.
Price	3659	28000,00	900000,00	223100,42	81832,18
Price per m ² (built)	3659	178,57	3167,94	954,28	307,99
Building area	3659	47,00	690,75	254,39	88,11
Land area	3659	0,00	50000,00	179,42	1475,19
Rooms	3659	1	8	3,88	0,644

3.2. Hedonic Approach

We use the hedonic method, which assumes previously that the price of a house depends on a combination of a limited set of qualitative and quantitative attributes. The relationship between the price per m² of housing and their attributes is estimated from a regression based on a set of observations of actual prices, and then used to reconstruct the price of a dwelling in the same sample.

For the hedonic price index, we constructed a cross-sectional hedonic equation with time dummy variable of house prices in the Counties of Aveiro and Ílhavo. The time dummy variable approach to constructing a hedonic house price index has been used frequently in academic studies but, to our knowledge not so much by statistical agencies.² One advantage of this approach is its simplicity.³ The time dummy method is recommended when the database has a large number of characteristics but few transactions for each period. Prices and attributes of all dwellings for several periods are pooled in the same regression and a dummy variable is created for each period. The objective of the exercise is to produce a quality-adjusted price index. As such, the principal interest lies in the dummy parameters which measure the period specific fixed effects on the logarithms of the price level after controlling for the attribute's effects of the dwellings (Hill, 2013). The standard semi-log formulation of our time-dummy equation is as follows:

² A few examples can be consulted in (Kestens et al., 2006; Wilhelmsson, 2008)

³ A concern with the time-dummy method is that when a new period is added to a data set, the price indexes for all periods change. To overcome that problem it is possible to estimate the time-dummy model only over adjacent periods (Triplett, 2004).

$$\ln(p_n^t) = \beta_0 + \sum_{\tau=1}^T \delta^\tau D_n^\tau + \sum_{k=1}^K \beta_k x_{nk}^t + u_n \quad (2)$$

D_n^τ represent the time dummies variables and x_{nk} the k attributes of the model for the n observations. The k attribute shadow prices are represented by the parameter β . The price index P_t for period t is derived by exponentiating the estimated parameter δ_t from the hedonic equation (Hill, 2013):

$$\hat{P}_t = \exp(\hat{\delta}_t) \quad (3)$$

The choice of the relevant explanatory variables to include in the model is crucial. We considered successively some qualitative and quantitative variables. The parsimony criterion implies compromising between the explanatory power of the model and its simplicity and applicability to local, regional, and national contexts. Beside our results, built according to the available data, we looked to other countries indexes.⁴ In the present study and considering a multiple set of possible variables, we included in our models the following characteristics:

- Net Surface
- Number of bedrooms
- Presence of storage room
- Garage
- Land area (for housing)
- Garden (for housing)
- Detached (for housing)
- Parish typology
- New / Used

Many other variables were excluded because they were not statistically significant, while others were not included due to lack of availability.

Table 4: Parishes classification

Concelho	Freguesia	Tipo
Aveiro	Aradas	APU
Aveiro	Cacia	AMU
Aveiro	Eirol	AMU
Aveiro	Eixo	AMU
Aveiro	Esgueira	APU
Aveiro	Glória	APU
Aveiro	Nariz	AMU
Aveiro	Nossa Senhora de Fátima	AMU
Aveiro	Oliveirinha	AMU
Aveiro	Requeixo	APR
Aveiro	Santa Joana	APU
Aveiro	São Bernardo	APU
Aveiro	São Jacinto	APR
Aveiro	Vera Cruz	APU
Ílhavo	Gafanha do Carmo	APR
Ílhavo	Gafanha da Encarnação	APU
Ílhavo	Gafanha da Nazaré	APU
Ílhavo	Ílhavo (São Salvador)	APU

⁴ We based our choice in several sources, but mainly on the Halifax House Price Indices (Fleming & Nellis, 1984) and the Notaires-INSEE indices published in France (Dubujet, 2000).

Regarding the geographical stratification we included a dummy variable APU using the new version of the Typology of Urban Area (TIPAU) published in 2009 by the National Institute of Statistics applied to parishes. The 2009 TIPAU is a tripartite classification of the parishes of the Portuguese territory in predominantly urban areas (APU), median urban areas (AMU) and predominantly rural areas (APR).⁵ Table 2 shows the parishes of both municipalities indicating their typology. The dummy variable APU equal one, for dwellings located in areas predominantly of urban typology, and zero otherwise, joining together the other two remaining typologies (AMU e APR), i.e., the parishes with moderately urban and predominantly rural areas. Many other models have more complex location variables related with accessibility or proximity to central areas or equipment. These are certainly relevant for more precise estimation, but we consider that its application is not feasible for the construction of a national RPPI since its replication would put numerous practical problems.

3.3. Spatial data analysis

Hedonic models are normally based in cross-section data. In the present paper, we focus our attention on how the spatial effects affect the estimation of hedonic price. The presence of autocorrelation and spatial heterogeneity profoundly affects the quality of econometric models (Baumont, 2009).

The hedonic equations incorporate in most cases a set of spatial variables designed to capture some of the spatial effects mentioned above. However, measurement of these spatial effects and the choice of appropriate variables, presents numerous and practical difficulties. According to (Anselin, 1988; LeSage & Pace, 2009) among others, the spatial data analysis with the introduction of the geographical dimension, allows not only to capture the spatial dependence effect, but also to improve the quality of estimation since spatial dependence violates some of the Gauss-Markov assumptions of the OLS estimation (cross section observations are no longer independent) producing inefficient estimators. Two kinds of spatial effects are pointed out in the literature, namely: (i) spatial autocorrelation, revealing that contiguous regions may influence each other's performance through spillover effects and (ii) spatial heterogeneity, whenever the same functional form is erroneously considered for all regions (for comprehensive references about spatial econometric see for instance (Anselin, 1988; Guillaing & Le Gallo, 2007; Le Gallo, 2002; LeSage & Pace, 2009).

To capture the interdependence between locations, it is necessary to consider the relative positions of each location. The choice of spatial weights is a key issue in spatial models. In the present work we adopt a standard approach, based on geographical proximity (contiguity). However geometric space is not always adequate to fully embrace the complexities of spatial structures (Bhattacharjee et al., 2012). For the adjacency criterion we use a normalized first order contiguity spatial weights matrix. Formally we define our weight matrix as follows:

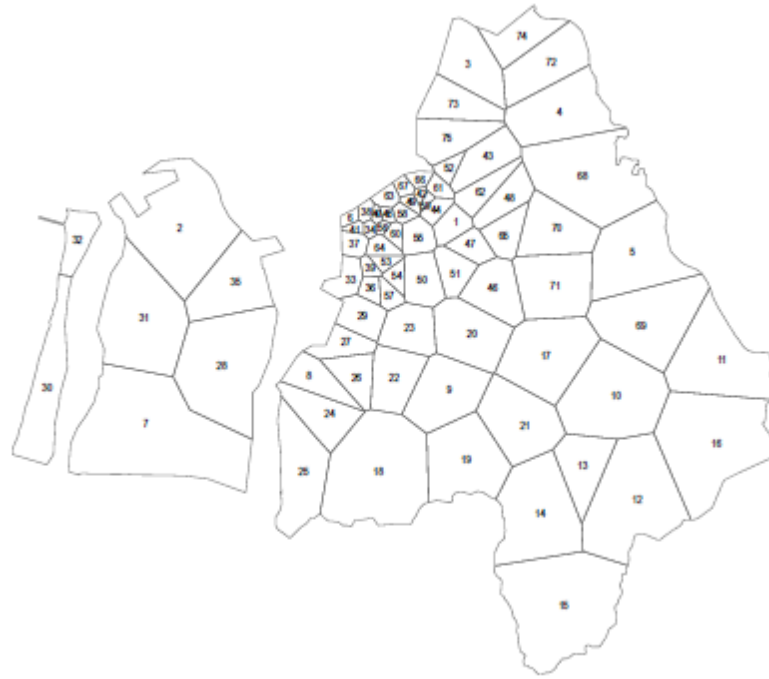
$$W = \begin{cases} w_{ij} = 0 & \text{if } i = j \\ w_{ij} = 1 & \text{if } d_{ij} = 0 \\ w_{ij} = 0 & \text{if } d_{ij} > 0 \end{cases} \quad (4)$$

This matrix is a square matrix, W , in which the term $w_{i,j}$ equal to one if the two locations i and j are contiguous and zero otherwise (d_{ij} represent the distance between the two regions). The weights matrixes are normalized with each line sum equal to one.

In our sample, the observations are not classified by any geographic information system, i.e., we do not have the coordinates of each individual residence. To circumvent this limitation we have built our contiguity matrix using the same methodology as in (Marques, 2012), delimiting 75 different geographical areas. These zones correspond to homogenous territories, normally smaller than parishes, and represent neighbourhoods, centre or other clusters which similar pattern (Figure 2). The working spatial contiguity matrix, W , appears in Figure 2. As we can see, the matrix W shows a sparse structure with most of the non-zero elements residing near the diagonal.

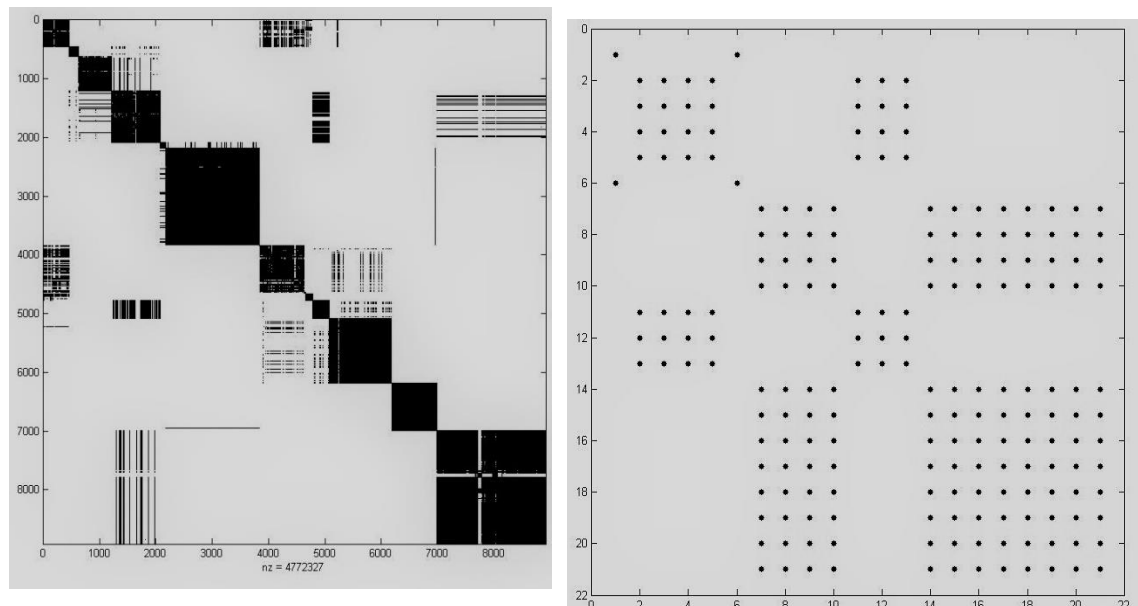
⁵ For a detailed description consult www.ine.pt.

Figure 1: Codes of the 75 zones used in spatial weight matrix. Source: (Marques, 2012).



In our sample, the observations are not classified by any geographic information system, i.e., we do not have the coordinates of each individual residence. To circumvent this limitation we have built our contiguity matrix using the same methodology as in (Marques, 2012), delimiting 75 different geographical areas. These zones correspond to homogenous territories, normally smaller than parishes, and represent neighbourhoods, centre or other clusters which similar pattern (Figure 2). The working spatial contiguity matrix, W , appears in Figure 2. As we can see, the matrix W shows a sparse structure with most of the non-zero elements residing near the diagonal.

Figure 2: full 8921×8921 spatial weights (contiguity) matrix (left side), and a partial view (right side).



We use that contiguity matrix to, firstly, measure the degree of spatial autocorrelation of log prices. The spatial autocorrelation is based on the Moran's statistic (Moran's I), which can be represented by the expression:

$$I = \frac{n}{\sum_{i=1}^n \sum_{j=1}^n w_{ij}} \frac{\sum_{i=1}^n \sum_{j=1}^n w_{ij} x_i x_j}{\sum_{i=1}^n \sum_{j=1}^n x_i x_j} \quad (5)$$

in which $w_{i,j}$ represents the (i,j) element of the spatial contiguity matrix, W , x_{it} represents the logarithm of price per square meter of apartment i , and n corresponds to the number of observations. Moran's statistic estimates the linear dependence between a variable in a specific location and the mean of the same variable in the neighbourhood.

A positive value of Moran 'I statistic indicates the presence of correlation between the dwelling price and the average price of the surrounding habitations. The Moran scatter plot (Figure 4) depicts the log-price on the horizontal axis with the average values of the neighbouring houses on the vertical axis. A positive value of I implies that most houses remain in the first and second quadrants. The remains quadrants are considered as atypical locations.

There are several mechanisms through which an observation can be influenced by a neighboring observation. (Elhorst, 2014a) establishes a taxonomy of the effects of spatial dependence. Three types of interaction are considered:

- the endogenous effects: the decision variable depends on the decision of neighboring agents.
- exogenous effects: the decision variable depends on attributes of neighboring observations.
- the effects of spatial correlation resulting from unobservable variables or variables not included in the model.

A complete model with all types of spatial interaction takes the following form (Elhorst, 2014a):

$$Y = \delta WY + \alpha I_N + X\beta + WX\theta + u \text{ with } u = \lambda Wu + \varepsilon \quad (6)$$

Where Y represents a vector of dimension $N \times 1$ containing the value of the dependent variable for each unit of the sample ($i = 1, \dots, N$), WY represents the endogenous interaction effect on the dependent variable, I_N represents a vector of dimension $N \times 1$ of ones associated with the constant term, α . X represents an $N \times K$ matrix of explanatory variables, β is a vector of dimension $K \times 1$ with the parameters of the model to be estimated, WX represents the effect of exogenous interaction on the explanatory variables, Wu , the interaction effects on the error term, and finally, $\varepsilon = (\varepsilon_1, \dots, \varepsilon_N)$ represents a vector of the error term that we assume iid for all i . W represents the neighborhood matrix. It is a non-negative $N \times N$ matrix. As for the spatial interaction parameters, we have the term δ associated with the spatial dependence of the lagged dependent variable, λ the term associated with the error autocorrelation and θ , representing a vector of $K \times 1$ parameters associated with each one of the explanatory variables.

Within spatial econometrics, the Spatial Error Model (SEM) ($\delta = 0$, $\theta = 0$ and $\lambda \neq 0$), the Spatial Lag Model (SAR) ($\delta \neq 0$, $\theta = 0$ and $\lambda = 0$) and the Spatial Durbin Model (SDM) ($\delta \neq 0$, $\theta \neq 0$ and $\lambda = 0$) have been widely used in the so-called spatial hedonic models (LeSage & Pace, 2009). The SEM model implies that the price of a house is affected by a missing variable associated with a neighboring house. In this case, prices are directly affected by the coefficient of each attribute given by the value of the estimated parameters of the model. In the SAR model, house prices are affected by the prices of neighboring houses. The reduced form of the model shows a spatial multiplier $(I - \rho W)^{-1}$ that must be considered when interpreting coefficients. In the SDM model the price of houses is affected not only by the price of neighboring houses, but also by the attributes of neighboring houses. The spatial multiplier takes the form $(I - \rho W)^{-1}(\beta_k + W\theta_k)$. Based on other restrictions on the parameters, we can find other models such as SDEM ($\delta = 0$, $\theta \neq 0$ and $\lambda \neq 0$). However, these models are less used in the literature (Elhorst, 2014a).

We found two approaches in the literature to select the best hedonic spatial model (see (Maslianskaia-Pautrel & Baumont, 2016) for a comprehensive description). The first approach starts from the simplest model towards the most complete model, while the second approach does the reverse, evolving from the most complete model to the simplest model. In the bottom-up approach, Lagrange Multiplier Tests are applied, in their robust versions (Anselin et al., 1996) to the non-spatial model. In the top-down version, Spatial Durbin Model serves as a starting point. The most adapted model is then deduced by applying the Likelihood Ratio Test, step by step, on the various parameters of the more general model. (Elhorst, 2010) proposes a mixed approach. It first applies the Lagrange Multiplier Tests to the residue of the OLS model. If spatial autocorrelation is detected

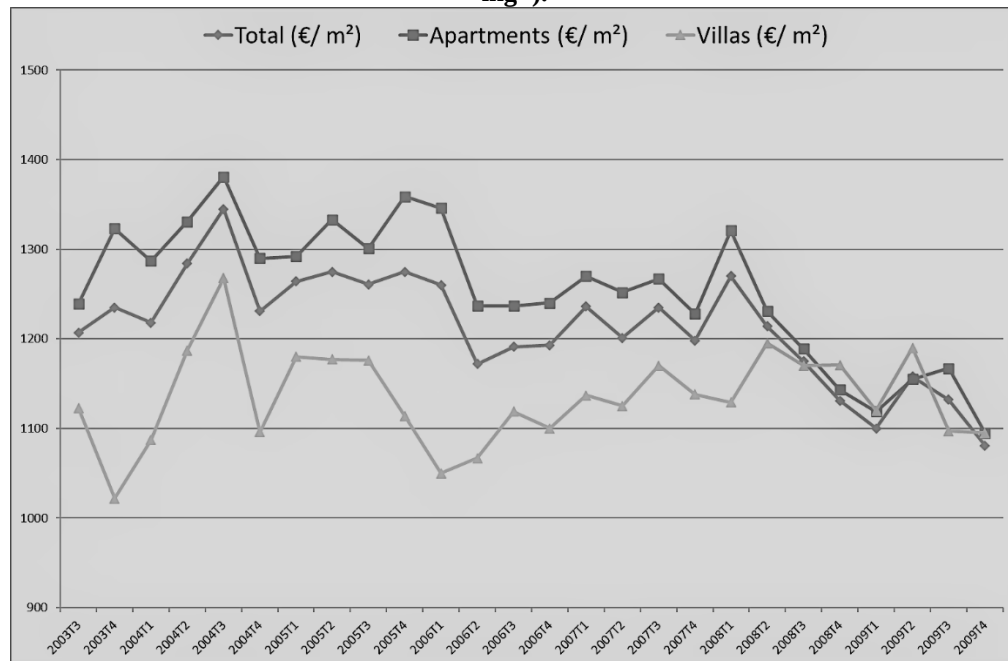
in the lag-dependent variable and in the error, the SDM model is directly estimated, and the Likelihood Ratio Tests are applied to compare it with the SAR and SEM restricted models.

4. RESULTS

Figure 3 exhibits the house price index of the INE (National Statistics Institute) "Survey on bank evaluation on housing". The average values of inquiries to bank assessment on housing published by the INE are measured in euros per m^2 . The calculations are made for different typologies and for various levels of geographical disaggregation. Prices exist for all NUTSIII (regional level), for the two major metropolitan areas of Lisbon and Porto and, finally, also to urban areas and counties that include median-sized cities. Thus, we used from the INE database the average values of bank assessment on housing comprising the municipality of Aveiro in a quarterly series covering the period from the third quarter 2003 and 4th quarter 2009. The average values correspond to the two sub-market apartments and townhouses, and their aggregation are made according to the method explained above (Section 2, equation 1). The area does not correspond exactly to our sample since it does not include the county of Ílhavo.

We can observe in Figure 3 a period of high prices between 2003 and 2005, with a peak in the third quarter of 2004. From there, we have a first decline in the first quarter of 2006 followed by a period of stability until 2007. The years 2008 and 2009 are marked by a downward trend in prices with a slight fall in the second quarter of 2009. This pattern is followed in a more or less similar way for both sub-markets (villas and apartments). Construction areas are normally higher in villas. Moreover, villas tend to be located far from the center. Therefore, villa's price per square meter is normally lower when compared with apartments.

Figure 3: Evolution of house price index published by the INE ("Survey on bank evaluation on housing").



For our exercise we will focus our attention on the apartment submarket, thus excluding the villa's market. With this emphasis, we favour the quality of observations and the homogeneity of the sample. Moreover, we will use only the data from 2005 to 2009, comprehending a total of 8162 observations. All estimations are carried out in Matlab, using the econometric tools made by J.P Elhorst and J. LeSage.⁶

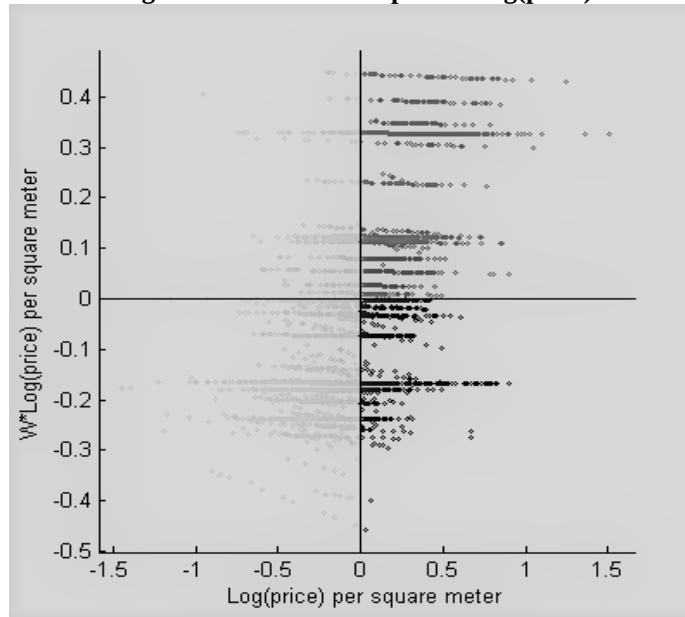
⁶ All calculation are based on (Elhorst, 2014a) and (LeSage, 1999). We use the authors Toolbox function available respectively at <http://www.regrooningen.nl/elhorst/software.shtml> and <http://www.econ.utoledo.edu>.

We start by measuring the global autocorrelation of the dependent variable, i.e., the logarithm of prices using the Moran's I Statistic. As it can be seen in Table 4, prices are positively auto correlated within space, with a Moran's I of 0.49 highly significant. This means that dwellings tend to group themselves according to price, with the segments more expensive concentrated in certain specific areas and the lower segments in other different areas.

Table 4: Moran's I statistic for the log of price per meter.

Variable	Moran's I	Moran's I stat.	P value
Log (price)	0.4916	45.85	0.0000

Figure 4: Moran scatterplot for log(price)



The Moran scatter plot (Figure 4), in which the average value of neighboring dwellings is plotted against the value of central dwelling, shows, as expected, that most of observation are in the quadrant HH and LL. We have 2717 observation in the HH quadrant, 841 in the LH quadrant, 3323 in the LL quadrant and 1281 in the HL quadrant, which means that 74% of apartments are in the HH and LL quadrant. The remaining observations (2122) are in the atypical quadrants. The Moran's I Statistic give us valuable indications on house pricing to concentrate and form clusters (Arbia, 2001). However, it tells us nothing about the spatial location of these specific manifestations of agglomeration. Thus, these global indexes, if relevant, can be an invitation to explore other local measures of agglomeration as statistical LISA (Local Indicator of Spatial Association) which decomposes the Moran's I Statistic to identify the individual contribution of each local site (in our case, each municipality).

Finally, we use a spatial econometric methodology to estimate the time dummy hedonic price model (Equation (2)). To choose the most appropriate spatial model, we applied the methodology proposed by (Elhorst, 2010). We estimated the OLS model and applied the robust LM tests (Anselin et al., 1996). Both tests (LM lag and LM error) confirm the presence of spatial dependence in the lagged dependent variable and in the error term. Therefore, the non-consideration of spatial dependence between the observations leads to biased and inconsistent estimators (LeSage & Pace, 2009). Based on these results, we estimate the SDM model and compare its results with the SAR and SEM models using the Likelihood Ratio Test to determine which model best fits the data. All results can be seen in Table 5.

We first compare SDM and SAR models. The LR-test of the SDM versus SAR model assumes a value of 2576.7, exceeding the critical value of 11.07 for a 95% significance level and 5 degrees of freedom. Secondly, we compare the SDM model with the SEM model. The LR-test statistic of the SDM model versus the SEM model assumes a value of 17.82, also exceeding the critical value of 11.07 for the same degrees of freedom and level of significance. According to the test, the SDM model performs better comparing with SAR and SEM models. Moreover, the SDM parameters are in general highly significant and with the correct signal. We therefore chose to distinguish SDM as the model that best fits the data.

House Price Indexes: An Empirical Exercise Using Spatial Econometrics

Table 5: Estimation results and spatial tests (Source: own calculations based on Sapo-casa database)

Models	OLS model	SAR	SEM	SDM
Estimation				
Obs	8162	8162	8162	8162
log-likelihood	1032.1	4604.25	5888.72	5897.63
Const.	9.111794 (p=0.0000)	6.624933 (p=0.0000)	9.153512 (p=0.0000)	7.735180 (p=0.0000)
log(area)	-0.548759 (p=0.0000)	-0.529134 (p=0.0000)	-0.536364 (p=0.0000)	-0.476261 (p=0.0000)
Rooms	0.090233 (p=0.0000)	0.093107 (p=0.0000)	0.096875 (p=0.0000)	0.081607 (p=0.0000)
Garage	0.017429 (p=0.0006)	0.026519 (p=0.0000)	0.049877 (p=0.0000)	0.050609 (p=0.0000)
New	0.221423 (p=0.0000)	0.195516 (p=0.0000)	0.180144 (p=0.0000)	0.181860 (p=0.0000)
APU	0.214557 (p=0.0000)	0.132102 (p=0.0000)	0.096899 (p=0.0000)	0.173189 (p=0.0000)
Y2006	-0.013881 (p=0.0000)	-0.018385 (p=0.0271)	-0.027311 (p=0.0000)	-0.025449 (p=0.0017)
Y2007	0.003524 (p=0.0423)	-0.000221 (p=0.0974)	-0.006671 (p=0.0987)	-0.017351 (p=0.0223)
Y2008	-0.007849 (p=0.0036)	-0.014007 (p=0.0883)	-0.031135 (p=0.0000)	-0.031853 (p=0.0000)
Y2009	-0.011720 (p=0.0008)	-0.027409 (p=0.0020)	-0.062411 (p=0.0000)	-0.049826 (p=0.0000)
W.log(area)				-0.566897 (p=0.0000)
W.Rooms				0.151958 (p=0.0000)
W.Garage				-0.080487 (p=0.0000)
W.New				0.074093 (p=0.0000)
W.APU				-0.058548 (p=0.0571)
ρ		0.350981 (p=0.0000)		0.494964 (p=0.0000)
λ			0.90001 (p=0.0000)	

Direct and indirect effects

When spatial dependence effects are included in the model, the interpretation of coefficients associated with independent variables must be adapted. Those coefficients, associated to each independent variable, have two effects. The direct effect stems from the impact associated with an observation within the geographical unit (including the spillover feedback). The indirect effect stems from the impact associated with an observation located in the neighbourhood of the geographical unit under study.

In a cross-sectoral model, no role is assigned to the time factor. The estimated model is interpreted as a steady-state equilibrium model. However, the effects of spatial diffusion take time. Therefore, the interpretation of the coefficients must be done with caution. The indirect effects can be interpreted as a movement towards a steady state equilibrium (LeSage, 2008). The direct effects represent the partial derivative of the dependent variable with respect to the explanatory variables. Unlike the OLS model, this partial derivative cannot be read directly from the value of the parameter estimators. It must be corrected by the previously mentioned spatial multiplier.

Table 6 shows the decomposition of the direct and indirect effects of the SDM model comparing the results with the same model without correction for spatial autocorrelation (baseline model). The direct effects do not differ much from the estimated coefficients, still revealing non-negligible spillover effects. According to (Anselin & Lozano-Gracia, 2009) the direct effect is the only correct measure for pecuniary externality. According to the estimation results, and focusing our attention on the direct effects, the logarithm of the price per meter of housing varies negatively with the logarithm of the total area. On the other hand, the number of rooms, the existence of a garage, first-hand purchase and insertion in a predominantly urban area positively influence the log price of housing.

Table 6: Estimation of the baseline model (OLS without correction for spatial autocorrelation) and SDM model with direct and indirect effects.

Variables	Baseline	SDM	
		Direct effects	Indirect effects
Const.	9.111794 (p=0.0000)	7.743578 (p=0.0000)	
log(area)	-0.548759 (p=0.0000)	-0.478024 (p=0.0000)	-0.460327 (p=0.0000)
Rooms	0.090233 (p=0.0000)	0.081950 (p=0.0000)	0.078904 (p=0.0000)
Garage	0.017429 (p=0.0006)	0.050833 (p=0.0000)	0.048960 (p=0.0000)
New	0.221423 (p=0.0000)	0.182193 (p=0.0000)	0.175468 (p=0.0000)
APU	0.214557 (p=0.0000)	0.174469 (p=0.0000)	0.168170 (p=0.0000)
Y2006	-0.013881 (p=0.0000)	-0.025745 (p=0.0014)	-0.024806 (p=0.0016)
Y2007	0.003524 (p=0.0423)	-0.017655 (p=0.0220)	-0.017007 (p=0.0223)
Y2008	-0.007849 (p=0.0036)	-0.032251 (p=0.0000)	-0.031075 (p=0.0000)
Y2009	-0.011720 (p=0.0008)	-0.050460 (p=0.0000)	-0.048619 (p=0.0000)

With the model estimation, we proceed with the construction of two RPPIs based on the annual dummy variables. The first uses the coefficients estimated from the OLS model. The second uses the direct effects associated with the annual dummy variables estimated in the SDM model. Both series can be seen in Table 8. A simple Paired-Samples T Test procedure reject the null hypotheses of equality between the two series, with a significance value of 0,084. Moreover, the standard errors of the coefficients on the dummy variables for time are lower for the SDM estimation compared with the OLS, which may be used as a criteria for our index evaluation (Eurostat, 2017).⁷

Both models display a similar trend, although with important differences in the price level. As it can be seen in Figure 5, prices decrease from 2007 onward. The two RPPI series run almost parallel. After a break in 2006, we see a slight recovery in 2007, followed by a further break in 2008 and 2009. However, the RPPI based on the SDM spatial model presents a more pessimistic scenario. The falls are more pronounced, especially in 2006 and 2009 and the 2007 recovery is less significant.

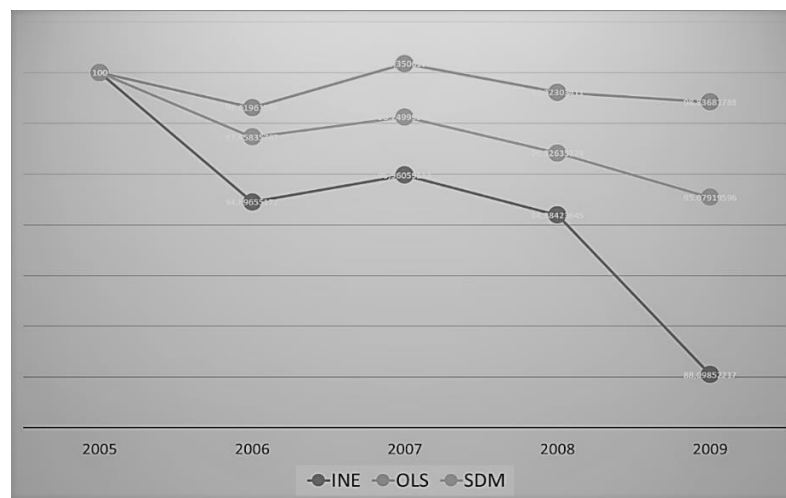
Table 7: RPPOs evolution, with (SDM) and without spatial dependence (baseline OLS).

Year	2005	2006	2007	2008	2009
OLS	100,00	98,62	100,35	99,22	98,84
SDM	100,00	97,46	98,25	96,83	95,08
% Change (OLS)	-	-1,38%	1,76%	-1,12%	-0,39%
% Change (SDM)	-	-2,54%	0,81%	-1,45%	-1,80%

Figure 5 compares the evolution of the two real property indexes, with (SDM) and without correction for autocorrelation (OLS) with the only indicator available in Portugal covering the evolution of real estate prices during the same period. Figure 6 compares the evolution of the two real estate indices, with (SDM) and without spatial autocorrelation correction (OLS), with the INE index that covers the evolution of real estate prices during the same period in the same geographic area of our study. According to the “Survey on bank evaluation on housing bank inquiries”, the price drop between 2007 and 2009 was 10.8%. This period corresponds to the subprime crisis that affected the global economy. In the same interval, the decrease in the index built from the OLS model is only 2%. On the other hand, the index based on the SDM model reveals a drop of 5%, much closer to reality represented by the housing bank inquiries. Admitting that the “Survey on bank evaluation on housing bank inquiries” represents a good approximation of the sector's reality, we can conclude that the SDM RPPI better reflects the evolution of the real estate market compared to the classic OLS RPPI.

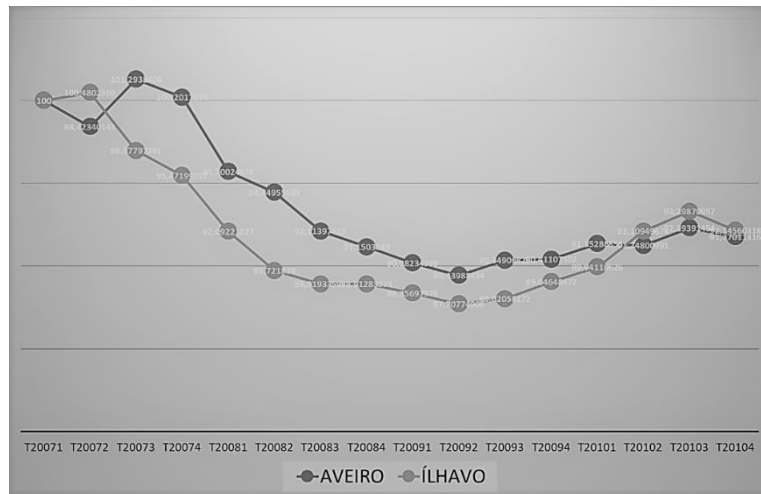
Figure 6 illustrates the quarterly evolution of the Confidencial Imobiliário Index between 2007 and 2010. Like the INE index, the Ci shows a 10% drop in prices between 2007 and 2009. Between 2009 and 2010, it shows a recovery. Also here, the SDM index that incorporates the correction for spatial autocorrelation is closer to the Confidencial Index than the OLS Index, indicating the relevance of incorporating the elements of spatial econometrics.

Figure 5: RPPIs graph with (SDM) and without spatial effects (OLS) compared with the evolution of average prices obtained from the “Survey on Bank evaluation on Housing” published by the INE (Portuguese Statistic Institute).



⁷ For longer time series, (Guo et al., 2014) use the index returns volatility and the first order autocorrelation to compare indexes.

Figure 6: Evolution of the Confidencial Imobiliário Index between 2008 and 2010 (Quarterly data provided by Confidencial Imobiliário).



5. CONCLUSION

This article builds a reliable RPPI using a spatial hedonic model. Property prices exhibits strong spatial correlation. The spatial correlation affects the validity of the OLS estimates used in the classic hedonic price models used in the literature. Therefore, the need to find tools to model spatial dependence has become obvious. According to ours results, the RPPI estimated from a SDM model applied to the period between 2005 and 2009 performs better compared to the classic OLS. Moreover, the results are closer to the real estate indicators available at INE in the same period.

Quantity and quality of available data are decisive for the choice of the type of price index. The methods, based on the first moments of the price distribution (or median), are very attractive for its simplicity and allow, provided there is sufficient degrees of freedom, to obtain disaggregated prices for various sub-markets, therefore, revealing good and precise information to the market. When the number of observations is scarce, hedonic methods represent a valid alternative, provided that the available observations are accompanied by qualitative information about the characteristics of the property traded.

In line with the literature, home prices show a high degree of spatial correlation not captured by traditional models. In this sense, the results from spatial econometric models show significant differences when compared with the results obtained with the traditional OLS model, thus raising relevant questions about the consistency of these estimators. Even in full hedonic models incorporating a wider set of variables intended to capture the territorial spatial effects, the literature reveals frequently the presence of auto correlation in the residuals (Baumont, 2009). This finding should have, in our opinion, a significant impact in the construction of a methodological framework for the development of RPPIs with national coverage, even considering the necessity of these methods being parsimonious and replicable in different territories. Given the difficulty of harmonizing the development of territorial variables impacting on house prices (CBO, services, equipment, infrastructure etc.) it seems that the tools of spatial econometrics will be an instrument to take increasingly into account in this matter.

Still considering the contribution to a methodological framework for the construction of real estate price indices or RPPIs, it is clear the need to find, upstream, the best mechanisms for the creation of a database that feeds the estimation of indexes. In this sense, the literature and the various practices point to four data sources: the notarial sources for transactions registrations, the fiscal institutions that assess the assets for tax purposes, the real estate agencies that promote business and finally the banking that provides credit for the purchase of housing. Any of these solutions have advantages and disadvantages. Considering the need to monitor the evolution of the real estate price level, eventually integrated in a wider framework of building a broader indicator of prices evolution, the crucial observations consist fundamentally of the trade register, if possible, performed in real

time. In this case, the recording notary shall certainly be the more comprehensive mechanism, in that not all sales need credit and many of these transactions are performed outside the domain of real estate agencies or without the bank intermediation. If the objective is to assess property wealth for national accounting or fiscal purpose or even to assess solvency of institutions or agents, the databases of national or regional fiscal institutions are certainly a source unavoidable.

Whatever the solutions or protocol to adopt to operationalize the constitution and updating of a real estate database, the involvement of public institutions, either through the INE, or the academic institutions, seems of utmost importance in a context where new technological solutions related to georeferencing data open new perspectives to econometricians. Therefore, and considering the results that reinforce the importance of spatial effects in the distribution of prices, it is no longer possible to think about the creation and updating of real estate databases without including the issue of developing, in parallel, a geographical information system that allows to incorporate the spatial component in econometric models' routines based on georeferenced data. The present study, despite its limited scope, demonstrates the relevance of spatial effects and raises the need for more studies with more recent data with greater geographical area.

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Acknowledgments: The authors would like to thank the reviewers for their valuable contributions, comments, and suggestions. This work was financially supported by the Research Unit on Gov[er]nance, Competitiveness and Public Policies (UIDB/04058/2020) + (UIDP/04058/2020), funded by national funds through FCT—Fundação para a Ciência e a Tecnologia, and has been supported by Portuguese national funds through the Foundation for Science and Technology, FCT, I.P., in the context of the JUST_PLAN project (PTDC/GES-OUT/2662/20)

Artigo submetido a 29 de Junho 2021; versão final aceite a 23 de Fevereiro de 2022
Paper submitted on June 29, 2021; final version accepted on February 23, 2022

A Robust Approach for the Infrastructural Classification of Railway Stations in Tripura, India

Uma Análise Robusta Das Infraestruturas Das Estações Ferroviárias Oferecidas Aos Passageiros Em Tripura, Índia

Stabak Roy

Department of Geography and Disaster Management, Tripura University, India

Tomás Lopes Cavalheiro Ponce Dentinho

Atlantic Applied Economics Studies Center (CEEApLA), University of the Azores

Samrat Hore

Department of Statistics, Tripura University, India

Saptarshi Mitra

saptarshigeotu2000@gmail.com

Department of Geography and Disaster Management, Tripura University, India

Abstract

An infrastructural classification is a Decision-Making Unit (DMU) for the service providers to deliver better infrastructure. This paper intends to classify the infrastructural facilities of the railway stations offered to the passengers in Tripura through an alternative synthetic indicator. The study is based on both primary and secondary data. The existing synthetic indicator is also applied to it and generalisation of the indicator called generalised synthetic indicator is framed according to the nature of the observed data sets. A robust synthetic indicator, linear order of existing and proposed alternative synthetic indicator, has been developed to classify the railway stations of Tripura based on existing infrastructural facilities. The study reveals that stations are categorised into four different (very good, good, poor and very poor) infrastructural classifications due to the frequency of passenger mobility, the proximity of urban centres, location of industrial units, land use of hinterland and undulating topography of the site. The causal interference has been represented through the geo-spatial technique. A policy recommendation has been proposed to provide better railway infrastructure for the passengers.

Keywords: Synthetic Indicator, Alternative Synthetic Indicator, Station Infrastructure, Railway Geography, Causality of Infrastructure

JEL Codes: O18, R11, D62

Resumo

Uma classificação de uma infraestrutura é uma Unidade de Tomada de Decisão (DMU) para os provedores de serviços fornecerem uma melhor infraestrutura. Este estudo pretende classificar as infraestruturas das estações ferroviárias oferecidas aos passageiros em Tripura, Índia, através de um indicador sintético alternativo. O estudo é baseado em dados primários e secundários. O indicador sintético existente também é aplicado e a generalização do indicador denominado indicador sintético generalizado é enquadrada de acordo com a natureza do conjunto de dados observados. Um indicador sintético robusto, de natureza linear do indicador sintético alternativo existente e proposto, foi desenvolvido para classificar as estações ferroviárias de Tripura com base nas infraestruturas existentes. O estudo revela que as estações são classificadas em quatro categorias de infraestrutura (muito bom, bom, mau e muito mau) devido à mobilidade facultada aos passageiros, à proximidade aos centros urbanos, à localização das unidades industriais, ao uso do solo do interior e à topografia

ondulada do equipamento. A interferência causal tem sido representada por meio da técnica geoespacial. Foi formulada uma recomendação de política para proporcionar uma melhor infraestrutura ferroviária aos passageiros.

Palavras-chave: Indicador Sintético, Indicador Sintético Alternativo, Infraestrutura da Estação, Geografia Ferroviária, Causalidade da Infraestrutura.

Códigos JEL: O18, R11, D62

1. INTRODUCTION

A railway station is a place where trains are stopped to exchange passengers, goods and control of train movement (Upadhyay and Gupta, 2012). Railway stations are an integral part of the railway transport system which is considered as the pillar of economic development, socio-cultural interaction and industrial growth as well as infrastructural development of any country, region and state (Roy and Mitra, 2020; Choudhary and Rao, 2018; Skorobogatova and Merlino, 2017; Wagner, 2012). The development of the transport system depends on the social and economic development of a country (Lingaitis and Sinkevičius, 2014). Convex topography and environmental vibrations also have an impact on the development of railway transport systems (Lu et al., 2019). The railway transport system is considered as the key factor of development and essential feature of all modern economies (Aldagheiri, 2010). Banerjee et al. (2020) argue that infrastructure development is a worthwhile object of policy and it plays an important role for determining the economic benefits.

Petrović et al. (2010) developed a cross-sectional profile of the existing supplementary amenities at railway stations and suggested to provide new facilities among the existing passengers for staying longer at the railway station as well as attracting new passengers in the railway stations. Goal et al. (2016) have shown the importance of the satisfaction paradigm on existing passenger amenities at the railway station. The operation and development of stations are the integration of multiple actors and interests (Bertolini, 1996). The infrastructural development of the railway stations may not be symmetrically distributed because of uneven traffic mobility, urban dynamics, industrial development, land use pattern (Brusinsma, 2009; Kasraian et al., 2016; Polom et al., 2018). Bruinsma (2009) focused on railway station area development and urban dynamics with internal and external effects through Cost Benefit Analysis (CBA) framework. It has been found that the development of a high-speed train station depends on large infrastructure projects like real-estate development projects. The railway systems of most countries have played an important role in the growth of cities. The direction of the urban system is expanded towards the railway stations (Pels, 2007).

Zemp et al. (2011) had classified the railway stations based on the demands and conditions of the site. Stoilova and Nikolova (2016) developed a methodological approach for classifying the railway passenger stations based on the potentiality of the location, infrastructure and transport volumes using principal component and cluster analysis. Jarocka and Glinska (2017) developed a synthetic indicator to present the state of development of railway transport infrastructure in Eastern Poland. Many researchers have been contributed to infrastructural development in the railway stations. But very few attended has been made to classify the railway stations with regard to the existing infrastructural facilities. The major problem of the Indian Railway in Tripura is inadequate infrastructural service delivery (Ministry of Railway, Government of India, 2009). Single track stations with inadequate infrastructural facilities like the non-existence of goods shed, insufficient working staff, poor passenger service etc. are the major issues for the development of the railway transport system in Tripura (Roy and Mitra, 2016 a). After 2016, few numbers of railway stations like Agartala, Udaipur, and Belonia have been designed for better infrastructural facilities, on the contrary, Jawaharnagar, Nadiapur and Nalkata railway stations have nominal infrastructural support (Mitra and Roy, 2020).

To address the infrastructural adequacy of the stations, proper classification has been required. This study intends to classify the railway stations in Tripura over existing infrastructure facilities and analyse the causality of differential infrastructural development for railway stations in Tripura.

2. LOCATION

The Indian railway is the fourth-longest railway network in the world with 123236 km route length and 7349 railway stations. The network is carried about twenty-three billion passengers (the highest in the world) and three million tons of freight (fourth highest in the world) in 2019-20 (Ministry of Railways, 2020). Indian railways provide services to all most all parts of the country with its eighteen zones and seventy divisions (Press Trust of India, 2019). Tripura, the second smallest state of Northeast India after Sikkim, was connected with other parts of the country in 2008 after a long socio-political struggle through meter gauge track (Roy and Mitra, 2020). After the intervention of Broad Gauge (1.676 m) in 2016 many infrastructural changes had been taken place at the different railway stations in Tripura.

The study is encompassed of all twenty-seven stations within the state of Tripura. About 264 km

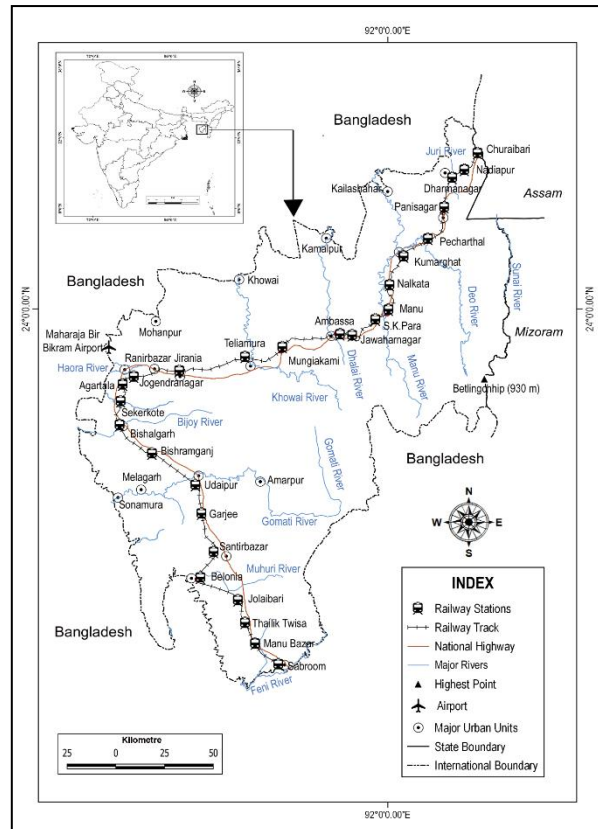
long operational railway track extends between Churaibari Railway Station (24°26' N. and 92°14' E.) in the North to Sabroom (23° 0' N. and 91°42' E.) in the South with twenty-five intermediate stations namely Nadiapur (24°23' N. and 92°12' E.), Dharmanagar (24°22' N. and 92°10' E.), Panisagar (24°16' N. and 92°09' E.), Pecharthar (24°11' N. and 92°06' E.), Kumarghat (24°09' N. and 92°02' E.), Nalkata (24°03' N. and 92°00' E.), Manu (23°59' N. and 91°59' E.), S.K. Para (23°58' N. and 91°58' E.), Jawaharnagar (23°55' N. and 91°54' E.), Ambassa (23°55' N. and 91°51' E.), Mung-iakami (23°53' N. and 91°42' E.), Teliamura (23°51' N. and 91°37' E.), Jirania (23°49' N. and 91°25' E.), Jogendranagar (23°48' N. and 91°18' E.), Agartala (23°47' N. and 91°16' E.), Sekerkote (23°44' N. and 91°16' E.), Bishalgarh (23°40' N. and 91°16' E.), Bishramganj (23°35' N. and 91°21' E.), Udaipur (23°30' N. and 91°28' E.), Garjee (23°25' N. and 91°29' E.), Santirbazar (23°19' N. and 91°31' E.), Belonia (23°14' N. and 91°29' E.), Jolaibari (23°11' N. and 91°35' E.), Thailik Twisa (23°7' N. and 91°36' E.) and Manu Bazar (23° 3' N. and 91°38' E.) Railway Station (Fig. 1 and Table 1).

The railway moves north to south across three major hill ranges namely Baramura, Atharamura and Longtharai and the state has 11 major rivers name Longai (98 km), Juri (79 km), Deo (98 km), Manu (167 km), Dhalai (117 km), Khowai (70 km), Haora (53 km), Bijoy (26 km), Gomati (95 km), Muhuri (64 km) and Feni (116 km) (Fig. 1). The Road network of Tripura is very poor during the monsoon season because of landslides, the common phenomenon in this hilly terrain region (Sen et al., 2013). After a long socio-political struggle, the capital city Agartala connected with the rest of India through a meter gauge line (1000 mm) in 2008 (Roy and Mitra, 2016 a). Gradually railway becomes the prime mode of transportation in Tripura by connecting Northeast India (Roy and Mitra, 2016 b). During 2016, gauge conversion (Meter Gauge [1000 mm] to Broad Gauge [1676 mm]) took place under the uni-gauge project of the Ministry of Railways, Government of India (Roy et al., 2019).

Table 1. Basic Geographical Information of the Railway Stations in Tripura

<i>Name of the Station</i>	<i>Station Code</i>	<i>Latitude</i>	<i>Longitude</i>	<i>Elevation (m)</i>	<i>Distance from Churaibari (km)</i>
Churaibari	CBZ	24°26' N	92°14' E	44	0
Nadiapur	NPU	24°23' N.	92°12' E.	37	5
Dharmanagar	DMR	24°22' N.	92°10' E.	24	10
Panisagar	PASG	24°16' N.	92°09' E.	36	22
Pecharthar	PEC	24°11' N.	92°06' E.	49	34
Kumarghat	KUGT	24°09' N.	92°02' E.	42	43
Nalkata	NLKT	24°03' N.	92°00' E.	44	54
Manu	MUNU	23°59' N.	91°59' E.	47	64
S.K. Para	SKAP	23°58' N.	91°58' E.	81	67
Jawaharnagar	JWNR	23°55' N.	91°54' E.	89	79
Ambassa	ABSA	23°55' N.	91°51' E.	80	84
Mungiakami	MGKM	23°53' N.	91°42' E.	110	102
Teliamura	TLMR	23°51' N.	91°37' E.	46	113
Jirania	JRNA	23°49' N.	91°25' E.	32	133
Jogendranagar	JGNR	23°48' N.	91°18' E.	31	147
Agartala	AGTL	23°47' N.	91°16' E.	27	151
Sekerkote	SEKE	23°44' N.	91°16' E.	29	157
Bishalgarh	BLGH	23°40' N.	91°16' E.	17	165
Bishramganj	BHRM	23°35' N.	91°21' E.	43	178
Udaipur	UDPU	23°30' N.	91°28' E.	19	193
Garjee	JRJE	23°25' N.	91°29' E.	32	203
Santirbazar	STRB	23°19' N.	91°31' E.	46	217
Belonia	BENA	23°14' N.	91°29' E.	40	227
Jolaibari	JLBRI	23°11' N.	91°35' E.	41	240
Manu Bazar	MUBR	23° 3' N.	91°38' E.	35	255
Sabroom	SBRM	23° 0' N.	91°42' E.	31	264

Source: Primary Survey, 2019

Figure 1. Location map of the study area

(Source: Prepared by the authors, 2021)

3. MATERIALS AND METHODOLOGY

The study is based on both primary and secondary data collected from every individual railway station of the state using survey instruments like measuring tape, digital distance meter, total station and hand-held GPS receivers (Garmin etrex 30x). Based on Indian Work Manual, 28 infrastructural variables like number of platforms, number of tracks, average platform length (m), average platform width (m), average platform height (m), size of the passenger shed (sq.m), size office area (sq. m), length of the foot over bridge (m), the width of the foot over bridge (m), the height of the footover bridge from railway track (m), no. of stairs in footover bridge, number of ticket counters, drinking water collection (taps) points, number of taps, number of water purifiers, number of bathrooms, lights, number of light posts, fans, mobile charging points, size of the waiting hall (sq. m.), size of the waiting room (sq. m.), sitting arrangement, public addressing system, number of dustbins, size of the parking area, number of trees, number of registered and non-registered vending stalls have been taken for station wise infrastructural development (Ministry of Railways, 2000).

Secondary data related to railway stations like monthly passenger flow, traffic volume, are collected from the office of the Station Manager or Station Master. Geo-spatial data like relief, slope, drainage, forest cover etc. were extracted from satellite imageries. The Shuttle Radar Topography Mission (SRTM) Digital Elevation Model (DEM) has been collected from using the United States Geological Survey (USGS) earth explorer platform. Sentinel Images data have been collected from Copernicus Open Access Hub. Images are processed and analysed by Global Mapper v.18, Arc GIS v10.7.1 softwares.

To identify the nature of the collected data sets, normality of each observed data has been tested through Shapiro-Wilk's test (Razali and Yup, 2011). The Shapiro-Wilk's test is based on the correlation between the observational data and the corresponding normal scores, and if the p-value of the test is found less than 0.05, then the assumption of normality of the corresponding data set has been discarded.

To assess state-wise railway development, Synthetic Indicator (Jarocka and Glinska, 2017) is widely applied. This indicator is a linear order of several variables, which are standardised by its

arithmetic mean and standard deviation. In our study, the twenty-four variables are discrete data and we found that the data observations do not follow the normality assumptions, wherever only four variables follow the normality assumptions (carried out through Shapiro-Wilk's test and reported in Table 2). A new Synthetic Indicator, called Alternative Synthetic Indicator (ASI), has been proposed in Roy et al. (2022) for non-normal data observations, where the indicator is structured as the linear order of the median (as a measure of central tendency) and mean deviation about median (as a measure of dispersion). Roy et al. (2022) also suggested a generalisation of the synthetic indicator, called as Generalised Synthetic Indicator (GSI), where the Synthetic Indicator is appropriate for the normality assumptions of the observational data sets and Alternative Synthetic Indicator (ASI) is for the non-normal data sets.

In our data sets of twenty-eight variables, only four variables follow the normality assumption and the remaining twenty-four variables follow non-normality. A robust synthetic indicator has been introduced here to classify the railway stations according to their corresponding infrastructural facilities. The robust indicator is formulated as standardisation (normalisation) of corresponding linear additivity of SI and ASI values.

Physical hindrances on railway development in Tripura have been analysed through Digital Elevation Modelling (DEM) and Relative Relief (RR) for understanding physical hindrances. Geo-spatial data like relief, slope, drainage extracted from SRTM DEM data using USGS earth explorer platform. Sentinel-2 satellite Images have been used to formulate Normalised Difference Vegetation Index (NDVI), Normalized Difference Built-up Index (NDBI) and Build-up Index (BI). These indices are processed and analysed to find the causality of differential infrastructural development at the railway stations (Mohammad et al., 2019).

NDVI is equal to the difference in the intensities of reflected light in the red (Band-4) and infrared (Band-8) range divided by the sum of these intensities, calculated by using following formula:

$$NDVI = \frac{B8(VNIR) - B4(Red)}{B8(VNIR) + B4(Red)},$$

where

B8 is Visible and Near-Infrared with 10 m resolution and 842 nm central wavelength,

and B4 is red band with 10 m resolution and 665 nm central wavelength.

NDVI of the railway stations and surrounding areas indicate the density of forest (canopy) as well as indicate urban and water features. NDBI emphasises the higher reflectance in the shortwave-infrared (SWIR) region, compared to the near-infrared (NIR) region, which applies to predictions urban or settlement areas (He et al., 2010). Here we have used NDBI to understand the nature of the hinterland of the railway stations which induce passenger mobility and its required infrastructural facilities. NDBI has been calculated by using the following formula:

$$NDBI = \frac{B11(SWIR) - B8(VNIR)}{B11(SWIR) + B8(VNIR)},$$

where

B11 is Short Wave Infrared (SWIR) with 20 m resolution and 1610 nm central wavelength,

and B8 is Visible and Near-Infrared with 10 m resolution and 842 nm central wavelength.

For more accuracy in Build-up area identification, Build-up Index (BI) has been calculated by using the following method

$$BI = NDVI - NDBI$$

Global Mapper v.18, Arc GIS v10.7.1. software has used to process the data.

4. SYNTHETIC INDICATOR AND ALTERNATIVE SYNTHETIC INDICATOR

Data normality has been tested through Shapiro-Wilk's Test for all twenty-eight variables of the study. It has been found that data of only four variables, namely width of the platform, number of the light, size of the waiting hall and parking area, are normally distributed. On the other hand, data of remaining twenty-four variables are found non-normality (Table 2).

The details of the Shapira-wilk's test for all twenty-eight variables with the value of parameter lambda and corresponding p-value are reported in Table 1. If the p-value of the respective variable is found more than 0.05, then the normality of corresponding observations is resumed otherwise, non-normality is considered.

Table 2. Normality Assumption of Observed Data Sets through Shapiro-Wilk's Test

Infrastructural Variables	Value of Lambda	P Value	Nature of Data Set
Number of platforms	0.7578	0.000027	Non-normal
Number of tracks	0.77	0.000043	Non-normal
Average platform length	0.8628	0.002085	Non-normal
Average platform height	0.8707	0.003051	Non-normal
Passenger shed	0.8305	0.0004843	Non-normal
Office area	0.849	0.0011	Non-normal
Length of the footover bridge	0.6537	0.000001109	Non-normal
Width of the footover bridge	0.7592	0.00002907	Non-normal
Height of the footover bridge	0.6021	0.000000219	Non-normal
Stairs in footover bridge	0.6272	0.0000004364	Non-normal
Number of ticket counters	0.5986	0.0000001991	Non-normal
Drinking water collection (taps) points	0.8024	0.0001509	Non-normal
Number of taps	0.7912	0.00009686	Non-normal
Number of water purifiers	0.5879	0.0000001496	Non-normal
Number of bathrooms	0.7991	0.000132	Non-normal
Numbers of light post	0.7856	0.00007781	Non-normal
Numbers of fan	0.7602	0.00003015	Non-normal
Numbers of mobile charging points	0.8171	0.0002751	Non-normal
Size of the waiting room	0.739	0.00001423	Non-normal
Seating arrangement	0.6634	0.000001248	Non-normal
Numbers of public addressing system	0.8365	0.00006298	Non-normal
Number of dustbins	0.8286	0.00004467	Non-normal
Number of trees	0.9006	0.01382	Non-normal
Registered and Non-Registered Hawkers and Vendors	0.8033	0.000156	Non-normal
Width of the platform	0.9714	0.6393	Normal
Number of lights	0.9352	0.09295	Normal
Size of the waiting hall	0.9469	0.1806	Normal
Parking area	0.9385	0.1119	Normal

Source: Computed by the researchers using R v. 4.0.3

Classification of railway stations through Synthetic Indicator is reported in Table 2 for four normal variables i.e., average platform width (m), numbers of lights, size of the waiting hall and parking area. The calculated mean and standard deviation of the Synthetic Indicator are 0 and 2.96, respectively.

Table 3. Classification of railway stations through Synthetic Indicator (SI)

Class	Method of Calculating Class	Class Range	Characteristic of Class	Class of the Stations
I	$z_i \geq \bar{z} + \sigma_z$	$z_i \geq 2.91$	Very good infrastructure	Agartala, Udaipur and Sabroom
II	$\bar{z} \leq z_i < \bar{z} + \sigma_z$	$0 \leq z_i < 2.91$	Good infrastructure	Garjee, Dharmanagar, Belonia, Bishramganj, Santirbazar, Jirania, Jogendranagar, Manu Bazar and Ambassa
III	$\bar{z} - \sigma_z \leq z_i < \bar{z}$	$-2.91 \leq z_i < 0$	Poor infrastructure	Thailik Twisa, Bishalgarh, S. K. Para, Teliamura, Manu, Joliabari, Kumarghat, Sekerkote and Churaibari
IV	$z_i < \bar{z} - \sigma_z$	$z_i < -2.91$	Very poor infrastructure	Panisagar, Mungiakami, Nalkata, Pecharthal, Jawaharnagar and Nadiapur

Source: Computed by the authors, 2021

The value of Synthetic Indicator of the respective station is reported below in bracket. For the stations, Panisagar (-3.04), Mungiakami (-3.23), Nalkata (-3.29), Pecharthal (-3.46), Jawaharnagar (-4.12) and Nadiapur (-4.63) are found with very poor infrastructure. Wherever for Thailik Twisa (-0.01), Bishalgarh (-0.03), S. K. Para (-1.81), Teliamura (-0.24), Manu (-0.33), Joliabari (-1.42), Kumarghat (-1.59), Sekerkote (-1.81) and Churaibari (-2.79), poor infrastructure is observed. Nine railway stations, namely Garjee (2.64), Dharmanagar (2.61), Belonia (2.57), Bishramganj (1.84), Santirbazar (1.83), Jirania (0.55), Jogendranagar (0.50), Manu Bazar (0.38) and Ambassa (0.24) have been found with good infrastructure and Agartala (7.63), Udaipur (5.95) and Sabroom (3.32) are with very good infrastructure (Table 3). In a nutshell, 3 (11.11%) stations are found with very good infrastructure, 9 (33.33%) are in good infrastructure, other 9 (33.33%) stations are also with poor infrastructure and the remaining 6 (22.23%) stations are reported with very poor infrastructure.

Table 4. Classification of railway stations through Alternative Synthetic Indicator (ASI)

Class	Method of Calculating Class	Class Range	Characteristic of Class	Class of the State
I	$y_i \geq \tilde{y} + MD_{\tilde{y}}$	$y_i \geq 24.39$	Very good infrastructure	Agartala, Dharmanagar, Udaipur and Belonia
II	$\tilde{y} \leq y_i < \tilde{y} + MD_{\tilde{y}}$	$7.07 \leq y_i < 24.39$	Good infrastructure	Sabroom, Ambassa and Kumarghat, Manu, Jirania, Teliamura, Garjee, Bishramganj, Santirbazar and Manu Bazar
III	$\tilde{y} - MD_{\tilde{y}} \leq y_i < \tilde{y}$	$-10.25 \leq y_i < 7.07$	Poor infrastructure	Joliabari, Churaibari, Bishalgarh, Panisagar, Pecharthal, Mungiakami
IV	$y_i < \tilde{y} - MD_{\tilde{y}}$	$y_i < -10.25$	Very poor infrastructure	Jogendranagar, Thailik Twisa, Nalkata, Sekerkote, Jawaharnagar, Nadiapur and S. K. Para

Source: Computed by the authors, 2021

On the other hand, for twenty-four non-normal railway infrastructural variables, Alternative Synthetic Indicator (ASI) has been calculated and found that 7 (25.93%) stations have very poor infrastructure. The stations are Jogendranagar (-12.43), Thailik Twisa (-23.55), Nalkata (-24.69), Sekerkote (-24.70), Jawaharnagar (-25.27), Nadiapur (-27.83) and S. K. Para (-30.08). Poor infrastructures are found in 6 (22.22%) stations: Joliabari (3.96), Churaibari (2.29), Bishalgarh (2.05), Panisagar (-0.42), Pecharthal (-0.70), Mungiakami (-8.57) railway stations. Only 10 (37.04%) railway stations have good infrastructure i.e., Sabroom (24.13), Ambassa (20.06), Kumarghat (17.95), Manu (17.13), Jirania (14.10), Teliamura (9.63), Garjee (7.69), Bishramganj (7.60), Santirbazar (7.49) and Manu Bazar (7.07). About only 4 (14.81%) railway stations of the state have very good infrastructure. Agartala (80.22), Dharmanagar (36.26), Udaipur (28.49) and Belonia (27.02) fall under this category (Table 4).

A Robust Synthetic Indicator (RSI) value for each station has been calculated by adding the corresponding normalised value of SI and ASI. RSI classification of railway stations over infrastructural facilities is reported in Table 4. Agartala (87.85), Dharmanagar (38.86), and Udaipur (34.44) railway stations are found with very good infrastructural facilities. There are 11 (40.74%) railway stations namely Belonia (29.59), Sabroom (27.45), Ambassa (20.30), Manu (16.80), Kumarghat (16.35), Jirania (14.65), Garjee (10.32), Bishramganj (9.44), Santirbazar (9.32), Teliamura (9.12) and Manu Bazar (7.45) railway station being observed with good infrastructure.

Table 5. Classification of railway stations through Robust Synthetic Indicator (RSI)

Class	Method of Calculating Class	Class Range	Characteristic of Class	Class of the Stations
I	$z_i \geq \bar{z} + \sigma_{\bar{z}}$	$z_i \geq 30.92$	Very good infrastructure	Agartala, Dharmanagar, and Udaipur
II	$\bar{z} \leq z_i < \bar{z} + \sigma_{\bar{z}}$	$4.99 \leq z_i < 30.92$	Good infrastructure	Belonia, Sabroom, Ambassa, Manu, Kumarghat, Jirania, Garjee, Bishramganj, Santirbazar, Teliamura and Manu Bazar
III	$\bar{z} - \sigma_{\bar{z}} \leq z_i < \bar{z}$	$-20.95 \leq z_i < 4.99$	Poor infrastructure	Joliabari, Bishalgarh, Churaibari, Panisagar, Pecharthal, Mungiakami and Jogendranagar
IV	$z_i < \bar{z} - \sigma_{\bar{z}}$	$z_i < -20.95$	Very poor infrastructure	Thailik Twisa, Sekerkote, Nalkata, Jawaharnagar, S. K. Para and Nadiapur

Source: Computed by the authors, 2021

Poor infrastructure has been found in 7 (25.93%) railway stations: Joliabari (2.54), Bishalgarh (2.01), Churaibari (-0.50), Panisagar (-3.46), Pecharthal (-4.16), Mungiakami (-11.79) and Jogen-dranagar (-11.93). The remaining 6 (22.22%) railway stations i.e., Thailik Twisa (-23.57), Sekerkote (-26.52), Nalkata (-27.98), Jawaharnagar (-29.39), S. K. Para (-30.12) and Nadiapur (-32.47) are reported with very poor infrastructure.

The infrastructural development of the railway stations is unevenly distributed and it has been measured through RSI (Table 5). The causality of unequal infrastructural distribution varies on multifaceted reasons. Tripura have unique ‘Valley and Ridge’ (Tilla and Lunga Topography) topography (Sen et al., 2015). Due to the physiographic hindrance surface of the state, transportation has been developed in a sluggish speed (Mitra and Roy, 2020).

Table 6. Relation between Elevation and Station Infrastructure

Elevation Zone	Altitudinal Value (m)	Name of the Station with Infrastructural Grade (GSI)	Percentage of Station Infrastructure			
			Class	No	% (within Zone)	% (Total Station)
I	<25	Agartala (I), Udaipur (I), and Bishalgarh (III)	Very Good	2	66.67	7.41
			Good	0	0.00	0.00
			Poor	1	33.33	3.70
			Very Poor	0	0.00	0.00
II	26-50	Dharmanagar (I), Bisramganj (II), Sabroom (II), Manu Bazar (II), Garjee (II), Santirbazar (II) Kumarghat (II), Teliamura (II), Belonia (II), Churaibari (III), Jirania (III), Panisagar (III), Jogendranagar (III), Jolaibari (III), Nadiapur (IV), Sekerkote (IV), and Thailik Twisa (IV)	Very Good	1	5.88	3.70
			Good	8	47.06	29.63
			Poor	5	29.41	18.53
			Very Poor	3	17.65	11.11
III	51-75	Manu (II), Pecharthal (III), Nalkata (IV) and S. K. Para (IV)	Very Good	0	0.00	0.00
			Good	1	25.00	3.70
			Poor	1	25.00	3.70
			Very Poor	2	50.00	7.41
IV	>75	Ambassa (II), Jawaharnagar (IV) and Mungiakami (IV)	Very Good	0	0.00	0.00
			Good	1	33.33	3.70
			Poor	0	0.00	0.00
			Very Poor	2	66.67	7.41
Total			27		100	

Source: Computed by the authors, 2021

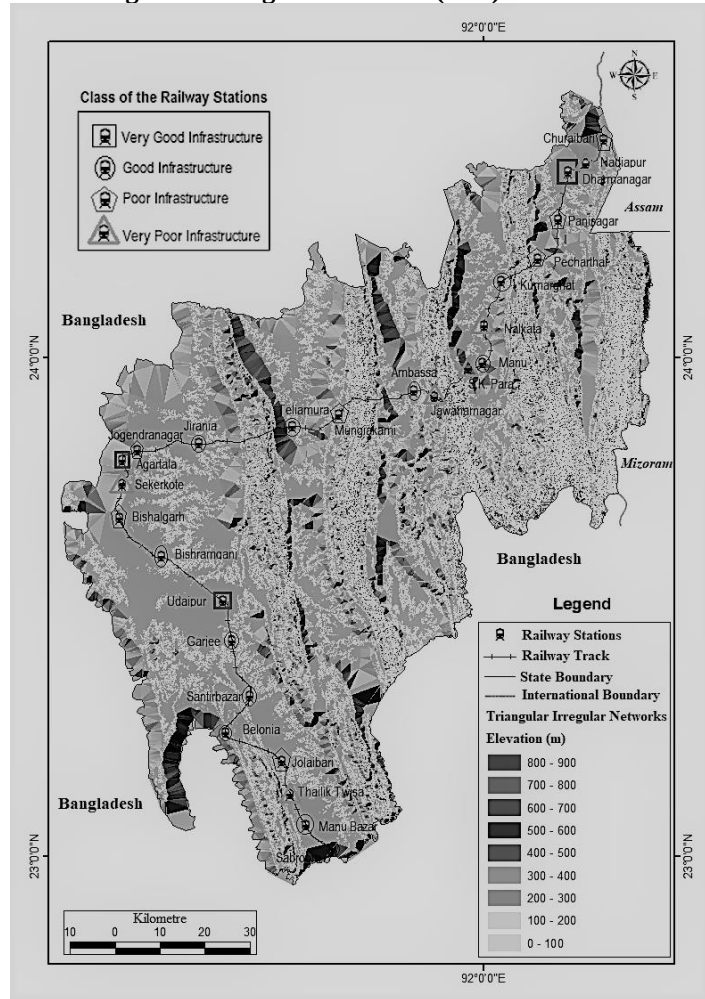
It has been found that the maximum (17 out of 27, 62.97%) railway stations are located between 26 m to 50 m altitude (Table 6). Track profile of the state varies from 12 m to 360 m, and is presented its topography in Figure 2. Due to the close proximity of the Gomati and Bijoy river, Udaipur and Bishalgarh railway stations are located at 19 m above form the Mean Sea Level (MSL). But Ja-waharnagar and Mungiakami railway stations are located at 101.45 m and 110.18 m from MSL in Atharamura and Longtharai hill range, respectively (Fig. 2). It has been found that such physio-graphic structure influences the infrastructural development of the station. Only 2 (7.41%) railway stations with very good infrastructure (Table 5) are located in below 25 m height from MSL, namely Agartala and Udaipur. Agartala is located in between 23° 45' to 23° 55' N latitudes and 91°15' to 91°20' E longitudes in the flood plain of the river Haora with 526292 total population (AMC, 2018). On the other hand, Udaipur is the third largest railway station of Tripura, located at the left bank of river Gomati with 37,781 population (Census of India, 2011). Udaipur has significant value for re-ligious tourism, archaeological tourism and heritage tourism. Bishalgarh railway station is also lo-cated at 19 m altitude due to the juxtaposition of river Bijoy (Fig 2.) Bishalgarh town is located about 21.2 km from Agartala city. Less number of trains (6) along with obnoxious departure and arrival times, peoples are compelled to travel by road which is the main causality of poor railway infrastructure has been found in Bishalgarh.

About 8 out of 17 (47.05%) railway stations between 26 m to 50 m having good infrastructure (Table 5). These stations are Sabroom (31.00 m), Manu Bazar (35.00 m), Garjee (35.39 m), Bish-ramganj (35.91 m), Belonia (40.00 m), Kumarghat (43.05 m), Santirbazar (46.00 m) and Teliamura

the hill range of Atharamura and Longtharai, respectively. Mungiakami railway station is located 110.18 m above the MSL which is the highest railway station in the state. Due to physiographic hindrance, passenger mobility is very few in Jawaharnagar (less than 300 passengers per month) resulted in very poor station infrastructure. Ambassa (79.29 m) is one of the high-altitude railway stations of Tripura, located right bank of river Dhalai (Fig. 2). However, due to functional activities like a district (administrative) headquarter, 11th largest populated town of the state and the location of Border Security Force (BSF) camp, Ambassa has good station infrastructure.

It has been observed that maximum stations with very good infrastructure are located in the low altitude. With the increase of height from MSL, station infrastructure has been reduced significantly.

Figure 3. Triangulated Irregular Network (TIN) Model of the study area



Source: Prepared by the authors, 2021

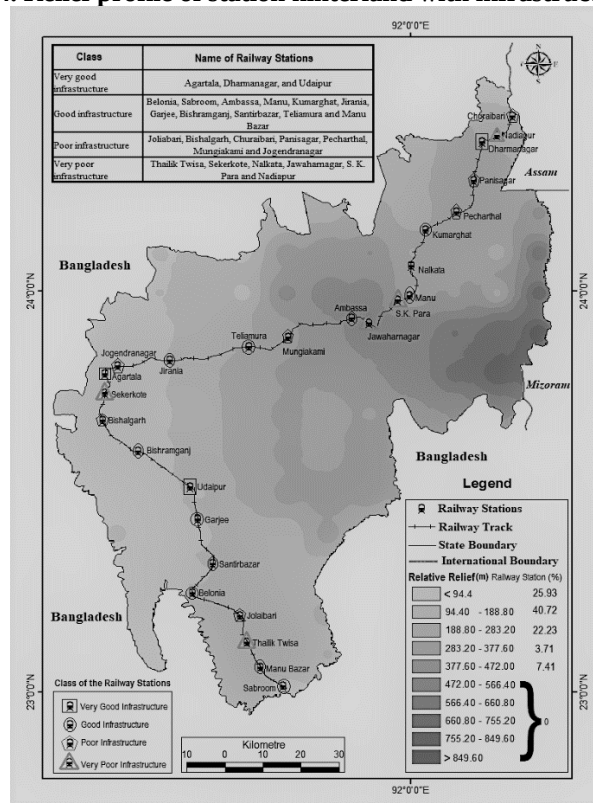
Triangulated Irregular networks represent the surface morphology of the state (Fig. 3). As we know, Tripura is land of Tilla and Lunga. Polymeric surfaces like Tilla and Lunga are characterised by the development of station infrastructure. It has been found that maximum railways are located in the valley region. Agartala, Dharmanagar, Udaipur railway stations with the very good infrastructure located in the valley of river Haora, Juri and Gomati, respectively (Fig 3). The stations with good infrastructure namely Belonia, Sabroom, Ambassa, Manu, Kumarghat, Jirania, Garjee, Bishramganj, Santirbazar, Teliamura and Manu Bazar are also located in the valley region.

Table. 7. Relation between Relative Relief and Station Infrastructure

Zone	Height (m)	Name of the Station with Infrastructural Grade (GSI)	Percentage of Station Infrastructure			
			Class	No	% (Within Zone)	% (Total Station)
I	<94.4	Agartala (I), Udaipur (I), Bisramganj (II), Garjee (II), Sabroom (II), Jogendranagar (III), Bishalgarh (III) and Sekerkote (IV)	Very Good	2	25.00	7.41
			Good	3	37.50	11.11
			Poor	2	25.00	7.41
			Very Poor	1	12.50	3.70
II	94.40-188.80	Dharmanagar (I), Santirbazar (II), Manu (II), Belonia (II), Manu Bazar (II), Churaibari (III), Jirania (III), Jolaibari (III), Nadiapur (IV) and Thailik Twisa (IV)	Very Good	1	10.00	3.70
			Good	4	40.00	14.81
			Poor	3	30.00	1.11
			Very Poor	2	20.00	7.41
III	188.80-283.20	Teliamura (II) Kumarghat (II), Panisagar (III), Pecharthal (III), Nalkata (IV) and Mungiakami (IV)	Very Good	0	0.00	0.00
			Good	2	33.33	7.41
			Poor	2	33.33	7.41
			Very Poor	2	33.33	7.41
IV	> 283.20	Ambassa (II), Jawaharnagar (IV) and S. K. Para (IV)	Very Good	0	0.00	0.00
			Good	1	33.33	3.70
			Poor	0	0.00	0.00
			Very Poor	2	66.66	7.41
Total				27		100

Source: Computed by the authors, 2021

Only 2 (7.41%) railway stations with very good infrastructure are found in less than 94.4 m relative relief area. With the increase of relative relief number of the railway station with very good infrastructure facilities are reduced. 10 (37.04%) railway stations are found between 94.40 m to 188.80 m relief zone.

Figure 4. Relief profile of station hinterland with infrastructural class


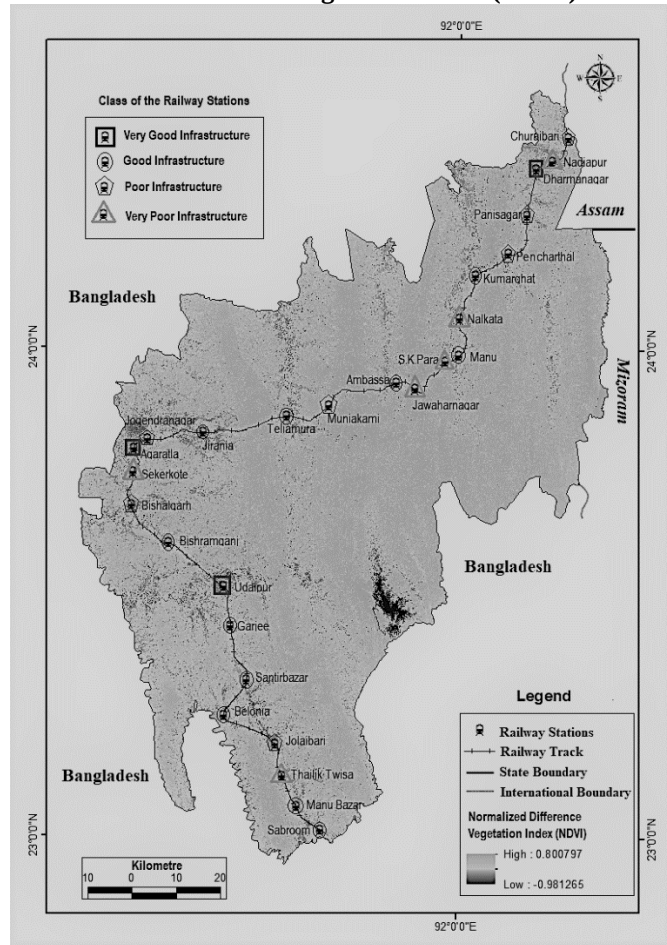
Source: Prepared by the authors, 2021

Above 283.20 m relative height, 2 out of 3 (66.67%) railway stations with poor infrastructure are observed. It explicates that with the increase of relative height from MSL, infrastructural facilities of the station has been reduced significantly (Table 7).

Relief of the stations and the surrounding area has been reflected through relative relief. It helps to understand the hinterland of the station. The hinterland of 7 (25.93%) railway stations are located below 94.40 m. (Fig. 4). Relative relief of 11 (40.72%) railway stations and surrounding area fall under 94.40 to 188.80 m. 6 (22.22%) railway stations relative relief are above 188.80 m. Relative relief of only 1 (3.70%) railway station is more than 283.20 m (Fig. 4).

Forest cover also play a significant role in station infrastructure. Nalkata, S.K. Para, Jawaharnagar and Thailik Twisa are located in the forested land and the infrastructural facilities of those stations are considerably very poor (Fig. 5).

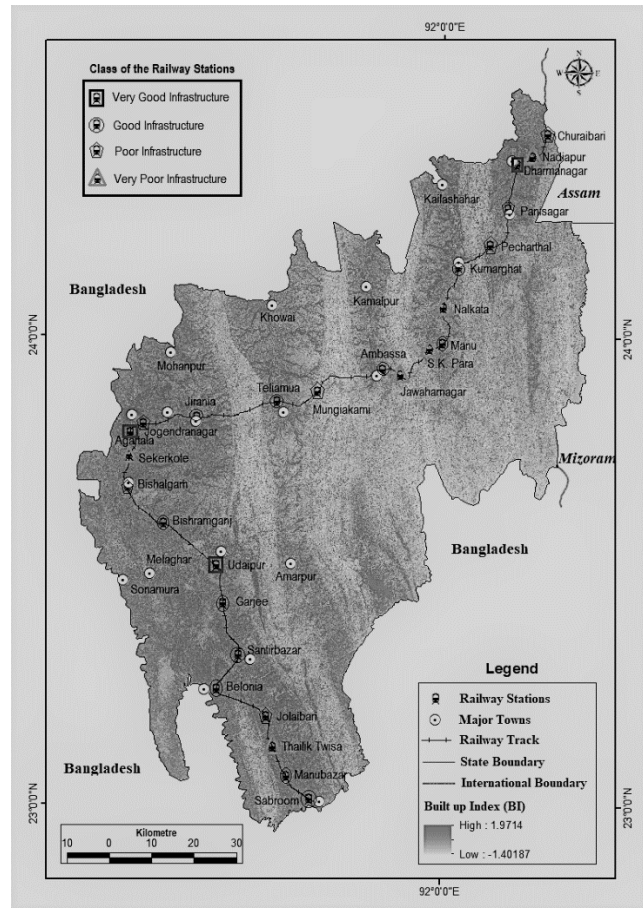
Figure 5. Normalized Difference Vegetation Index (NDVI) of the study area



Source: Prepared by the authors, 2021

On the other hand, those stations are located in urbanised area like Agartala and Dharmanagar having very good infrastructure. Udaipur, Belonia, Sabroom, Kumarghat, Manu, Teliamura, Jirania are located in the peri-urban area found with good infrastructural facilities. Build-up Index (BI) illustrates that those station surrounding areas have more build-up (majorly settlement) area and good infrastructure except Bishalgarh and Panisagar (Fig. 6)

Figure 6. Built up Index (BI) of hinterland with infrastructural class of railway stations



Source: Prepared by the authors, 2021

5. CONCLUSION

The infrastructural facilities of the railway stations are not equally distributed in Tripura. The causalities of differential development are surface topography, relief structure, forest cover, distance from the nearest urban centre, passenger mobility etc. A robust synthetic indicator has been induced to classify the infrastructural development of railway stations in Tripura. This indicator is structured a linear combination of Synthetic Indicator (for normal data observations) and Alternative Synthetic Indicator (for non-normal data). Agartala, Dharmanagar and Udaipur have very good stations in infrastructure which needs to maintain for more passenger mobility. Suburban or Periurban railway stations like Jogendranagar, Sekerkote, Teliamura, Jirania, Manu, Panisagar etc. have huge potentiality for future development. Thalik Twisa, Nalkata, Jawaharnagar, S. K. Para and Nadiapur railway stations are needed to provide more infrastructural facilities to attract more passengers.

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Artigo submetido a 3 de Março 2021; versão final aceite a 27 de Setembro de 2021
Paper submitted on March 3, 2021; final version accepted on September 27, 2021

Modelo Teórico de Convergência do Preço da Terra Agrícola e sua Estimativa para o Brasil¹

Theoretical Model of Agricultural Land Price Convergence and its Estimation for Brazil

Ricardo Harbs

rharbs@alumni.usp.br

Professor-doutor associado ao Instituto de Pesquisas e Educação Continuada em Economia e Gestão de Empresas (PECEGE)

Carlos José Caetano Bacha

carlosbacha@usp.br

Professor Titular da Universidade de São Paulo (USP)

Resumo

Neste artigo, desenvolve-se um modelo teórico para explicar a possível ocorrência de convergência do preço da terra agrícola entre regiões (que podem ser estados, microrregiões ou municípios, por exemplo), demonstrando-se que esse processo pode ocorrer, desde que haja livre movimento de capital, bem como de mão de obra e de tecnologia entre as regiões. Em seguida, as hipóteses de convergência β e σ são testadas econometricamente para os preços de terras de duas categorias (para lavouras e para pastagens) e considerando dados agregados por microrregiões brasileiras no período de 2003 a 2017. Os resultados confirmaram as formulações teóricas do artigo, uma vez que não foi possível rejeitar as hipóteses de convergência β e σ dos preços de terras de ambas as categorias. De modo geral, os preços de terras mais baratas – que se encontravam em regiões menos desenvolvidas – cresceram de forma mais rápida durante o referido período, convergindo para os preços de terras relativamente caras das regiões mais desenvolvidas.

Palavras-chave: Mercado de terras; Convergência; Econometria espacial

Código JEL: C21, R12, Q15

Abstract

In this article, we developed a theoretical model to explain the agricultural land price convergence among regions (which can be states, microregions or cities, for example), demonstrating that this process can take place as long as there are free capital, labor and technology flows among regions. In sequence, β and σ -convergences were econometrically evaluated for two kinds of agricultural land prices (for crops and pastures) and considering data aggregated by Brazilian microregions from 2003 thru 2017. The results confirmed our theoretical formulations, since the convergence hypothesis (β and σ) were not rejected for both types of farmland prices. In general, cheaper land prices - which were found in less developed regions - grew faster from 2003 thru 2017, converging to the relatively expensive land prices of more developed regions.

¹ Esta pesquisa é derivada da tese de doutorado, na área de Economia Aplicada, realizada por Ricardo Harbs sob orientação do Prof. Dr. Carlos José Caetano Bacha, da Escola Superior de Agricultura “Luiz de Queiroz” – Universidade de São Paulo. O referido programa de doutorado foi financiado pelo Conselho Nacional de Desenvolvimento Científico e Tecnológico (CNPq) e pela Coordenação de Aperfeiçoamento de Pessoal de Nível Superior (CAPES), tendo sido realizado no período de fevereiro de 2016 a dezembro de 2020.

Keywords: Agricultural land market; Convergence; Spatial Econometrics

Classificação JEL: C21, R12, Q15.

1. INTRODUÇÃO

A convergência é um processo através do qual as diferenças, observadas nos valores de certas variáveis económicas entre países ou regiões, tendem a declinar com o passar do tempo. Isso ocorre, por exemplo, quando a renda *per capita* de um país em desenvolvimento cresce mais rapidamente do que a de um país desenvolvido, verificando-se uma tendência de redução da desigualdade entre esses países. Esse processo de convergência também pode ocorrer com outras variáveis, como produtividade e preços de fatores de produção, a exemplo do preço da terra.

Entre os fatores que levam à convergência da renda *per capita* entre regiões, pode-se mencionar o fato de que os investimentos, quando realizados em regiões com baixa disponibilidade de capital (na forma de máquinas e equipamentos, por exemplo), apresentam retorno relativamente maior. Isso gera um estímulo à transferência de capital das regiões “ricas” para as “pobres”, atuando no sentido de reduzir a desigualdade entre essas regiões. Ao mesmo tempo, a convergência também pode resultar da disseminação entre as regiões do conhecimento e da adoção de novas tecnologias e formas de produção.

A convergência- β absoluta constitui uma indicação de que as regiões “pobres” terão crescimento relativamente mais rápido, convergindo para os patamares observados nas regiões ditas “ricas”. A convergência- β condicional, por outro lado, ocorre quando as variáveis das regiões convergem para diferentes patamares (ou estados estacionários), os quais são determinados por fatores de ordem económica ou cultural. Por fim, a convergência- σ indica que a dispersão de determinada variável (como a renda *per capita*, por exemplo) tende a declinar com o passar do tempo. Com efeito, Barro e Sala-i-Martin (1995) demonstram que a convergência- β absoluta é condição necessária, mas não suficiente para a ocorrência de convergência- σ .

A despeito da vasta literatura existente sobre a convergência da renda *per capita* entre países e regiões (através das estimativas de convergência- β e de convergência- σ)², poucos estudos avaliam a extensão desse processo a outras variáveis económicas no Brasil, a exemplo dos preços dos fatores produtivos. Neste país, até onde se sabe, o trabalho de Malassise, Parré e Fraga (2015) constitui o único estudo voltado à análise da convergência de preços de terras. Neste trabalho, os autores evidenciam uma tendência de convergência do preço da terra agrícola, entre os municípios do Estado do Paraná, no período de 1999 a 2011. Restam, no entanto, dúvidas quanto à existência dessa convergência do preço da terra em outros estados, e até mesmo entre estados e microrregiões do Brasil que pertençam a estados distintos.

Além disso, a literatura especializada ainda carece de uma análise dessa convergência ou não de preços de terras que leve em conta períodos mais recentes, considerando os possíveis efeitos do aumento na demanda internacional por *commodities* agrícolas (especialmente de grãos como soja e milho), bem como de investimentos em termos de infraestrutura e urbanização. É possível que esses eventos, vivenciados pela economia brasileira, por exemplo, ao longo das duas últimas décadas, tenham gerado distintos impactos sobre a evolução dos preços de terras no território brasileiro. Adicionalmente, chama-se a atenção para a ausência de um modelo teórico específico para justificar a possível ocorrência de convergência do preço da terra. Ao cobrir algumas destas lacunas, este artigo oferece uma contribuição ao entendimento do tema.

Considerando o acima exposto, o objetivo geral deste artigo consiste em elaborar um modelo teórico que justifique a possível ocorrência da convergência de preços da terra entre regiões e derivar uma equação, correspondente à equação β -convergência, que será estimada considerando os preços de cada hectare de terra nua nas microrregiões do Brasil.

Terra nua é aquela em seu estado natural, sem benfeitoria e melhorias. Esta terra nua pode ter vocação para ser utilizada para o plantio de lavouras ou para a pastagem, por exemplo. Assim, pode-se considerar o preço de cada hectare de terra nua para lavoura de modo diferente do preço de cada hectare de terra nua para pastagem. No Brasil, a Informa Economics – FNP é a única instituição que

² Os congressos da *European Regional Science Association* (ERSA) têm apresentado, desde a década de 1990, muitos trabalhos empíricos tratando da convergência da renda entre regiões europeias e de outras partes do mundo.

calcula anualmente esses preços do hectare da terra nua em nível de microregiões (estipuladas pela própria instituição) para todo o país. Dados de 2003 a 2017 desta instituição serão considerados na análise feita no artigo.

Os objetivos específicos do artigo são:

- i) Apresentar a teoria econômica subjacente ao conceito de convergência e adaptar, em seguida, um modelo teórico específico para justificar a possível ocorrência de convergência do preço da terra entre regiões (que podem ser estados ou microrregiões dentro dos estados), derivando uma equação de β -convergência para o preço da terra; e,
- ii) A partir dos dados divulgados pela FNP, testar econometricamente a existência de β -convergência e também da convergência- σ dos preços de cada hectare de terra nua entre as microregiões do Brasil, separando entre terra nua para lavoura e para pastagem.

As séries de preços de terras nuas da Informa *Economics* – FNP são divulgadas em nível de microregiões (conjuntos de municípios) definidas por esta instituição, o que permite uma análise desta variável dentro dos estados brasileiros. Salienta-se, contudo, que essas regiões são definidas de acordo com os critérios da FNP, não havendo correspondência com o nível de agregação adotado pelo Instituto Brasileiro de Geografia e Estatística – IBGE.

Para atingir os objetivos geral e específico acima colocados, este artigo divide-se em mais quatro seções. Na seção 2, há uma revisão bibliográfica abrangendo os principais trabalhos sobre análise de convergência. A seção 3 contém uma exposição acerca do modelo de Solow (1957), mostrando que a convergência da renda *per capita* e da produtividade, por exemplo, constituem uma consequência natural do modelo. Em seguida, partindo-se de uma função de produção apresentada por Romer (2006), constrói-se um modelo teórico específico para a ocorrência de convergência do preço da terra, sendo que tal modelo fundamenta equações de convergência β e σ a serem estimadas. A seção 4 foi reservada à apresentação e análise dos resultados das estimativas econométricas dessas equações de convergência do preço da terra, de acordo com as categorias de terras consideradas (terras para lavoura ou para pastagem). Por fim, a seção 5 apresenta as principais conclusões do artigo.

2. REVISÃO BIBLIOGRÁFICA

A lista de trabalhos sobre convergência é extensa, sendo que a maioria deles dedica-se à análise da convergência da renda *per capita* entre países, estados ou municípios. A seguir, são apresentados alguns dos principais estudos sobre a análise de convergência no mundo e no Brasil.

Barro e Sala-i-Martin (1995) avaliaram a hipótese de convergência da renda *per capita* entre 48 estados dos Estados Unidos da América, em um período de 110 anos (entre 1880 e 1990). Além de estimarem o coeficiente de convergência absoluta para o período completo, esses autores realizaram estimativas para nove subperíodos. Como resultado, constatou-se que o coeficiente β (que indica a ocorrência de convergência absoluta) era estatisticamente significativo, não somente para o período completo, como também para sete subperíodos, sendo que as únicas exceções foram os anos de 1920 a 1930 e de 1980 a 1990. Entre 1920 e 1930, estados norte-americanos com maior participação do setor agropecuário em seu produto (que já eram relativamente pobres) foram afetados pelo declínio nos preços de *commodities* agrícolas, o que reverteu a tendência de convergência (da renda *per capita*) observada até aquele momento. No subperíodo de 1980 a 1990, por outro lado, o acentuado aumento dos preços de combustíveis – ocasionado pelo segundo choque do petróleo – teve impacto positivo para os estados produtores dessa *commodity*, nos quais a renda *per capita* já era relativamente maior, em detrimento dos demais. Esse processo seria revertido somente a partir de 1986, com o declínio dos preços internacionais do petróleo.

A partir do trabalho original de Barro e Sala-i-Martin (1995), foram desenvolvidos muitos estudos sobre a convergência da renda *per capita* ou da produtividade em diversos países. Entre esses trabalhos, podem ser citados os de Persson (1997), Lusigi e Thirtle (1998), Gutierrez (2000), Surriyanto e Thirtle (2001), Johnson e Takeyama (2001) e Gezici e Hewings (2003), por exemplo.

Vários autores se dedicaram à análise da convergência da renda *per capita* no Brasil. Entre esses trabalhos, destacam-se os de Ferreira e Ellery Junior (1996), Azzoni (1997), Cançado (1999), Ferreira (1999), Pôrto Júnior e Ribeiro (2003), Magalhães, Hewings e Azzoni (2005), Coelho e Figueiredo (2007) e Oliveira Junior et al. (2009), por exemplo.

Magalhães, Hewings e Azzoni (2005), por exemplo, analisaram a hipótese de convergência da renda *per capita* entre 21 estados brasileiros no período de 1970 a 1995. As estimativas de convergência absoluta foram realizadas através de MQO, considerando o período completo e os subperíodos de 1970 a 1980 e de 1980 a 1995. No primeiro subperíodo (anos de 1970), caracterizado por elevadas taxas de crescimento econômico, a hipótese de convergência da renda *per capita* entre os estados brasileiros foi rejeitada. Tal hipótese, no entanto, foi confirmada para o período completo (de 1970 a 1995), bem como para o segundo subperíodo analisado (de 1980 a 1995), que foi pautado pela ocorrência de recessões e baixo crescimento econômico. A análise de convergência- σ revelou uma tendência de divergência (aumento da dispersão) no início da década de 1970, sendo que a convergência- σ foi observada somente a partir da década de 1980.

Além de revelar a importância da interdependência espacial, os resultados do trabalho de Magalhães, Hewings e Azzoni (2005) reforçam o argumento de Azzoni (1997), evidenciando que, durante a década de 1970, os estados “mais ricos” da região Centro-Sul foram capazes de absorver grande parte dos benefícios proporcionados pelo crescimento econômico. A partir da década de 1980, ao contrário, esses estados “mais ricos” sofreram os maiores impactos decorrentes dos períodos de recessão ou baixo crescimento do PIB. Esse comportamento explicaria as tendências de divergência e de convergência observadas no primeiro e no segundo subperíodos do estudo, respectivamente.

Apesar do grande número de trabalhos sobre a convergência da renda *per capita* entre países e regiões, poucos são os estudos que analisam, de forma empírica, a convergência no preço da terra. Entre as raras iniciativas, pode-se mencionar o estudo de Yang, Ritter e Odening (2017), no qual se testou a hipótese de convergência entre os preços de terras agrícolas de 37 municípios da Baixa Saxônia, estado localizado na região noroeste da Alemanha. Os autores utilizaram uma base de dados anuais abrangendo o período de 25 anos (entre 1990 e 2014) e que continha, além do preço médio da terra, informações sobre a produtividade média dos imóveis rurais pesquisados em cada município. Antes da análise de convergência, esta última variável (índice de produtividade) foi utilizada em uma regressão visando a obtenção de preços ajustados de acordo com a qualidade da terra. O procedimento foi adotado pelo fato de que, dentro de um único município, pode haver significativa variabilidade da produtividade da terra. Assim, dependendo dos negócios realizados em cada localidade, os dados de produtividade e de preço da terra podem variar significativamente de um ano para o outro, comprometendo os resultados.

Com os preços da terra ajustados, Yang, Ritter e Odening (2017) realizaram uma análise de convergência dos mesmos entre todos os municípios da Baixa Saxônia. Como a hipótese de convergência absoluta foi rejeitada, a etapa seguinte consistiu em identificar os clubes de convergência, os quais seriam constituídos por municípios que possuíssem padrão semelhante para a evolução dos preços de terras agrícolas. Através do método de seleção de painel sequencial (*Sequential Panel Selection Method* – SPSM), que consiste em uma sucessão de testes de estacionariedade e de raiz unitária para painel, foram identificados três clubes de convergência.

No Brasil, destaca-se o estudo de Malassise, Parré e Fraga (2015), que testou a hipótese de convergência absoluta no preço da terra para lavoura, entre os municípios do Paraná, no período de 1999 a 2011. Inicialmente, os autores utilizaram o modelo de Mínimos Quadrados Ordinários – MQO e o coeficiente β estimado foi estatisticamente significativo, levando à não-rejeição da hipótese de existência de convergência absoluta. Adicionalmente, os autores não rejeitaram a hipótese de dependência espacial, o que justificou a introdução de um modelo de *lag* espacial (com defasagem espacial da variável independente), considerado pelos autores como o mais indicado para as estimativas de convergência. Após a incorporação da variável de *lag* espacial, o coeficiente de determinação (R^2) da regressão de convergência aumentou de 0,13 para 0,64, enquanto o coeficiente β passou de -0,314 para -0,159, mas mantendo-se estatisticamente significativo. Em ambos os modelos, portanto, os resultados apontaram para a existência de convergência no preço da terra agrícola durante o período analisado. Embora tenha se restringido à análise de convergência absoluta, não testando as hipóteses de convergência condicional, clubes de convergência ou convergência- σ e focando sua análise no Paraná, o trabalho de Malassise, Parré e Fraga (2015) abriu um vasto campo de pesquisas, constituindo, até onde se sabe, o único estudo sobre convergência do preço da terra na literatura brasileira. Apesar disso, o referido trabalho não possui referencial teórico para fundamentar a ocorrência de convergência do preço da terra. Este referencial teórico é desenvolvido na próxima seção.

3. REFERENCIAIS ANALÍTICO E METODOLÓGICO

3.1. O modelo de convergência

A convergência entre a renda *per capita* de países e regiões é uma consequência natural do modelo de Solow (1957). Segundo Romer (2006), existem ao menos três razões para acreditar que a renda *per capita* dos países pobres deve crescer mais rapidamente que a dos países ricos. Em primeiro lugar, porque o modelo estabelece que todos os países convergem para o caminho de crescimento equilibrado (ou estado estacionário), sendo razoável esperar que as economias em desenvolvimento alcancem, em algum momento, o nível de produto *per capita* prevalente em economias desenvolvidas. Em segundo lugar, porque nos países com grande disponibilidade de capital por trabalhador (k próximo de k^*), o produto marginal desse fator é inferior ao de países com menor disponibilidade de capital. Havendo mobilidade de capitais, essas diferenças justificariam a migração de investimentos dos países ricos para os pobres. Em terceiro lugar, deve-se destacar o papel da transmissão de conhecimentos, que atuaria no sentido de elevar a produtividade dos países em desenvolvimento, acelerando o processo de convergência.

Ainda assim, a hipótese de convergência “absoluta” somente é confirmada quando a análise se restringe a países ou estados que, apesar das diferenças em termos de renda *per capita*, possuem culturas e instituições semelhantes. De acordo com Mankiw (2000), isso ocorre pelo fato de que os países convergem para o nível de renda *per capita* correspondente aos seus próprios estados estacionários, os quais dependem de fatores como a proporção da renda poupada (nível de poupança), crescimento da população e progresso tecnológico, conforme preconizado pelo modelo de Solow (1957). Ao se analisar o crescimento econômico de países com grandes disparidades em termos de condições materiais de suas populações, o que se observa, em muitos casos, é um processo de convergência condicional.

Considerando a importância do modelo desenvolvido por Solow (1957), bem como as perspectivas de estudos que o mesmo abre, é natural que exista vasta literatura sobre o processo de convergência (absoluta ou condicional). Conforme destacado na seção 2, a maior parte dos trabalhos se concentra na análise da hipótese de convergência da renda *per capita*. Contudo, existem outras variáveis de interesse que, em princípio, podem apresentar comportamento de convergência entre países e regiões. Como exemplo, pode-se mencionar o capital por trabalhador (K/L), o produto marginal do trabalho (salário) e o produto marginal do capital (rendimento do capital).

No caso da renda *per capita*, em particular, as premissas de mobilidade do capital e da mão de obra efetiva, presentes no modelo de Solow (1957), constituem as bases para o modelo teórico de convergência dessa variável. Para que se possa inferir sobre a convergência do preço da terra agrícola, contudo, é indispensável que esse fator produtivo seja devidamente incorporado à função de produção. Como a terra agrícola, ao contrário do capital e da mão de obra efetiva, é um fator de produção imóvel, essa característica pode ter implicações sobre a dinâmica do seu preço, bem como sobre a possibilidade (ou não) de convergência do preço entre regiões. Assim, antes de se testar a hipótese de convergência do preço da terra agrícola, faz-se necessário verificar se, a partir do modelo neoclássico de crescimento econômico, existem justificativas ou premissas que deem respaldo a essa hipótese. Essa análise pode ser demonstrada através de um modelo, apresentado por Romer (2006), que incorpora o fator terra à função de produção³. Tem-se a seguinte função de produção (com três fatores de produção):

$$Y_{(t)} = K_{(t)}^{\alpha} T_{(t)}^{\gamma} [A_{(t)} L_{(t)}]^{1-\alpha-\gamma}, \quad (1)$$

$$\alpha > 0, \gamma > 0, (\alpha + \gamma) < 1$$

Na expressão (1), capital (K), mão de obra (L) e conhecimento (A) seguem as seguintes dinâmicas: $\Delta K_{(t)} = sY_{(t)} - \delta K_{(t)}$; $\Delta L_{(t)} = nL_{(t)}$; e, $\Delta A_{(t)} = gA_{(t)}$. Ademais, o fator terra (T) possui dotação fixa e não pode ser reproduzido, de maneira que $\Delta T_{(t)} = 0$. A partir desses parâmetros, Romer (2006) demonstra que uma economia com tais características, cuja função de produção é determinada pela expressão (1), caminha para o seu estado estacionário. Para tanto, a estratégia adotada

³ Na versão original apresentada por Romer (2006), a função de produção também contém uma variável específica para a dotação de outros recursos naturais exauríveis (R).

pelo autor consiste em verificar se tal economia possui um caminho de crescimento equilibrado⁴, inferindo sobre as taxas de crescimento das variáveis econômicas ao longo desse caminho. Segundo Romer (2006), ademais, a condição necessária para o caminho de crescimento equilibrado é que o capital (K) e o produto (Y) cresçam à mesma taxa.

No modelo original proposto por Romer (2006), a terra (T) constitui um fator de produção com dotação fixa, de maneira que a sua taxa de crescimento é nula. Contudo, a depender da região e do estágio de desenvolvimento da economia, a abertura de novas áreas e o aproveitamento de pastagens naturais (ou de terras levemente degradadas) pode resultar em aumento na oferta desse fator produtivo. Assim, a violação da hipótese original (de terra com dotação fixa) torna o modelo mais realista, ampliando a sua aderência em relação às condições de economias que ainda possuem regiões de fronteira agrícola⁵. Relaxando a hipótese supracitada, tem-se que:

$$\Delta T_{(t)} = cT_{(t)} \quad (2)$$

Resta, contudo, verificar se uma economia com tais características pode alcançar, em algum momento, o caminho de crescimento equilibrado. Para tanto, conforme visto, deve-se considerar a hipótese de que o capital (K) e o produto (Y) cresçam à mesma taxa. A equação de variação do capital ($\Delta K_{(t)} = sY_{(t)} - \delta K_{(t)}$) implica que a taxa de crescimento do capital será dada por:

$$\frac{\Delta K_{(t)}}{K_{(t)}} = s \frac{Y_{(t)}}{K_{(t)}} - \delta \quad (3)$$

Assim, para que a taxa de crescimento do capital seja constante, a relação entre capital e produto (K/Y) também deve ser constante. Isso significa que essas variáveis devem apresentar a mesma taxa de crescimento. Para verificar quando isso ocorre, Romer (2006) toma o logaritmo natural de ambos os lados da função de produção (1), obtendo:

$$\ln Y_{(t)} = \alpha \ln K_{(t)} + \gamma \ln T_{(t)} + (1 - \alpha - \gamma)[\ln A_{(t)} + \ln L_{(t)}] \quad (4)$$

Diferenciando ambos os lados da expressão (4) em relação ao tempo, obtêm-se:

$$g_Y = \alpha g_K + \gamma g_T + (1 - \alpha - \gamma)[g_A + g_L] \quad (5)$$

Sendo que g_Y = taxa de crescimento do produto, g_K = taxa de crescimento do estoque de capital; g_T = taxa de crescimento do fator terra; g_A = taxa de crescimento do conhecimento; e g_L = taxa de crescimento da mão de obra.

As taxas de crescimento do fator terra (T), do conhecimento (A) e da mão de obra (L) são c , g e n , respectivamente. Assim, a expressão (5) pode ser simplificada para:

$$g_Y = \alpha g_K + \gamma c + (1 - \alpha - \gamma)(n + g) \quad (6)$$

Na sequência, considera-se a hipótese de que as taxas de crescimento do produto (g_Y) e do capital (g_K) são iguais. Resolvendo para g_Y , obtêm-se a seguinte expressão:

$$g_Y^{cce} = \frac{(1 - \alpha - \gamma)(n + g) + \gamma c}{1 - \alpha} \quad (7)$$

Sendo que g_Y^{cce} corresponde à taxa de crescimento do produto (Y) no caminho de crescimento equilibrado.

A partir desse ponto, é possível demonstrar que a economia em análise converge, de fato, para o caminho de crescimento equilibrado. Para tanto, considera-se a hipótese de que a taxa de crescimento do capital (g_K) esteja acima do valor referente ao caminho de crescimento equilibrado. Nesse caso, a expressão (6) permite verificar que g_Y também estará acima do seu valor de estado estacionário, embora o produto (Y) cresça menos que o estoque de capital (K)⁶. Consequentemente, a relação entre o produto e o capital (Y/K) sofrerá decréscimo, levando à redução da taxa de crescimento do capital (g_K), conforme indicado na expressão (3). Com esse raciocínio, que está de

⁴ Quando a economia atinge o estado estacionário, cada variável cresce a uma taxa constante. Por esse motivo, diz-se que as variáveis seguem o “caminho do crescimento equilibrado” (ROMER, 2006).

⁵ Os autores agradecem ao revisor anônimo pelas considerações quanto à possibilidade de conversão de terras incultas (ou levemente degradadas) para uso agrícola em determinadas regiões.

⁶ *Ceteris paribus*, o produto (Y) cresce menos que o estoque de capital (K) pelo fato de que $\alpha < 1$.

acordo com as etapas apresentadas por Romer (2006), pode-se concluir que tal economia converge para o seu caminho de crescimento equilibrado e, ao alcançá-lo, nele permanecerá.

A depender da oferta de terra, a economia pode ter uma taxa de crescimento do produto (g_Y) maior, menor ou igual àquela observada no modelo de Solow (1957)⁷. Não obstante, as principais conclusões do modelo de Solow (1957) aplicam-se, também, ao modelo desenvolvido por Romer (2006). Como o produto marginal do capital ($PMgK$) é decrescente, haverá estímulo à transferência de capital das regiões ricas para as pobres. Consequentemente, o estoque de capital dessas últimas regiões crescerá mais rapidamente, induzindo à convergência de renda *per capita* entre as regiões.

A incorporação do fator terra à função de produção (expressão 1) e a subsequente dedução de uma fórmula para a taxa de crescimento do produto no caminho de crescimento equilibrado (g_Y^{cce}) são etapas importantes, que levam a algumas conclusões sobre a convergência da renda *per capita*. Com efeito, o modelo empregado por Barro e Sala-i-Martin (1995) permite que se avalie a hipótese de convergência da renda *per capita*, e não de outras variáveis como a remuneração do capital e do trabalho, por exemplo. No caso desse artigo, contudo, avalia-se a possibilidade de convergência do preço da terra agrícola. Como são variáveis distintas (renda *per capita* e preço da terra agrícola), não se pode simplesmente assumir que ambas tenham o mesmo comportamento de convergência, e nem mesmo inferir previamente sobre os fatores subjacentes a essa suposta convergência no caso do preço da terra agrícola. Em primeiro lugar, deve-se verificar se existem razões suficientes para acreditar que os preços de terras mais baratas – que se encontram em regiões menos desenvolvidas – cresçam de forma mais rápida, convergindo para os preços de terras relativamente caras. A resposta a essa questão, bem como às possíveis dúvidas sobre o processo de convergência do preço da terra agrícola, exigiram o desenvolvimento das expressões (8) a (18), que não constam em Romer (2006) e constituem uma contribuição original deste artigo.

A expressão (8) – que é a derivada da expressão (1) em relação a T – permite verificar que a transferência de capital atuará no sentido de elevar o produto marginal da terra ($PMgT$) em regiões com menor disponibilidade de capital. Consequentemente, as regiões menos favorecidas apresentarão tendência de maior crescimento do rendimento da terra.

$$PMgT = \gamma K_{(t)}^\alpha T_{(t)}^{\gamma-1} [A_{(t)} L_{(t)}]^{1-\alpha-\gamma} \quad (8)$$

Naturalmente, a transferência de mão de obra efetiva ($A_t L_t$) também pode desempenhar papel relevante, acelerando o processo de convergência do rendimento da terra entre regiões de um mesmo país. Conforme salientado anteriormente, o rendimento da terra constitui um dos principais determinantes para o seu preço, de maneira que a expressão (8) pode ser utilizada em uma fórmula geral para o preço real da terra:

$$p_{(t)} = \frac{PMgT_{(t)}}{r_{(t)}} [1 + \tau_t] \quad (9)$$

Sendo que:

$$\frac{\partial \tau}{\partial K} > 0 \quad (10)$$

Na expressão (9), r corresponde à taxa de juros real, sendo utilizada para calcular o valor presente do rendimento da terra; τ , por outro lado, é uma variável específica para a expectativa de evolução patrimonial, representando as previsões de valorização (ou de desvalorização) da terra no momento de sua aquisição.

De acordo com Reydon (1992), o preço da terra é determinado não somente pelos rendimentos que a mesma proporciona, como também pelas expectativas de ganhos a serem auferidos com a sua revenda. A incorporação dessas expectativas explica porque, em muitas regiões, o preço da terra supera o valor presente de seus rendimentos.

Conforme indicado na expressão (10), espera-se que a variação do estoque de capital (ΔK) tenha impacto positivo sobre a expectativa de evolução do preço da terra. Fazendo $\theta_t = 1 + \tau_t$, e

⁷ No modelo de Solow (1957), em que o capital (K) e a mão de obra efetiva ($L \times A$) constituem os únicos fatores produtivos, o crescimento do produto de estado estacionário é determinado pela taxa de crescimento da população e pela taxa de progresso tecnológico ($n + g$). Se a taxa de crescimento da terra for nula ($c = 0$), como no modelo original de Romer (2006), a taxa de crescimento do produto (g_Y^{cce}) certamente será menor do que ($n + g$), pois $\left[\frac{(1-\alpha-\gamma)}{(1-\alpha)} \right] < 1$, dado que $\gamma > 0$ (ver equação 7).

considerando que $PMgT_t = \gamma \frac{Y_{(t)}}{T_{(t)}}$, a expressão referente ao preço real da terra pode ser reescrita como sendo:

$$p_{(t)} = \gamma \frac{Y_{(t)}}{T_{(t)}r_{(t)}} \theta_t \quad (11)$$

Tomando o logaritmo natural de ambos os lados da expressão (11), tem-se que:

$$\ln p_{(t)} = \ln \gamma + \ln Y_{(t)} - \ln T_{(t)} - \ln r_{(t)} + \ln \theta_{(t)} \quad (12)$$

Diferenciando a equação (12) em relação ao tempo, obtêm-se a relação entre as taxas de crescimento das variáveis, ou seja:

$$g_p = g_\gamma + g_Y - g_T - g_r + g_\theta \quad (13)$$

Sendo que g_p = taxa de crescimento do preço da terra; g_γ = taxa de crescimento do parâmetro γ ; g_Y = taxa de crescimento do produto; g_T = taxa de crescimento do fator terra; g_r = taxa de crescimento da taxa de juros real; e g_θ = taxa de crescimento do parâmetro θ . Como o coeficiente γ é constante, e considerando que $g_T = c$, a expressão (13) pode ser reescrita como sendo:

$$g_p = g_Y - c - g_r + g_\theta \quad (14)$$

Por fim, é possível substituir a expressão (6), referente à taxa de crescimento do produto, na expressão (14) para obter a taxa de crescimento do preço real da terra, tal que:

$$g_p = \alpha g_K + \gamma c + (1 - \alpha - \gamma)(n + g) - c - g_r + g_\theta \quad (15)$$

$$g_p = \alpha g_K + (1 - \alpha - \gamma)(n + g) - (1 - \gamma)c - g_r + g_\theta \quad (16)$$

Essa última expressão permite entender, claramente, a evolução diferenciada do preço da terra em regiões com maior e menor disponibilidade de capital. De acordo com o modelo de Solow (1957), sabe-se que o estoque de capital de uma região pobre (A) cresce mais rapidamente que o de uma região rica (B). Assim, verifica-se que $g_K^A > g_K^B$. Como a expectativa de valorização do patrimônio (θ_t) depende da taxa de crescimento do capital, é possível afirmar que $g_\theta^A > g_\theta^B$, o que significa que, nas regiões menos favorecidas, as expectativas de valorização da terra também crescerão de forma mais acentuada. Ao mesmo tempo, é razoável supor que o crescimento econômico, deflagrado pelo aumento do capital, atuará no sentido de atrair pessoas e novos conhecimentos às regiões mais pobres, elevando as taxas de crescimento da mão de obra (n) e do progresso tecnológico (g). O fenômeno acima ilustrado é mais plausível de ocorrer em regiões de um país com a mesma estrutura político-institucional, sem restrições de transferência de capital, de mão de obra e de conhecimento entre regiões, como o Brasil.

Por fim, a análise da expressão (16) também pode lançar alguma luz sobre o papel da oferta de terra agrícola (c) nas regiões ditas pobres. Supondo que a região pobre (A) seja de fronteira agrícola, pode-se inferir que a oferta de terra agrícola – seja mediante incorporação de novas áreas (desmatamento) ou conversão produtiva de áreas levemente degradadas – atuará no sentido de reduzir o seu preço, contrapondo-se aos efeitos altistas causados pela transferência de fatores (capital e mão de obra), bem como de tecnologia entre as regiões. Não obstante, esse efeito será limitado aos primeiros estágios de desenvolvimento econômico; com a redução na disponibilidade de terras incultas (que não sejam áreas legalmente protegidas, por exemplo) e/ou de terras degradadas susceptíveis à exploração agropecuária, a taxa de crescimento da terra agrícola (c) apresentará comportamento declinante. Em outras palavras, pode-se afirmar que o custo de conversão produtiva será crescente, impondo limites ao aproveitamento de áreas degradadas. Verifica-se, portanto, que a convergência do preço da terra agrícola não ocorre de forma “automática”, somente mediante transferência de capital e de mão de obra efetiva (como acontece, por exemplo, no caso de convergência da renda *per capita*). Nesse caso, a convergência também depende da disponibilidade de terras passíveis de uso agrícola em cada região.

Feitas as devidas ressalvas quanto ao fator terra, a análise pormenorizada da expressão (16) revela que a hipótese de convergência do preço da terra entre diferentes regiões de um mesmo país, nas quais possa haver a livre mobilidade de trabalho e de capital, está de acordo com os pressupostos do modelo neoclássico de crescimento econômico. O Brasil oferece exemplos desse processo de

transferência de fatores produtivos (trabalho e capital) entre suas regiões e subsequente valorização do preço da terra de regiões menos desenvolvidas, referendando a expressão (16). Foi o que ocorreu entre as décadas de 1970 e 1980, com a expansão da produção agropecuária nas regiões Centro-Oeste e Norte, e é o que vêm ocorrendo, desde o final da década de 1990, na região denominada MATOPIBA, que abrange o bioma do Cerrado nos estados de Maranhão, Tocantins, Piauí e Bahia.

No Centro-Oeste, por exemplo, a elevação do produto marginal da terra (PMgT), com a consequente valorização de seu preço, foi acompanhada de pesquisas visando a introdução de variedades de soja adaptadas às condições edafoclimáticas do Cerrado (BONELLI, 1998). Esse fato não deixa dúvidas quanto ao papel desempenhado pelo progresso tecnológico. Simultaneamente, observou-se a transferência de capital e de pessoas, que já detinham experiência na atividade, de outras regiões do Brasil, notadamente do Sul, para o Centro-Oeste (ZANIN; BACHA, 2017).

Mas por que os “sulinos”, que desempenharam um papel tão importante na expansão da produção de soja para o Cerrado, teriam realizado investimentos nessa região? Além de políticas públicas (como abertura de estradas, por exemplo), deve-se considerar o fato de que o produto marginal do capital (PMgK), na região Sul do país, era significativamente menor do que aquele observado na fronteira agrícola. Ao investirem seus recursos na região do Cerrado, na qual a disponibilidade de capital era relativamente baixa, estes produtores lograram maiores retornos.

Na exposição realizada até o momento, demonstrou-se não somente a possibilidade teórica da existência de convergência no preço de cada hectare da terra entre as regiões de um mesmo país (como o Brasil), como também os fatores subjacentes para que esse processo ocorra, quais sejam, a transferência de capital e de mão de obra entre as regiões, além do progresso tecnológico permitindo a ocupação de novas regiões. Resta, no entanto, uma dúvida. Uma vez encerrado o processo de convergência, quando o preço da terra atingir o seu estado estacionário, qual será a taxa de crescimento do preço da terra? Para determiná-la, deve-se lançar mão da expressão (14), referente à taxa de crescimento do preço da terra, e substituir g_Y por g_Y^{cce} . No caminho de crescimento equilibrado, conforme visto, a taxa de crescimento do produto (g_Y^{cce}) é determinada pela expressão (7). Substituindo a expressão (7) na equação (14), obtém-se a seguinte expressão:

$$g_p^{cce} = \frac{(1-\alpha-\gamma)(n+g)+\gamma c}{1-\alpha} - c - g_r + g_\theta \quad (17)$$

$$g_p^{cce} = \frac{(1-\alpha-\gamma)(n+g)}{1-\alpha} - \left(1 - \frac{\gamma}{1-\alpha}\right)c - g_r + g_\theta$$

$$g_p^{cce} = \frac{(1-\alpha-\gamma)(n+g-c)}{1-\alpha} - g_r + g_\theta \quad (18)$$

Sendo que g_p^{cce} corresponde à taxa de crescimento do preço da terra no caminho de crescimento equilibrado. Como θ depende da taxa de crescimento de capital, e considerando que $g_k^{cce} = g_Y^{cce}$, infere-se que a taxa de crescimento do preço da terra, no estado estacionário, dependerá fundamentalmente da oferta de terra agrícola, da dinâmica da taxa de juros e das taxas de crescimento da mão de obra (n) e do progresso tecnológico (g).

Ao atingir o seu nível de estado estacionário, o preço da terra cresce a taxa g_p^{cce} . Sob a hipótese de taxa de crescimento da terra (c) e taxa de juros real (r) constantes, a expressão (14) permite inferir que se o preço da terra (p) estiver acima do nível de preço do estado estacionário (p^*), então as taxas de crescimento do produto (g_Y) e do capital (g_K) também estarão acima dos seus respectivos níveis de estado estacionário. Nesse caso, as expressões (3) e (6) permitem verificar que haverá redução na taxa de crescimento do capital (g_K), com a consequente redução das taxas de crescimento do produto (g_Y) e do preço da terra (g_p). Essa lógica é demonstrada através da seguinte expressão⁸:

$$g_p = g_p^{cce} + \Phi(\log p - \log p^*) \quad (19)$$

Na expressão (19), o parâmetro p corresponde ao preço de cada hectare da terra em determinado momento, enquanto p^* constitui o preço de cada hectare da terra em nível de estado estacionário. Assim, $(\log p - \log p^*)$ mede a distância, em termos de preço real do hectare da terra, que separa uma região de seu estado estacionário. Além disso, o parâmetro Φ é negativo e corresponde à velocidade de convergência para o nível de estado estacionário. Assim:

⁸ A partir da expressão (19), são utilizadas as fórmulas apresentadas por Valdés (1999).

i) Se $(\log p - \log p^*) = 0$, a região já se encontra em seu estado estacionário e, portanto, o preço real do hectare de terra crescerá à taxa g_p^{cce} .

ii) Se $(\log p - \log p^*) > 0$, o preço real do hectare de terra estará acima do seu nível de estado estacionário e, portanto, crescerá a uma taxa menor que g_p^{cce} , ou seja, $g_p < g_p^{cce}$.

iii) Se $(\log p - \log p^*) < 0$, o preço real do hectare de terra estará abaixo do seu nível de estado estacionário e, portanto, crescerá a uma taxa maior que g_p^{cce} , ou seja, $g_p > g_p^{cce}$.

Para passar a expressão (19) do tempo contínuo para o tempo discreto, é possível utilizar a seguinte aproximação:

$$g_p = \frac{d \log p}{dt} = \log p_{(t+1)} - \log p_{(t)}$$

Assim, a expressão (21) pode ser reescrita como sendo:

$$\begin{aligned} \log p_{(t+1)} - \log p_{(t)} &= g_p^{cce} + \Phi(\log p_{(t)} - \log p_{(t)}^*) \\ \log p_{(t+1)} &= g_p^{cce} + \Phi(\log p_{(t)} - \log p_{(t)}^*) + \log p_{(t)} \\ \log p_{(t+1)} &= g_p^{cce} - \Phi \log p_{(t)}^* + (1 + \Phi) \log p_{(t)} \end{aligned} \quad (20)$$

A expressão (20) é uma equação de diferenças de 1ª ordem no $\log p_{(t)}$. Através de uma série de deduções matemáticas, demonstradas por Valdés (1999), esta expressão pode ser reescrita como:

$$\log p_{(T)} = g_p^{cce} T + (1 - e^{\Phi T}) \log p_{(0)}^* + e^{\Phi T} \log p_{(0)}$$

Subtraindo $\log p_{(0)}$ de ambos os lados:

$$\begin{aligned} \log p_{(T)} - \log p_{(0)} &= g_p^{cce} T + (1 - e^{\Phi T}) \log p_{(0)}^* + e^{\Phi T} \log p_{(0)} - \log p_{(0)} \\ \log \frac{p_{(T)}}{p_{(0)}} &= g_p^{cce} T + (1 - e^{\Phi T}) \log p_{(0)}^* + (e^{\Phi T} - 1) \log p_{(0)} \end{aligned} \quad (21)$$

Dividindo a equação (21) em ambos os lados pelo tempo (T), obtém-se uma expressão para a taxa média anual de crescimento do preço da terra, dada por:

$$\frac{1}{T} \log \frac{p_{(T)}}{p_{(0)}} = g_p^{cce} + \frac{(1 - e^{\Phi T})}{T} \log p_{(0)}^* + \frac{(e^{\Phi T} - 1)}{T} \log p_{(0)} \quad (22)$$

Após a incorporação de um termo de erro aleatório ($\varepsilon_{0,T}$), a expressão (22) pode ser simplificada para:

$$\frac{1}{T} \log \left(\frac{p_T}{p_0} \right) = \alpha + \beta \log p_{(0)} + \varepsilon_{0,t} \quad (23)$$

Sendo que:

$$\alpha = g_p^{cce} + \frac{(1 - e^{\Phi T})}{T} \log p_{(0)}^* \quad (24)$$

$$\beta = \frac{(e^{\Phi T} - 1)}{T} \quad (25)$$

A expressão (23), também conhecida como “Barro Regressão”, estabelece uma relação entre a taxa de crescimento do preço da terra (entre os períodos 0 e T), e o logaritmo do preço da terra no período inicial (0). Nesse caso, a existência de uma relação negativa ($\beta < 0$) indica a existência de convergência absoluta entre os preços de terras. Dessa forma, quanto menor for o preço do hectare da terra em determinada região, maior será a sua taxa de crescimento, havendo tendência de convergência entre os preços do hectare de terras vigentes em diferentes regiões.

A partir do parâmetro β , é possível calcular o valor de Φ , que indica a velocidade com a qual determinada variável (nesse caso, o preço do hectare da terra) converge para o seu nível de estado estacionário, conforme indicado na exposição acima. Se $\Phi = -0,05$, por exemplo, isso significa que a diferença entre o preço do hectare da terra no momento inicial (P_t) e o seu valor máximo (P_*) sofrerá, a cada ano, redução de 5% (VALDÉS, 1999).

Conforme visto anteriormente, a convergência- β absoluta tem, como pressuposto, que todas as regiões convergem para o mesmo estado estacionário. Não obstante, o modelo desenvolvido por

Solow (1957) levanta indícios de que as regiões devem convergir para os seus próprios estados estacionários, que dependem de fatores econômicos e culturais. Por esse motivo, autores como Barro e Sala-i-Martin (1995), Lusigi e Thirtle (1998), Gutierrez (2000) e Ferreira e Ellery Junior (1996), por exemplo, consideram a hipótese de convergência- β condicional. Para testar a hipótese de convergência- β condicional, a expressão (23) pode ser ampliada de modo a incorporar outras variáveis explicativas (X_i), obtendo-se:

$$\frac{1}{T} \log \left(\frac{p_T}{p_0} \right) = \alpha + \beta_1 \log p_{(0)} + X_i \beta_{1+j} + \varepsilon_{0,t} \quad (26)$$

Uma questão relevante, a ser explorada tanto neste artigo como em futuros trabalhos empíricos, diz respeito ao tipo de convergência- β (absoluta ou condicional) que seria mais adequado ao preço da terra agrícola. Em primeiro lugar, chama-se a atenção para o fato de que a capacidade produtiva da terra depende de variáveis de primeira natureza como clima, relevo, incidência solar e precipitação pluviométrica, por exemplo. Assim, o nível de renda da terra agrícola (e o seu preço) pode variar de acordo com as características edafoclimáticas das regiões. Ademais, deve-se considerar que a renda líquida da terra agrícola também depende do custo unitário de transporte (por quilômetro), bem como das distâncias em relação às cidades ou centros consumidores. *Ceteris paribus*, as terras agrícolas de regiões próximas às cidades terão maior renda líquida e, conseqüentemente, maior preço do que aquelas de regiões relativamente distantes. Diferenças em termos de localização implicam terras agrícolas com diferentes níveis de preço, mesmo em situação de equilíbrio (no caminho de crescimento equilibrado) e ainda que as referidas terras tenham o mesmo potencial produtivo. Em função dos fatores supracitados, é mais prudente esperar que a convergência do preço da terra agrícola seja condicional, e não absoluta.

Por fim, a convergência- σ indica uma tendência de redução na variabilidade de determinada variável. O procedimento para inferir sobre a existência (ou não) de convergência- σ consiste em calcular o desvio padrão do logaritmo do preço do hectare de terra, entre os estados e/ou de regiões, acompanhando a sua evolução ao longo do tempo. Entretanto, é importante observar que a simples análise do gráfico de dispersão, apesar de recomendável, pode não ser precisa quanto à existência (ou não) de uma tendência de redução na dispersão do logaritmo do preço da terra. Por esse motivo, McCunn e Huffman (2000) sugerem a aplicação de um teste para a hipótese de convergência- σ , através da estimativa da seguinte equação:

$$Var(\log p_t) = \Psi_1 + \Psi_2 t + \varepsilon_t \quad (27)$$

Em que $Var(\log p_t)$ corresponde à variância do preço da terra, Ψ_1 é a constante, Ψ_2 constitui o parâmetro de convergência- σ e t é o tempo. Se o parâmetro Ψ_2 é negativo ($\Psi_2 < 0$) e estatisticamente significativo, não se pode rejeitar a hipótese de que a variância do logaritmo do preço da terra, entre estados e microrregiões considerados, está caindo com o passar do tempo. Tem-se, portanto, evidência estatística da ocorrência da convergência- σ . Por fim, deve-se destacar que há relação entre os conceitos de convergência- β absoluta e de convergência- σ . Conforme demonstrado por Barro e Sala-i-Martin (1995), a convergência- β absoluta é condição necessária, mas não suficiente para a ocorrência de convergência- σ .

3.2. Dependência espacial

Conforme visto na seção anterior, a convergência do preço da terra depende de fatores como transferência de capital e de mão de obra entre as regiões, além da disseminação de conhecimentos sobre novas tecnologias e técnicas de produção. Um aspecto importante, frequentemente ignorado nos estudos empíricos sobre convergência, diz respeito à dependência espacial entre variáveis independentes, dependentes e/ou resíduos da regressão. Tudo o mais constante, a velocidade de convergência do preço da terra entre regiões distantes, ou cuja interação seja dificultada por restrições de acesso, será mais lenta do que aquela observada entre regiões que possuem proximidade geográfica. Isso ocorre pelo fato de que as distâncias, ou quaisquer outros tipos de barreiras, dificultam a mobilidade de capitais e de pessoas entre as regiões, bem como a difusão do progresso tecnológico. No caso do preço da terra, também deve-se levar em conta fatores locais como clima, relevo e tipo de solo, que determinam o potencial de produção agropecuária e, conseqüentemente, o preço da terra em diferentes regiões. Por todos esses motivos, o ideal é que a dependência através do espaço seja devidamente controlada, através de procedimentos e de modelos estatísticos e econométricos

específicos para essa finalidade. Caso contrário, corre-se o risco de que o parâmetro β da equação (23), ou o β_1 de convergência, da equação (26), bem como os coeficientes das demais variáveis explicativas (no caso de convergência condicional) sejam viesados e inconsistentes.

Naturalmente, é possível que o fenômeno em estudo – e podendo ser estimado pela equação (23) ou pela equação (26) – não seja caracterizado pela dependência espacial, de maneira que os parâmetros estimados através de Mínimos Quadrados Ordinários – MQO serão consistentes e não viesados. Entretanto, levando-se em conta a natureza do processo de convergência – que decorre de interações entre regiões com diferentes graus de desenvolvimento – a dependência através do espaço é uma hipótese que deve ser considerada e devidamente testada de antemão.

A primeira etapa da análise estatística, necessária para a realização do teste de dependência espacial entre as variáveis (em especial, o preço do hectare da terra, no caso deste trabalho), consiste em definir uma ou mais matrizes de pesos espaciais, que representam o tipo de relação ou conexão entre as regiões que compõem a análise. Conforme indicado por Almeida (2012), o peso espacial (w_{ij}) denota a intensidade da dependência (ou correlação) espacial entre as regiões i e j , por exemplo. Desse modo, a matriz de pesos espaciais (W) será uma matriz quadrada, de dimensão $n \times n$ (sendo que n é o número de regiões), indicando o grau de vizinhança de uma região em relação a todas as outras.

Existem diferentes matrizes de pesos espaciais, sendo que as mais comuns são as matrizes de pesos binários e as matrizes de distância inversa. No caso da matriz de pesos binários, os pesos espaciais (1 ou 0) são atribuídos de acordo com algum critério de contiguidade física, necessário para que as regiões sejam consideradas como vizinhas. Segundo Almeida (2012), as principais matrizes de pesos binários são as do tipo rainha (*queen*), torre (*rook*) e bispo (*bishop*). A matriz do tipo “rainha” é aquela em que as regiões são consideradas como vizinhas caso haja qualquer tipo de contiguidade física, seja através de fronteiras (com extensão diferente de zero) ou de vértices. No caso da matriz do tipo “torre”, por outro lado, a vizinhança é atribuída somente às regiões que possuem fronteira física diferente de zero. Por fim, a matriz do tipo “bispo” é aquela em que se considera somente o critério de contiguidade nos vértices.

No que diz respeito ao uso de matrizes binárias, frequentemente é utilizada a estratégia de “normalização”, que consiste em fazer com que a soma dos pesos, em cada linha da matriz, seja equivalente à unidade. Conforme indicado por Almeida (2012), a normalização da matriz faz com que o peso espacial (w_{ij}) tenha uma interpretação muito simples, passando a indicar a porcentagem da influência que uma região exerce sobre a outra.

Outra matriz de ponderação, frequentemente empregada em estudos empíricos, corresponde à matriz de distância inversa. Nesse tipo de matriz, os pesos espaciais (w_{ij}) são definidos de acordo com o critério de distância geográfica. Assim, quanto maior for a distância entre duas regiões i e j , por exemplo, menor será o peso ou a importância atribuída ao respectivo elemento (w_{ij}) da matriz, indicando baixo grau de interação através do espaço. Formalmente, o peso w_{ij} é determinado através da seguinte expressão:

$$w_{ij} = d_{ij}^{-b} \quad (28)$$

Em que d_{ij} corresponde à distância entre as regiões i e j , e b é um parâmetro de amortecimento. Pela expressão (28), observa-se que quanto maior for o parâmetro b , menor será a força de interação entre as regiões. Entre os problemas inerentes ao critério de distância inversa, Almeida (2012) destaca o fato de que o parâmetro b é determinado de forma arbitrária, sendo calibrado como $b = 1$ ou $b = 2$ na expressão (28). Nesse artigo, considerou-se que $b = 1$.

Além das matrizes supracitadas, é possível trabalhar com diferentes bandas de distâncias, estipulando um limite a partir do qual as regiões deixam de ser consideradas como vizinhas. Em uma matriz de distância inversa com corte de 100 km, por exemplo, o critério de distância geográfica (dado pela expressão 28) será utilizado até o limite de 100 km. Para todas as regiões que se encontram além dessa distância, será atribuído o valor zero ao respectivo elemento da matriz W .

Após a definição de uma matriz de pesos espaciais, que seja representativa do grau de conexão entre as regiões, a hipótese de dependência espacial pode ser testada através do teste I do Moran, que é calculado pela seguinte fórmula:

$$I = \frac{n}{S_0} \left(\frac{e' W e}{e' e} \right) \quad (29)$$

Em que n corresponde ao número de regiões, S_0 equivale à soma dos pesos espaciais ($\sum_i \sum_j w_{ij}$), e $e = y - X\hat{\beta}$ constitui o vetor de resíduos da regressão. De acordo com Almeida (2012), o procedimento visando à detecção de dependência espacial consiste em estimar o modelo por meio do método de Mínimos Quadrados Ordinários – MQO e, posteriormente, empregar os resíduos da regressão no teste supracitado (equação 29). A hipótese nula do teste é de que os resíduos se distribuem de forma aleatória, não havendo autocorrelação espacial entre os resíduos. Portanto, a rejeição da hipótese nula indica a existência de algum tipo de dependência espacial nos resíduos da regressão.

A matriz de pesos espaciais é utilizada não somente para realizar o teste I de Moran, como também para controlar os efeitos de dependência em caso de autocorrelação espacial nos resíduos. Nesse caso, a matriz é utilizada como um operador de defasagem espacial, sendo multiplicada pelo vetor de uma ou mais variáveis que possuem dependência através do espaço. Naturalmente, é possível que surjam dúvidas em relação à escolha da matriz de pesos espaciais. Conforme indicado por Almeida (2012), a escolha de uma matriz inadequada – que capte pouca autocorrelação espacial – pode ser uma fonte de má especificação do modelo, levando à obtenção de estimadores viesados e inconsistentes. Para evitar que isso aconteça, deve-se testar a hipótese de dependência para um conjunto de matrizes, selecionando aquela que estiver associada ao maior valor do teste I de Moran.

De acordo com Almeida (2012), a dependência espacial pode decorrer da correlação entre as variáveis explicadas (y_i) de diferentes regiões. Nessa hipótese, a dependência espacial pode ser controlada por meio de defasagem espacial na variável dependente (Wy_i). Além disso, é possível que a dependência espacial esteja associada ao efeito de transbordamento (*spillover effect*) das variáveis explicativas (X_i). Em síntese, esse efeito ocorre quando a influência das variáveis explicativas (X_i) ultrapassa os limites de sua região, impactando os resultados (ou variáveis dependentes) de regiões vizinhas. Nesse caso, o viés deve ser corrigido através de defasagem espacial nas variáveis independentes (WX_i). Por fim, não se pode descartar a influência de fatores não observados. Isso ocorre quando uma variável relevante, porém não mensurável, afeta não somente a variável dependente (y_i) da própria região, como também as variáveis dependentes das regiões vizinhas. Nesse último caso, a dependência espacial pode ser controlada por meio de defasagem espacial do termo de erro. As expressões (30) e (31) constituem um modelo geral, que incorpora todas as formas de dependência espacial:

$$y_i = \rho Wy_i + X_i\beta + WX_i\tau + \xi_i \quad (30)$$

$$\xi_i = \lambda W\zeta_i + \varepsilon_i \quad (31)$$

A partir das expressões (30) e (31), e mediante a imposição de restrições sobre os parâmetros das variáveis defasadas espacialmente, é possível obter diferentes modelos espaciais, conforme indicado no Quadro 1.

Entre os procedimentos disponíveis para a escolha do modelo espacial, o mais indicado consiste em estimar todos os modelos apresentados no Quadro 1, selecionando aquele que estiver associado ao menor Critério de Informação de Akaike (AIC).

No caso da análise de convergência- β , a eventual incorporação de variáveis espacialmente defasadas – com o objetivo de se controlar a dependência espacial – implica a estimativa de convergência- β condicional do preço da terra agrícola (equação 26). Em caso de rejeição da hipótese de dependência espacial, contudo, o parâmetro β estimado por MQO será consistente e não viesado, referendando a hipótese de convergência- β absoluta do preço da terra agrícola (equação 23).

Quadro 1 – Tipos de modelos espaciais

Modelos	Parâmetros		
	ρ	τ	λ
Autorregressivo espacial (SAR)	$\neq 0$	0	0
Erro autorregressivo espacial (SEM)	0	0	$\neq 0$
Defasagem com erro autorregressivo (SAC)	$\neq 0$	0	$\neq 0$
Durbin espacial (SDM)	$\neq 0$	$\neq 0$	0
Durbin espacial do erro (SDEM)	0	$\neq 0$	$\neq 0$

Fonte: Almeida (2012); Malassise, Parré e Fraga (2015).

3.3. Fontes de dados

Neste artigo, os dados divulgados pela Informa Economics – FNP foram utilizados para testar a hipótese de convergência (β e σ) do preço de cada hectare de terras nuas para lavouras e para pastagens, entre as regiões do Brasil, no período de 2003 a 2017. A FNP pesquisa os preços de terras agrícolas em 133 regiões que são definidas pela própria instituição, não havendo correspondência com a divisão territorial estipulada pelo IBGE (ver FNP (2017)).

Com a exceção das regiões metropolitanas de São Paulo e do Rio de Janeiro, que não são consideradas em função de sua baixa participação na produção agropecuária, a pesquisa da FNP cobre todo o território brasileiro. Em algumas regiões definidas pela FNP, contudo, não são pesquisados os preços de todas as categorias de terras. No caso de terras para lavouras, por exemplo, não há registro de preço para as microrregiões (definidas pela FNP) de Imperatriz/MA, São Luís/MA, Rendeção/PA, Ilhas/PA, Rio Branco/AC, Tarauacá/AC, Boca do Acre/AM e Caracará/RR. Assim, as análises de convergência (β e σ) dos preços de terras para lavouras foram realizadas com base em dados de 125 microrregiões. Quanto à escolha do tipo de terra, optou-se pelas terras para lavouras de maior produtividade. Na ausência desse tipo de terra, foram selecionados os preços de terras para lavouras com produtividade média ou baixa, nessa ordem de prioridade.

No caso de terras para pastagens, em virtude da indisponibilidade de informações, não foram consideradas as regiões do Perímetro Irrigado de São Francisco/PE, Oeste Potiguar/RN, Agreste Potiguar/RN, Médio e Baixo Jaguaribe/CE, Litoral Cearense/CE e Boa Vista/RR. Portanto, as análises de convergência dos preços de terras para pastagens foram realizadas com base nas informações de 127 microrregiões. Quanto à definição do tipo de terra para pastagem, optou-se pelas terras de maior rendimento animal em cada região da FNP. Quando havia, na mesma região, terras para pastagem com o mesmo rendimento animal, porém em municípios diferentes, considerou-se a média dos seus preços. Salienta-se que os preços de terras agrícolas foram indexados pelo Índice Geral de Preços – Disponibilidade Interna (IGP-DI), da FGV, sendo inflacionados com base no ano de 2017.

4. RESULTADOS ECONOMETRICOS

4.1. Convergência- β

O Quadro 2 contém os valores do teste *I* de Moran usando os dados da FNP e as matrizes de distância inversa, rainha (*queen*), e de distância inversa com cortes de 600 km, 800 km e 1.000 km.

Para ambos os preços de terras (para lavouras e pastagens), os valores do *I* de Moran foram estatisticamente significativos, independentemente da matriz de pesos usada. Assim, a rejeição da hipótese nula de independência dos erros também constitui um indicativo de que os preços de terras agrícolas seguem um processo de convergência- β condicional, o que já era esperado em função das características do fator terra, conforme aludido anteriormente. Ademais, para ambas as categorias de preços de terras (para lavouras e para pastagens), a matriz rainha (*queen*) está associada ao maior valor da estatística *I* de Moran, sendo, portanto, a mais indicada para as operações de defasagem e consequente controle da autocorrelação espacial nos resíduos.

Quadro 2 – Teste I de Moran visando a escolha da matriz de pesos espaciais

Matriz de pesos espaciais	Preços de terras para Lavouras		Preços de terras para Pastagens	
	Estatística	p-valor	Estatística	p-valor
Distância inversa	0,0152	0,0491	0,0390	0,0000
Queen	0,1421	0,0117	0,1450	0,0070
Distância inversa c/ corte de 600 Km	0,0917	0,0066	0,1257	0,0006
Distância inversa c/ corte de 800 Km	0,0533	0,0340	0,1234	0,0000
Distância inversa c/ corte de 1.000 Km	0,0373	0,0583	0,0913	0,0000

Fonte: Resultados da pesquisa

Após a definição das matrizes de ponderação, deve-se proceder à escolha de um modelo espacial visando o controle das relações de dependência das variáveis através do espaço. O Quadro 3 contém o Critério de Informação de Akaike (AIC) registrado para cada modelo espacial, segundo o tipo de terra (para lavouras ou para pastagens). Para os preços de terras para lavouras, os resultados evidenciam que o modelo SEM seria o mais adequado para controlar a autocorrelação espacial dos resíduos. Desse modo, pode-se inferir que o fenômeno de dependência espacial, no caso de preços de terras para lavouras, decorre, exclusivamente, do efeito de variáveis não controladas através do modelo. Para os preços de terras para pastagens, os resultados do Quadro 3 permitem observar que o modelo SDM possui o menor critério de informação, sendo o mais indicado para a estimação do parâmetro de convergência- β condicional. No caso de terras para pastagens, esse resultado indica que a dependência espacial decorre não somente do efeito de transbordamento da variável dependente (taxa de crescimento do preço da terra), como também do efeito de transbordamento da variável independente (logaritmo do preço da terra no período inicial) nas regiões que compõem a amostra.

Quadro 3 – Critério de Informação de Akaike (AIC) visando a escolha do modelo espacial

Modelo espacial	Preços de terras para Lavouras	Preços de terras para Pastagens
SAR	-518,5360	-494,5715
SEM	-520,9716	-502,1545
SAC	-520,5453	-515,2360
SDM	-517,7964	-519,6474
SDM	-519,7322	-517,9964

Fonte: Resultados da pesquisa

O Quadro 4 contém as estimativas de convergência- β para os preços de terras para lavouras e para pastagens entre os anos de 2003 e 2017 e usando informações em nível de regiões definidas pela FNP. Os resultados indicam que não é possível rejeitar a hipótese de convergência- β de preços de ambas as categorias de terras, seja usando MQO ou modelos de econometria espacial. Logo, conclui-se que os preços de terras mais baratas, que se encontravam nas regiões menos favorecidas do país, cresceram de forma mais rápida que os preços de terras mais caras durante o período de 2003 a 2017. Apesar da diferença em relação aos valores dos parâmetros, as estimativas obtidas por meio de Mínimos Quadrados Ordinários – MQO levam às mesmas conclusões que aquelas propiciadas pelos modelos espaciais. Entretanto, os resultados demonstram a importância de se controlar a autocorrelação espacial nos resíduos, uma vez que as variáveis dependente e independente defasadas (no caso de terras para pastagens) e a defasagem do termo de erro (no caso de terras para lavouras) foram estatisticamente significantes (Quadro 4). Verifica-se, portanto, que a não consideração da dependência espacial pode gerar resultados viesados e inconsistentes, comprometendo – em alguns casos – as próprias conclusões acerca das relações de causa e efeito.

A partir do parâmetro β , associado ao logaritmo do preço da terra no ano de 2003, foi possível calcular a velocidade de convergência (Φ) para os preços do hectare de terra de ambos os tipos (para lavouras e para pastagens) e segundo os modelos considerados na análise. No caso de terras para lavouras, os resultados do modelo SEM levaram à obtenção de um parâmetro Φ de -0,0137, indicando que houve, no período de 2003 a 2017, redução de 1,37% ao ano na diferença entre o preço da terra para lavoura e o seu respectivo preço em nível de estado estacionário. No caso de terras para pastagens, o resultado do modelo SDM indicou velocidade de convergência (Φ) superior, de 4,28% ao ano (Quadro 4).

Quadro 4 – Estimativas de convergência- β , por tipo de terra, entre os anos de 2003 e 2017

Coef.	Variável	Preços de terras para Lavouras		Preços de terras para Pastagens	
		MQO	SEM	MQO	SDM
β	$\log(p2003)$	-0,0112***	-0,0125***	-0,0102**	-0,0322***
ρ	$\mathbf{W} \log(p2017/p2003) / T$	-	-	-	0,3413***
τ	$\mathbf{W} \log(p2003)$	-	-	-	0,0323***
λ	$\mathbf{W} \xi_{sit}$	-	0,2728**	-	-
Φ	-	-0,0122	-0,0137	-0,0110	-0,0428
	Wald	25,94***	26,46***	11,60***	52,25***
	Jarque-Bera	13,2657***	19,1400***	7,0765**	6,3680**
	White	27,5614***	28,3750***	22,4608***	38,3032***
	Log Likelihood	261,9965	264,4858	249,3198	264,8237
	R^2	0,1718	0,1718	0,0837	0,2342
	Nº de observações	125	125	127	127

Fonte: Resultados da pesquisa.

Notas: *** p < 0,01; ** p < 0,05; * p < 0,10. As estimativas foram realizadas pelo método de Quase Máxima Verossimilhança (QMV), que prescinde da hipótese de normalidade dos erros. Adicionalmente, foram utilizados erros-padrão robustos à heterocedasticidade.

Estes procedimentos foram adotados, inclusive, para os modelos sem controle espacial (identificados pela sigla de MQO).

4.2. Convergência- σ

O Quadro 5 apresenta as estimativas da convergência- σ para os preços de cada hectare de terras para lavouras e para pastagens entre os anos de 2003 e 2017. Em ambos os casos, não é possível rejeitar a hipótese de existência da convergência- σ , uma vez que o coeficiente Ψ_2 é negativo e estatisticamente significativo a 1%. Esse resultado indica que o período de 2003 a 2017 foi caracterizado, de modo geral, por uma tendência de redução na dispersão entre os preços de cada hectare de terra nua para lavouras e para pastagens entre as regiões brasileiras (tal como definidas pela FNP).

Quadro 5 – Estimativas de convergência- σ , por tipo de terra, entre os anos de 2003 e 2017

Parâmetros	Preços de terras para Lavouras	Preços de terras para Pastagens
Ψ_2	-0,0043***	-0,0017***
	(0,0006)	(0,0004)
Wald	44,39***	15,23***
Jarque-Bera	0,9356	2,0400
White	2,7415	4,0424
Durbin-Watson	1,4311	2,0428
Log Likelihood	47,8281	53,4273
R^2	0,7735	0,5394

Fonte: Resultados da pesquisa.

Notas: *** p < 0,01; ** p < 0,05; * p < 0,10. Erro padrão entre parênteses.

5. CONSIDERAÇÕES FINAIS

Este artigo contribui, teórica e empiricamente, com estudos sobre convergência do preço da terra entre regiões ao desenvolver, inicialmente, um modelo teórico para justificar o processo de convergência do preço da terra, derivando-se dele uma equação de β -convergência que foi estimada para analisar o comportamento dos preços do hectare de terra nua, entre regiões brasileiras, tomando os anos de 2003 a 2017. As estimativas fizeram uso de modelos de econometria espacial, de modo a

controlar os efeitos de interação das variáveis e dos fatores não observados (termos de erros) através do espaço.

Através do modelo teórico, desenvolvido na seção 3, observou-se que a possibilidade de ocorrência de convergência do preço do hectare da terra entre as regiões está de acordo com os pressupostos da teoria neoclássica de desenvolvimento econômico. Além disso, a dedução de uma fórmula para calcular a convergência- β condicional do preço da terra entre as regiões (equação (26)) revelou, entre outros aspectos, os fatores subjacentes ao processo de convergência, que correspondem à transferência de capital e de mão de obra, além do acesso à tecnologia moderna, entre as regiões. Desse modo, constatou-se que a ocorrência de convergência do preço do hectare da terra entre as regiões é factível, sendo amparada por uma teoria que já havia sido testada empiricamente, ainda que com outras variáveis (com destaque para a renda *per capita*). A partir de então, restava apenas testar econometricamente a ocorrência de convergência do preço da terra agrícola no Brasil, o que efetivamente foi feito na seção 4.

Os resultados econométricos não permitiram a rejeição de ocorrência de convergência- β condicional para os preços de ambas as categorias de terra (para lavouras e para pastagens) entre as microregiões brasileiras no período de 2003 a 2017. De modo geral, os preços de terras mais baratas – que se encontravam em regiões menos desenvolvidas – cresceram de forma mais rápida, convergindo para os preços de terras relativamente caras das regiões mais desenvolvidas. Adicionalmente, os resultados indicaram que o período de 2003 a 2017 teria sido caracterizado por um processo de convergência- σ , ou seja, de redução na dispersão entre os preços de terras para lavouras e para pastagens.

Ao avaliar a hipótese de ocorrência de convergência do preço da terra agrícola entre regiões brasileiras (no período de 2003 a 2017), esse artigo traz importante contribuição à literatura sobre a dinâmica e funcionamento do mercado de terras. Não obstante, o tema ainda pode ser aprofundado por meio de outros estudos que busquem quantificar, por exemplo, a influência de fatores como transferência de capital, bem como de mão de obra e de tecnologia entre as regiões, sobre o referido processo de convergência do preço da terra agrícola.

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Artigo submetido a 20 de Setembro de 2021; versão final aceite a 14 de Janeiro de 2022
Paper submitted on September 20, 2021; final version accepted on January 14, 2022

A Pastorícia no Desenvolvimento dos Territórios de Montanha em Portugal: Uma Análise Multidimensional aos Desafios e Oportunidades¹

Pastoralism in the Development of Mountain Territories in Portugal: A Multidimensional Analysis of Challenges and Opportunities

Rui Pinto

rui.pinto@forestwise.pt

Gestor de Projeto (Mestre em Engenharia Florestal), ForestWISE CoLab – Laboratório Colaborativo para a Gestão Integrada da Floresta e do Fogo, Campus da UTAD

Marina Castro

marina.castro@ipb.pt

Professora Auxiliar na Escola Superior Agrária de Bragança/Instituto Politécnico de Bragança/CIMO-Centro de Investigação de Montanha

Filipa Torres-Manso

ftorres@utad.pt

Professora Auxiliar na Universidade de Trás-os-Montes e Alto Douro/CIFAP-Departamento de Ciências Florestais e Arquitetura Paisagista/CETRAD-Centro de Estudos Transdisciplinares de Desenvolvimento

Manuel Rainha

manuel.rainha@gmail.com

Gestor de Recursos Florestais/SONAE ARAUCO

Resumo

A sustentabilidade da pastorícia extensiva, designadamente em territórios de montanha, encontra-se ameaçada devido à sua desvalorização e, consequentemente, ao acentuado decréscimo de pastores e efetivos pecuários. O abandono desta atividade contribui para a desvitalização do tecido socioeconómico local, perda de biodiversidade e um aumento do risco de incêndios de grandes dimensões. O objetivo deste estudo foi realizar um diagnóstico à pastorícia extensiva em seis territórios de montanha em Portugal, identificando constrangimentos e potenciais estratégias de valorização, fazendo uso de metodologias participativas. Os resultados apontam para a necessidade de desenvolver políticas que visem uma maior valorização e reconhecimento social do pastor e estratégias que proporcionem um aumento da rentabilidade da pastorícia, nomeadamente através do pagamento de serviços de ecossistema e da gestão de biomassa combustível.

Palavras-chave: pastoreio; montanha; oportunidades; desafios; valorização

Códigos JEL: Q10; Q15; Q19

¹ Instituições financiadoras: Projeto Interreg SUDOE OpentoPreserve (SOE2/P5/E0804: Open2Preserve), Agência para a Gestão Integrada dos Fogos Rurais, I.P

Abstract

The sustainability of extensive pastoralism, particularly in mountainous areas, is threatened by its devaluation and the sharp decline in shepherds and livestock. The abandonment of this activity contributes to the devitalisation of the local socio-economic environment, loss of biodiversity in agri-forestry areas and an increased risk of large-scale fires. The aim of this study was to carry out a diagnosis of extensive pastoralism in six mountain territories in Portugal, identifying constraints and potential valorisation strategies, making use of participatory methodologies. The results point to the need to develop policies and strategies aimed at a greater appreciation and social recognition of shepherds and breeders and an increase in the profitability of pastoralism, namely through payment for ecosystem services and management of fuel biomass.

Keywords: pastoralism; mountain; opportunities; challenges; valorization

JEL Codes: Q10; Q15; Q19

1. INTRODUÇÃO

Com cerca de 500 milhões de pastores em todo o mundo (McGahey et al., 2014), a pastorícia é responsável por significativos contributos socioeconómicos e ambientais em mais de 100 países (Davies et al., 2016; Manzano, 2015; Tessema et al., 2014; Reid et al., 2008). De acordo com a Organização para a Alimentação e Agricultura das Nações Unidas (FAO), estima-se que existam na Europa cerca de 15 milhões de hectares consignados a sistemas agropastoris (Augère-Granier, 2020), representando Portugal um número aproximado de 1,92 milhões de hectares em pastagens permanentes (naturais e melhoradas) (ICNF, 2015). Em Portugal, a importância da pastorícia é desde logo relatada nos textos dos primeiros forais (Vicente, 2014) e reforçada por outros autores para a relevância económica, social, ambiental, histórica e cultural que representa para muitos territórios rurais (Canals, 2019; Pinho, 2018; San Emetério et al., 2016; Torres-Manso et al., 2014; Fuhlendorf et al., 2009; Moreira e Coelho, 2008; Dias, 1965; Ribeiro, 1945; Ribeiro, 1940-1941).

É sobretudo nos territórios de maior altitude, que a atividade pastoril tem maior tradição. Em Portugal, as zonas montanhosas representam cerca de 40% do território nacional (Azevedo et al., 2016), sendo normalmente áreas marginais, periféricas e com solos maioritariamente ocupados por povoamentos florestais, matos e pastagens². A fraca aptidão dos solos e a altitude, ambos fatores limitantes para a agricultura, favorecem o desenvolvimento da pastorícia extensiva. Neste contexto, a atividade pastoril em regime extensivo com espécies e raças altamente adaptadas a estas condições, tornou-se mesmo, em muitas regiões, a única atividade possível de garantir a subsistência das populações locais.

De um modo geral, apesar da tradição pastoril e da importância que a mesma representa para alguns territórios portugueses, observa-se nos últimos 100 anos, um acentuado decréscimo do efetivo pecuário (em particular pequenos ruminantes) e do número de pastores/criadores (INE, 2020). Nos anos 40 do século XX, Dias (1965) colocava o país entre os congéneres europeus onde esta atividade mantinha excecional caráter e enorme diversidade. Porém, já nesse tempo, e referindo-se a esta atividade, o autor sublinhava uma rápida e profunda transformação no então “mundo moderno” que ia “inexoravelmente destruindo a vida tradicional, para a substituir por formas mais racionais de economia” (1965: 333).

O abandono da atividade pastoril que se vem observando, para além de consequências ambientais e ecológicas negativas, transporta também constrangimentos socioeconómicos que se repercutem na desvalorização da pastorícia e no despovoamento dos territórios rurais (Gómez Sal, 1997; Pinto-Correia, 2000; Castro, 2004; Lasanta-Martínez et al., 2005; Peco et al., 2006). Estes constrangimentos, associados a outros fatores, designadamente de ordem política, condicionam o desenvolvimento e a coesão territorial, contribuem para a desestruturação do meio rural que os caracteriza e para o seu empobrecimento (Bento-Gonçalves, 2021). Simultaneamente, com os terrenos agrícolas votados ao

² Inventário Florestal Nacional Nº 6 (ICNF)

abandono, os espaços florestais com uma gestão incipiente e um clima de influência atlântico-mediterrânico favorável ao desenvolvimento da vegetação (Pyne, 2006 e 1997), torna-se inevitável o aumento de biomassa de espécies arbustivas altamente inflamáveis, com consequente elevação do risco de incêndio rural e maior suscetibilidade a fogos de extrema severidade (Vélez, 2006 e 1982; Sil et al., 2019). A incipiente gestão da vegetação, designadamente com a redução da atividade pastoril, contribui para a alteração do regime do fogo de alta frequência e baixa intensidade que existia nos territórios de montanha, evoluindo para um regime de fogo de baixa frequência e alta intensidade que, tal como refere Moreira (2008), transforma os incêndios rurais numa força destruidora de territórios, recursos e vidas humanas, pela frequência com que ocorrem, mas sobretudo pela intensidade.

Os efeitos positivos desta atividade no ambiente, constituindo uma mais valia para as regiões em termos sociais e económicos (Gómez Sal, 2000; Mosquera-Losada et al., 2005), associado ao crescente interesse na pastorícia por parte de agentes com responsabilidades na gestão dos territórios rurais, nomeadamente no apoio à gestão de combustíveis para a prevenção dos incêndios rurais, têm desencadeado algumas iniciativas de apoio à realização de queimadas extensivas, visando concertar os planos de fogo controlado dos municípios e das comunidades intermunicipais com a prática do pastoreio. Porém, a redução de pastores e efetivos pecuários nos territórios rurais, tem dificultado a implementação deste tipo de estratégias. Diversos autores e técnicos propõem uma abordagem integrada e participativa dos vários *stakeholders* envolvidos, destacando a necessidade de criação de equipas pluridisciplinares na conceção de medidas e estratégias de intervenção nos territórios (Moreira e Coelho, 2008). Também no conhecimento das diferentes perceções sociais, de modo a facilitar o ajustamento dos objetivos das políticas às representações da pastorícia, assim como, na definição de estratégias concertadas (Marta-Costa et al., 2013) que favoreçam o desenvolvimento destes territórios, este tipo de abordagem é importante.

Assim, é essencial perceber de que forma se podem compatibilizar as perspetivas dos diversos *stakeholders* envolvidos nesta atividade, de maneira a encontrar potenciais soluções que ajudem a reverter o cenário de desvalorização da pastorícia em regime extensivo em territórios de montanha, e de potenciais estratégias que promovam o seu rejuvenescimento. Por conseguinte, é necessária uma abordagem holística (Moreira e Coelho, 2008; Manzano, 2021) e a aplicação de metodologias participativas para identificar as atuais perceções sociais em torno da atividade.

Partindo da aplicação de metodologias participativas junto dos *stakeholders* (técnicos, entidades e pastores/criadores), definiram-se os seguintes objetivos para este estudo: a) identificar as dimensões de análise mais relevantes para os constrangimentos da atividade pastoril; b) diagnosticar os atuais constrangimentos em cada uma dessas dimensões de análise; c) apresentar potenciais soluções para a revitalização da pastorícia extensiva em Portugal.

2. MATERIAL E MÉTODOS

Entre dezembro de 2020 e fevereiro de 2021, realizou-se um diagnóstico à atividade pastoril em seis territórios de montanha em Portugal, designadamente no Planalto Mirandês e Montalegre (Norte) e Castro Daire, Cinfães, Figueira de Castelo Rodrigo e Território Serra da Estrela (Centro), recolhendo perceções de diversos atores sociais que têm relação com a pastorícia, identificando constrangimentos e potenciais estratégias de valorização para a atividade. Dado o contexto em que o estudo se insere e os objetivos definidos, optou-se pela aplicação de um design de investigação social assente numa abordagem qualitativa (Patton, 1980).

O estudo teve como base territorial o projeto nacional do Mecanismo de Apoio à Realização de Queimadas (MARQ), coordenado pela Agência para a Gestão Integrada dos Fogos Rurais (AGIF), assim como, alguns dos objetivos propostos pelo projeto Interreg SUDOE “OpentoPreserve”.

A técnica que serviu de base à recolha de dados foi o *focus-group* (no caso concreto, um grupo de discussão por cada território considerado) (Wilkinson, 1998; Silva et al. 2014). O objetivo destes encontros é recolher informação rica e detalhada, sobre um determinado assunto de investigação, permitindo a interação dos participantes na discussão (Carey and Asbury, 2016). O contexto pandémico atual, limita consideravelmente a recolha de informações através deste método. Assim, como forma de ultrapassar este constrangimento, optou-se por adaptar a metodologia usada em *focus-group* num formato *online*, em plataforma digital apropriada para o efeito (no caso concreto, o ZOOM). O carácter experimental desta metodologia, foi igualmente avaliado no sentido de perceber

se os objetivos pretendidos foram alcançados e da possibilidade do seu uso em situações alternativas. Dado o formato destes encontros, assim como, o enquadramento dos mesmos que envolveram a participação pública de diversos *stakeholders*, estes tomaram a designação de Encontros Participativos.

Os Encontros Participativos foram antecidos por três reuniões preparatórias (*brainstorming*) entre investigadores da Universidade de Trás-os-Montes e Alto Douro (UTAD), o Instituto Politécnico de Bragança (IPB) e Técnicos da AGIF, de maneira a planear os encontros participativos com uma equipa pluridisciplinar.

Foi usado um método de amostragem dirigida (amostragem intencional), onde indivíduos (independentemente da idade, do sexo ou habilitações académicas), organizações e entidades foram selecionados com base no seu conhecimento e envolvimento na atividade pastoril e na gestão dos territórios. Para a proposta inicial de participantes e constituição dos grupos de discussão, foram considerados contatos fornecidos pela AGIF e o trabalho de avaliação do primeiro ano de implementação do MARQ, nalguns concelhos das regiões norte e centro do país, entre outubro de 2019 e maio de 2020.

No que concerne ao número de participantes, estabeleceu-se que se situaria entre os seis (6) e os doze (12) por encontro, para além do moderador da sessão e dos observadores convidados. Depois de definidas as listas de participantes, foram endereçados convites formais, via e-mail, e enviados lembretes para a realização do evento na semana anterior ao evento e 30 minutos antes deste se realizar.

Para os encontros participativos, foram concebidas uma estrutura e uma dinâmica que serviram de base à recolha das informações pretendidas. As respostas obtidas em cada encontro foram registadas, categorizadas e organizadas de acordo com as dimensões existentes (social, económica, ambiental, técnica e jurídico-legal). Adicionalmente, foram consideradas as observações efetuadas pelos observadores presentes e complementadas as respostas dadas pelos participantes.

Os encontros foram gravados com prévio consentimento dos participantes. No final de cada encontro, os participantes preencheram um breve questionário de avaliação do mesmo.

3. RESULTADOS E DISCUSSÃO

O Quadro 1 regista o número de participantes em cada um dos Encontros Participativos e a respetiva taxa de participação que se situou em 61%, tendo o encontro relativo ao concelho de Cinfães registado a menor taxa de participação (25%). Facto assinalável, foi a participação exclusiva de pastores/criadores pecuários no encontro referente ao território da Serra da Estrela.

Quadro 1 – Número de participantes em cada Encontro Participativo

Distrito	Concelho	Nº de convidados	Nº de participantes	Taxa de participação (%)
Viseu	Castro Daire	11	9	82
	Cinfães	12	3	25
Guarda	Figueira de Castelo Rodrigo	12	6	50
	Território da Serra da Estrela	11	9	82
Bragança	Planalto Mirandês	12	8	67
Vila Real	Montalegre	13	8	62
Total		71	43	61

Fonte: elaborado pelo autor

Cerca de 70% dos participantes que responderam ao questionário de avaliação dos encontros, fez uma apreciação global muito positiva do respetivo evento. A participação de todos os intervenientes na discussão dos assuntos, foi considerada muito satisfatória e permitiu recolher contributos de diferentes perspetivas.

3.1 As dimensões mais relevantes na abordagem pluridisciplinar da pastorícia

Os intervenientes destacaram a estreita interligação que existe entre as diferentes dimensões apresentadas (social, económica, ambiental, técnica e jurídico-legal), realçando a dificuldade (senão mesmo a impossibilidade) em dissociá-las. Ainda assim, as dimensões económica (39,4%), social (27,3%) e ambiental (21,2%) foram indicadas como as que mais contribuem para uma análise integrada da atividade pastoril nestes territórios. Esta é uma realidade corroborada por diversos autores na avaliação da sustentabilidade da pastorícia noutros países (Tessema, 2014; Dong, 2016; Manzano, 2021). A marginalização social da pastorícia, do pastor e a baixa rentabilidade desta atividade, são fatores que encabeçam e justificam as escolhas da dimensão socioeconómica. A dimensão ambiental também foi referida como de elevada importância e de estreita relação com as duas anteriores. Por detrás desta perceção, está a frequência dos incêndios que periodicamente atingem estes territórios e a assunção de, nalguns casos, os mesmos estarem relacionados com a atividade pastoril. No encontro que envolveu os pastores da região da Serra da Estrela, foram referidos vários motivos que justificam o exercício da atividade, nomeadamente a tradição familiar, o gosto de trabalhar com animais e ao ar livre (na natureza), o contributo que é prestado na gestão do território, a compensação financeira da atividade e o orgulho pessoal em serem pastores/criadores de gado.

3.2 Principais constrangimentos

Na dimensão social, para além dos constrangimentos recorrentes do êxodo rural (pessoas, bens e serviços), do despovoamento, do envelhecimento populacional e de um território do interior do país carente de diversas infraestruturas, regista-se a referência à marginalização social a que o pastor e a sua atividade estão sujeitos. A esta perceção junta-se a falta de reconhecimento da profissão de pastor e a contínua redução de pastores nos territórios onde outrora a sua presença era significativa. Em períodos diferentes, Pinto (1999), Torres-Manso (2015), e Sá Rego e Castro (2021), fazem referência a esta mesma realidade. Para além de todas as outras limitações de ordem social, estas apresentam-se com implicações diretas na reduzida participação dos pastores no planeamento de estratégias e iniciativas que visem a gestão do território. Esta situação, onde o fraco associativismo e cooperativismo foi igualmente indicado como um dos responsáveis, designadamente no que ao pastoreio extensivo de pequenos ruminantes diz respeito, ficou também patente na ausência de pastores (ou seus representantes) nas Comissões Municipais de Defesa da Floresta Contra Incêndios. Paralelamente, a baixa escolaridade dos pastores (Montalegre), a disponibilidade que a atividade exige (Montalegre) e questões inerentes à aceitação social para o uso do fogo (que, por exemplo, exigem um cuidado e atenção especiais com a colocação de fotografias nas redes sociais alusivas a ações de fogo controlado), são também limitações apontadas entre alguns dos participantes. A FAO também realça estas questões de forma clara, sublinhando os baixos índices de alfabetização e a falta de capacidade de influência das partes interessadas nas pastagens a nível mundial, como fatores que comprometem seriamente a capacidade de adaptação e resiliência dos pastores (McGahey et al., 2014). O painel de participantes do território da Serra da Estrela, identificou outras limitações relacionadas com o abandono dos terrenos e o sistema de partilhas das propriedades nas heranças, que condicionam o acesso às propriedades por desconhecimento dos proprietários e tornam a propriedade cada vez mais dividida, dificultando o contacto com os proprietários.

Relativamente à dimensão económica, são apontados como principais constrangimentos a forte dependência dos apoios financeiros à atividade pecuária e o facto de muitas vezes se encontrarem desenquadrados da realidade do território. Também se salientam a baixa rentabilidade da atividade e a forma como esta variável justifica o maior afastamento dos mais jovens desta atividade e das suas escolhas profissionais (Montalegre). Outros participantes colocam em evidência o subaproveitamento na exploração de produtos do rebanho ou as dificuldades sentidas ao nível do escoamento dos mesmos (Cinfães). Na zona da Serra da Estrela sublinha-se a perda de rendimento com a venda dos produtos feita a intermediários e a dificuldade de venda direta aos matadouros. No Planalto Mirandês foi ainda destacada a falta de valorização dos serviços de ecossistema gerados pela atividade pastoril, bem como a falta de valorização dos produtos locais e regionais e a reduzida dimensão das explorações agrícolas. Mobilizados pelas receitas provenientes da instalação de aerogeradores, alguns órgãos gestores de terrenos comunitários, relegaram para segundo plano a gestão e ordenamento do território que poderia ser efetuado através da pastorícia. Esta questão é apontada como um

constrangimento ao desenvolvimento da atividade, pois revela o desinteresse pela mesma e consequente desvalorização que se foi instalando nalguns territórios, contribuindo, entre outros, para a degradação das pastagens naturais.

No que concerne a dimensão ambiental, o grande número de incêndios nestas regiões é considerado, de forma generalizada, como o principal constrangimento ao desenvolvimento da pastorícia. Situação que é relacionada com a elevada relação existente entre a carga de combustível/encabeçamento, designadamente em Figueira de Castelo Rodrigo. No entanto, a falta de planos de pastoreio e melhoramento de pastagens, a não valorização dos serviços de ecossistema inerentes à pastorícia e a reduzida articulação em diversas facetas da atividade em espaços protegidos e classificados de Rede Natura 2000, também foram problemas identificados nalguns concelhos. Por último, foi referido o desconhecimento da sociedade em geral, do benefício da atividade para o ambiente. Este conjunto de problemas identificados tem reflexo noutras realidades geográficas espalhadas pelo mundo, tal como refere Manzano (2001).

Na dimensão técnica a expressão mais utilizada é a “falta de apoio” que é notada ao nível do acompanhamento técnico aos pastores, na sua formação e sensibilização das comunidades pastoris, designadamente, no uso do fogo e em candidaturas de apoio a financiamentos. Esta situação reflete-se na dificuldade de acesso e desconhecimento dos pastores relativamente a programas e medidas de apoio à sua atividade. A avançada idade da maioria dos pastores (Castro Daire), a predação do lobo (Cinfães), a falta de infraestruturas de apoio ao pastoreio extensivo (como abrigos para pernoita, cercas e bebedouros) e que, entre outras, exigem grandes deslocações dos rebanhos para se alimentarem, foram aspetos igualmente referidos no âmbito dos condicionalismos técnicos. Este último aspeto é apontado por outros autores, quando referem que a mobilidade pastoril é influenciada pelo estado dos recursos e infraestruturas necessárias para os movimentos, incluindo pontos de água, trilhos de gado, pastos e locais de acampamento (Davies et al., 2016). As respostas dadas pelos pastores da Serra da Estrela, sublinham muito a dificuldade na gestão do tempo despendido entre a atividade pastoril e outros afazeres, assim como, o reduzido território disponível para pastoreio e a falta de recursos humanos nas explorações.

Finalmente, a dimensão jurídico-legal fez evidenciar um quadro legal confuso, pouco claro e de difícil concretização, seja na atividade em si ou no uso do fogo. As referências ao desconhecimento dos proprietários de muitos terrenos privados, à simplificação de processos para construção de infraestruturas de apoio à pastorícia e a elevada burocracia, são problemas transversais. A falta de articulação e organização entre diversas entidades responsáveis pela gestão do território, assim como, a mobilidade e acesso aos terrenos por parte dos pastores também foram salientados. Na Serra da Estrela também se realçaram as questões relacionadas com a legislação sobre a produção de leite e de queijo, assim como, a falta de fiscalização na produção do queijo Serra da Estrela.

3.3 Soluções propostas para os constrangimentos identificados

Os participantes partilharam iniciativas e experiências que foram ou estão a ser desenvolvidas, em diversos territórios portugueses e espanhóis, e que procuram dar resposta a alguns dos problemas referidos anteriormente (por exemplo, os projetos MARQ, Rebanhos+ Clima Positivo e Ramats de Foc).

Para os intervenientes, retirar o pastor e a pastorícia da marginalização social significa aumentar os seus rendimentos e os seus níveis de formação. A necessidade de valorizar o conhecimento empírico dos pastores mais velhos e envolvê-los na formação dos mais novos também foi sublinhado. As Escolas de Pastores em Espanha e mais recentemente em Portugal, foram usadas como exemplo nesta matéria.

O associativismo e cooperativismo também foram apontados como ferramenta para proporcionar maior poder de intervenção aos pastores, no planeamento e gestão dos recursos do território rural, naquilo que pode ser uma alavanca importante para aumentar os índices de aceitação social da atividade e do próprio pastor.

As propostas da vertente económica passam por iniciativas de empreendedorismo inovador associado à valorização dos produtos do rebanho, através de campanhas de *marketing*, selos de certificação diferenciadores e combinações com outras atividades e setores da economia, como o turismo ou a restauração. Este aumento da rentabilidade da atividade considera ainda a possibilidade de pagamento de um ordenado ao pastor, em função das realidades das comunidades pastoris existentes,

e o aumento dos subsídios por cabeça para 70-75€, tendo em conta, entre outros fatores, o regime de exclusividade com que a maioria dos pastores se dedica à atividade. Em consequência, sugere-se um maior envolvimento dos municípios, freguesias, Conselhos Diretivos de Baldios e outras organizações por forma a tornar possível esta realidade. Nos territórios da Serra da Estrela, a produção de queijo e leite está muito presente na necessidade manifestada em criar uma organização imparcial que defenda os interesses do produtor e que consiga evitar flutuações do preço do leite ao longo do ano.

Em termos ambientais, as potenciais soluções passam por perceber a sensibilidade do pastor para a importância da preservação ambiental e paisagística do território, procurando envolvê-lo no planeamento e operacionalização de ações de gestão do território (designadamente em questões relacionadas com o uso do fogo para renovação de pastagens ou em matéria de defesa da floresta contra incêndios (DFCI). O pagamento dos serviços de ecossistema de regulação proporcionados pela atividade, é uma vertente cujo conhecimento deve ser aprofundado e mais valorizada. Observa-se, igualmente, a necessidade de trabalhar na formação de técnicos habilitados para a elaboração de planos de pastoreio, que deem resposta a necessidades ambientais dos territórios, nomeadamente no campo dos incêndios rurais, da preservação da paisagem e da biodiversidade, em articulação com outras organizações e instituições de ensino superior.

As soluções relativas aos constrangimentos técnicos, incidiram sobretudo na formação e capacitação dos pastores (manejo dos animais e uso do fogo), no apoio à realização de queimadas controladas e na simplificação dos processos de ajudas financeiras e de gestão das explorações pecuárias. A criação de gabinetes de apoio pelas autarquias ou Conselhos Diretivos de Baldios para prestar apoio aos pastores, também foi apresentada como possível solução. Adicionalmente, foram dados contributos no sentido de melhorar os processos de comunicação, informação e aprendizagem mútua entre pastores e agentes de diversas organizações (promover mais encontros entre pastores e técnicos e mais reflexão nos temas relacionados com a pastorícia), assim como, melhorar o conhecimento sobre a dimensão dos encabeçamentos e percursos de pastoreio adaptados a cada região.

Nos aspetos jurídico-legais foi dado particular realce à necessidade de realizar um cadastro predial que apoie no planeamento e gestão do território (designadamente, em matéria DFCI e de acessibilidade à propriedade por parte dos pastores) e à necessidade de melhorar o enquadramento jurídico no uso do fogo, atribuindo maior flexibilidade, por exemplo, na utilização do fogo de gestão. Para além disso, foi feita menção ao papel que o MARQ tem desempenhado em ultrapassar constrangimentos ao uso do fogo nestes territórios, com o objetivo de renovação de pastagens. Mais uma vez, os pastores da Serra da Estrela concretizam a necessidade de uma fiscalização mais eficaz à produção de queijo, de modo a reduzir os queijos que resultam de mistura de leite de regiões diferentes das da Serra da Estrela.

3.4 A pastorícia na prevenção dos incêndios rurais e na gestão de biomassa

Muitas pastagens dependem do fogo para a sua conservação, embora os pastores sejam criticados quando o usam como uma ferramenta de gestão para renovar as pastagens e para combater as pragas (UICN, 2011). Relativamente ao contributo da pastorícia na gestão de biomassa combustível e na problemática dos incêndios rurais, o MARQ é apontado como projeto que deve ser alargado a outras regiões, em face do sucesso que tem auferido junto da maioria das comunidades e dos pastores em particular. Em Cinfães sublinha-se a necessidade de ter mais rebanhos nas serras por forma a consumir a elevada carga de biomassa existente. Em Figueira de Castelo Rodrigo, entre várias opiniões, sobressaem as que indicam a necessidade de apoiar o pastor e a sua atividade através do pagamento de serviços que visem a gestão de combustíveis em ações DFCI e de preservação da paisagem e da biodiversidade. Para além disso, reconhece-se o saber empírico dos pastores no uso do fogo e na gestão da paisagem através do pastoreio extensivo, mas acrescenta-se a necessidade de maior interligação entre técnicos e pastores, nomeadamente no planeamento e execução de queimadas controladas. Em Montalegre pede-se maior participação dos pastores no planeamento e operacionalização de queimadas controladas, assim como, a possibilidade de atribuir novas funções ao pastor, socialmente reconhecidas e financeiramente apoiadas (por exemplo, vigilantes da natureza ou na prevenção dos incêndios). Por fim, no Planalto Mirandês reconhece-se a necessidade remodelar o programa das “*cabras sapadoras*”, o estabelecimento de contratos com os pastores para efetuar gestão de combustíveis em áreas consideradas estratégicas e o incentivo à criação de Zonas de Intervenção

Florestal (ZIF), desde que a sua formação seja acompanhada pelo efetivo funcionamento das mesmas.

4. CONCLUSÕES

A metodologia usada para este estudo, permitiu a concretização dos encontros participativos *on-line* e o diagnóstico à atividade pastoril nos territórios em estudo, revelando-se como uma alternativa válida ao formato presencial dos *focus-group* para futuros trabalhos de investigação deste tipo.

Conclui-se com a análise multidimensional que as questões socioeconómicas e ambientais assumem particular importância na discussão integrada da atividade pastoril. Confirmou-se a interdisciplinaridade da pastorícia e as especificidades dos respetivos contextos sociogeográficos nos seis territórios estudados. A análise dos constrangimentos e limitações ao desenvolvimento da pastorícia nestes territórios, identifica as seguintes orientações:

- a) valorizar a pastorícia e melhorar a perceção social do pastor;
- b) aumentar a rentabilidade da atividade para o produtor, diversificando a oferta de produtos e garantindo a sustentabilidade da cadeia de valor (produção, distribuição e consumo);
- d) apoiar e acompanhar os pastores na sua atividade, desenvolvendo relações de cooperação e confiança com as comunidades pastoris, de maneira a promover uma gestão do território mais inclusiva e participativa, designadamente através da aprendizagem mútua entre os diversos agentes responsáveis pela gestão do território;
- e) ajustar o enquadramento jurídico-legal e reduzir a burocracia para a prática da atividade pastoril, no que se refere à mobilidade, acesso à propriedade, ao uso do fogo e às candidaturas aos apoios financeiros; e
- f) garantir um regime de fogo que permita conciliar as necessidades de renovação de pastagens com a conservação da natureza e da biodiversidade.

Foram apresentadas iniciativas que visam experimentar abordagens integradas e pluridisciplinares. Contudo, as mesmas carecem da valorização dos serviços de ecossistema inerentes à atividade pastoril.

À tendência para o colapso dos sistemas agro-silvo-pastoris de montanha devido à redução de populações, pastores e rebanhos, contrapõe-se a crescente consciencialização para a relevância desta atividade nos territórios de montanha do norte e centro de Portugal, pensando sobretudo na redução do risco de incêndio e na ocupação do território.

À escala europeia e nacional propõe-se a conceção e melhoramento de políticas de apoio a jovens agricultores, que estimulem a prática e o rejuvenescimento da atividade pastoril. Os exemplos de novos casos de empreendedorismo na atividade que se observam no país, com caráter inovador, outra formação e mentalidade, deverão ser acompanhados, pois são um sinal de esperança na revitalização e sustentabilidade da pastorícia e no contributo que a mesma possa desempenhar na dinamização socioeconómica dos territórios, na redução de risco de incêndio e na conservação da biodiversidade.

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Artigo submetido a 2 de Dezembro de 2021; versão final aceite a 14 de Fevereiro de 2022
Paper submitted on December 2, 2021; final version accepted on February

Determinantes de los Flujos de Remesas en el Ecuador, Desde una Perspectiva Territorial

Determinants of Remittance Flows in Ecuador, From a Territorial Perspective

Carlos Andrade Herrera

cjandrade@puce.edu.ec

PhD in Applied Economics - Camilo José Cela University, Madrid – Spain

Ronny Correa-Quezada

rforrea@utpl.edu.ec

Department of Economics, Private Technical University of Loja, Loja, Ecuador

Resumen

El objetivo de la investigación es determinar los factores que influyen en el envío de remesas (en dólares) de Estados Unidos y España a Ecuador, en el periodo 2000 – 2020. La metodología empleada son los modelos de serie con corrección de errores estándar, tendencia secular o de largo plazo. Los resultados muestran que el crecimiento de la actividad económica, medida por medio del Producto Interno Bruto per cápita, empleo, salarios, tipo de cambio (euro/dólar), aumenta la remisión de estos flujos a Ecuador y consecuentemente el desarrollo local. Es decir, mientras estas economías registren tasas de crecimiento positivas, los migrantes ecuatorianos tendrían más oportunidades de aumentar sus ingresos y, por tanto, enviar mayores cantidades de remesas hacia sus localidades. En este escenario, los flujos de remesas son determinados por ciertas variables macroeconómicas (crecimiento del PIB, salario, empleo y tipo de cambio) de los países anfitriones que afectan directamente a los ingresos de los emigrados.

Palabras clave: Remesas, PIB, tipo de cambio, series de tiempo, salarios, tasa de empleo, tasa de desempleo.

Clasificación JEL: F22, F24, J61, C30

Abstract

The objective of the research is to determine the factors that influence the sending of remittances (in dollars) from the United States and Spain to Ecuador, in the period 2000 - 2020. The methodology used is the series models with correction of standard errors, trend secular or long-term. The results show that the growth of economic activity, measured by means of the Gross Domestic Product per capita, employment, wages, exchange rate (euro/dollar), increases the remittance of these flows to Ecuador and consequently local development. In other words, as long as these economies register positive growth rates, Ecuadorian migrants would have more opportunities to increase their income and, therefore, send greater amounts of remittances to their localities. In this scenario, the remittance flows are determined by certain macroeconomic variables (GDP growth, salary, employment and exchange rate) of the host countries that directly affect the incomes of the emigrants.

Keywords: Remittances, GDP, exchange rate, time series, wages, employment rate, unemployment rate.

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1. INTRODUCCIÓN

En las dos últimas décadas (2000 – 2020) los recursos provenientes del exterior por concepto de remesas familiares adquirieron importancia como fuente de ingresos de la economía, y un complemento de la renta de los hogares receptores ecuatorianos. Los ingresos de remesas se han caracterizado por su relativa estabilidad en los hogares receptores y por su contribución positiva al esquema de dolarización de la economía ecuatoriana. La permanencia de estos ingresos plantea interrogantes acerca de los factores que las determinan, así como de las características de los beneficiarios y la motivación que alienta a los emigrados al envío de divisas al país.

Las remesas como fuente de divisas, no forman parte del endeudamiento externo del país, y cuyos volúmenes son regulares y estables en el financiamiento del ingreso secundario de la balanza de pagos. Los flujos de remesas son comprendidos como una consecuencia del fenómeno migratorio y son considerados como un flujo de capital equivalente a otros rubros, como la inversión extranjera directa, donaciones, endeudamiento, entre otros (Islas y Moreno, 2011). Al día de hoy no existen investigaciones empíricas, aplicadas al caso ecuatoriano, que posean un soporte conceptual y analítico que permitan comprender los determinantes de los flujos de remesas. Identificar los determinantes de las remesas familiares permitirá concebir, ¿por qué y cómo? se determinan los envíos al país y cuáles son las principales razones de su relativa estabilidad, así como cuál será su tendencia en el mediano y largo plazos. De las respuestas a estas interrogantes se podría vislumbrar la conveniencia de la aplicación de instrumentos o políticas de desarrollo local.

Convine mencionar que las limitaciones del estudio estuvieron relacionadas con la ausencia de investigaciones sobre los flujos de remesas recibidos en el Ecuador desde una perspectiva territorial, que habría permitido contrastar sus resultados con los obtenidos en este trabajo.

El presente artículo está organizado por una parte introductoria en la que se contextualiza el tema objeto de estudio y se plantea el objetivo. En la segunda sección se presenta la revisión de la literatura sobre los flujos de remesas y proporciona una síntesis teórica. En la tercera se realiza un análisis de los flujos de remesas (país de procedencia, región, provincia, estacionalidad, producción) y se presenta un modelo econométrico (series de tiempo) para exhibir los determinantes de los flujos de remesas provenientes de Estados Unidos y España al Ecuador. Finalmente, en la cuarta sección se presenta los resultados, hallazgos y contribuciones de los flujos de remesas que son determinados por ciertas variables macroeconómicas (crecimiento del PIB, salario, empleo y tipo de cambio).

2. REVISIÓN DE LA LITERATURA

La economía de la migración analiza las decisiones familiares que actúan colectivamente para maximizar sus expectativas de ingresos y disminuir las carencias de mercados de trabajo (Lauby y Stark, 1988; Taylor, 1986; Stark, 1991). Así los hogares asumen los riesgos migratorios para mejorar el bienestar de sus economías, diversificando los aportes familiares (local y externo). En el caso de que las actividades internas no consigan alcanzar un nivel de renta adecuada, el hogar recurre a la migración externa con el consecuente ingreso complementario por el envío de remesas (Massey et al., 1993:4). Así, se suele considerar que los principales motivos del envío de los flujos de remesas son el resultado de la generosidad de los emigrantes, compromiso de vida con sus familiares (manutención) e interés propio (ahorro - inversión) y con sus comunidades.

Los flujos de remesas en ciertos estudios fueron abordados como resultado de la generosidad de los emigrados y por el interés propio del emigrante (ahorro – inversión) como el principal motivo de envío de remesas (Islas & Moreno, 2011:12). En el primer caso, las variables determinantes del monto de remesas son aquellas que afectan a las características de la familia del emigrante (manutención). En el segundo, las características del emigrante y su entorno explicarían el envío de dinero (ahorro - inversión). En estos casos, se considera que los flujos de remesas son administrados por: el jefe de familia (esposa, esposo y/o hijo) a través de canalizar las remesas hacia el ahorro e inversiones; y, la familia y el emigrante que en consenso promueven el aseguramiento y fortalecimiento de la renta familiar.

Para analizar la dinámica de las remesas, Gupta (2005), señala que se puede pensar en un marco optimizador mediante el cual, un migrante maximiza su utilidad eligiendo el nivel óptimo de su consumo, y los flujos de remesas enviados a su familia para cubrir sus necesidades. Las remesas como ayuda para mantener a los miembros de la familia dependerían de la renta del emigrado y de las necesidades e ingresos de los beneficiarios. Los flujos de remesas orientados a inversiones (en depósitos, propiedades, acciones, etc.) se verían influidas por consideraciones de riesgo y rendimiento. Los principales resultados establecidos en la literatura son: las remesas están motivadas más por un motivo altruista que por un motivo de inversión; las remesas son utilizadas para consumo que para inversión; y no responden a las tasas relativas de rendimiento de las inversiones en el país de origen.

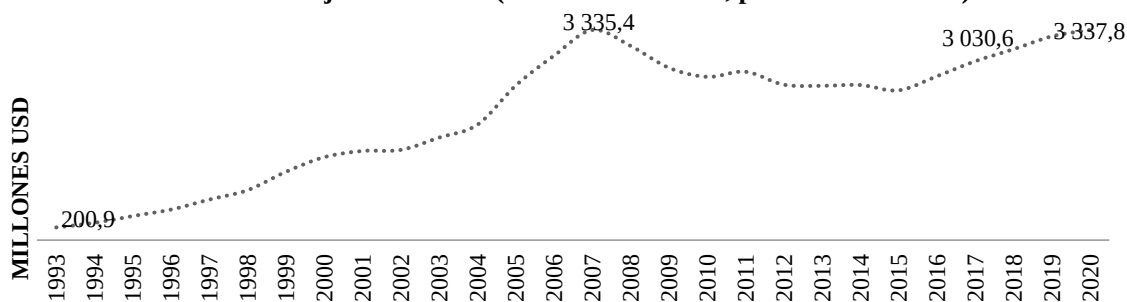
A la hora de determinar el impacto de los flujos de remesas en el desarrollo económico se analizan sus usos alternativos: consumo, ahorro e inversión (Casilda, 2008). En principio, parecería más productivo canalizarlos a inversión en lugar de consumo. No obstante, según el grado cultural y costumbres de los receptores de estos flujos se destinarán a inversiones productivas que mejoren en parte el desarrollo económico o si se canalizan hacia el consumo de primera necesidad que mejoren el bienestar en el corto plazo y el desarrollo de sus comunidades. Por otra parte, al priorizar los bienes de primera necesidad (alimentación, vestimenta, etc.) estos tendrán efectos microeconómicos beneficiosos en el bienestar y mejora del capital humano (Casilda, 2008:15).

3. LOS FLUJOS DE REMESAS

3.1. Un análisis descriptivo

Los flujos de remesas que se contabilizaron en el Ecuador durante el período 1993 – 2020, disponible en las bases del BCE en forma agregada, sumaron alrededor de USD 56.085,3 millones, que representaron un componente importante del ingreso de miles de hogares ecuatorianos y contribuyeron a reducir en cierta medida los niveles de pobreza, aunque como contrapartida se ha perdido la institucionalidad del hogar y/o la desintegración parcial o total. Asimismo, estos recursos contribuyen a la microeconomía de las familias beneficiarias al incrementar el consumo final de los hogares y a la macroeconomía del país al ser una fuente de permanente de divisas para el esquema de dolarización. El examen de estos flujos exhibe un comportamiento irregular, cuyos montos superan en el período 1993 - 1999 los USD 3,862.9 millones, mientras que a partir del 2000 año en que se inicia la dolarización de la economía ecuatoriana hasta 2020 superaron los USD 52,222.4 millones (Véase gráfico 1). Estos flujos de remesas son compilados por el Banco Central del Ecuador, como parte de la cuenta corriente de la balanza de pagos.

Gráfico 1: Flujos de remesas (Millones de dólares, período 1993 - 2020)

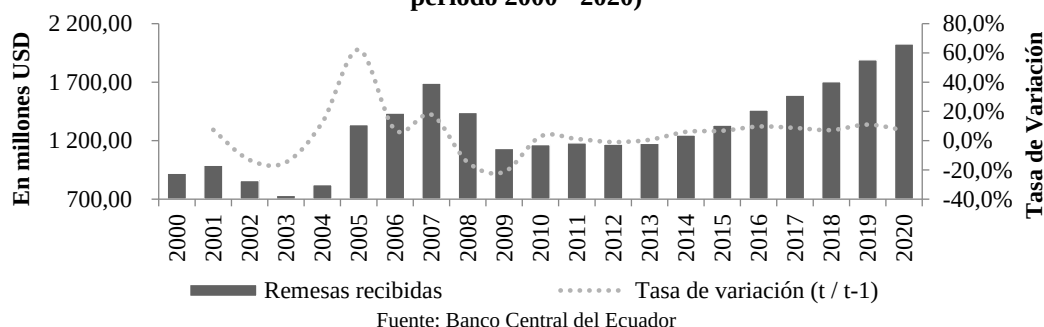


Fuente: Banco Central del Ecuador

La evolución del flujo de remesas en el período 2000 – 2020 pos dolarización muestra una media de crecimiento anual de 6,0%, conforme a la coyuntura económica de los países donde residen los emigrantes ecuatorianos, principalmente Estados Unidos y España, que en conjunto representaron alrededor del 83,8% del monto de remesas recibidos en 2020. El flujo remesas recibido de Estados Unidos en este año representó el 60,7%, de España el 23,1% y la diferencia fue receptada por el resto del mundo que sumó 16,2%. El flujo de remesas procedente de Estados Unidos en el período en estudio mostró una evolución irregular y creciente (Véase gráfico 2) que pasó de USD 921,

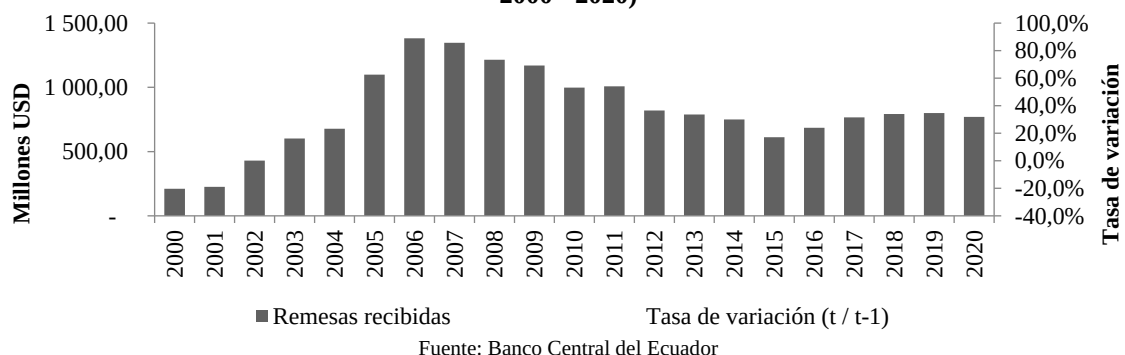
millones en el año 2000 a USD 2.026,6 millones en 2020, representando un crecimiento de 2,2 veces, este incremento se atribuiría al desempeño de la economía americana y al ingreso de un mayor número de emigrantes ecuatorianos que se habrían desplazado hacia ese país, por efectos de la crisis económica del Ecuador en 1999. El monto de remesas recibidos en 2020 ascendió a USD 2.026,6 millones, que representó el 60,7% del flujo receptado, confirmando que Estados Unidos es la Nación que más remesas envía al Ecuador. El Buró Nacional de Investigación Económica de Estados Unidos -NBER - informó que el Producto Interno Bruto (PIB) en 2020 se contrajo en 3.5% respecto del año anterior, como consecuencia del impacto de la pandemia de Covid-19 y de las restricciones implementadas para contener la propagación de los contagios. La caída del PIB se atribuye al descenso del gasto final de los hogares, exportaciones, inversión privada no residencial y al gasto de las Administraciones locales y estatales, que en parte fueron compensadas por los aumentos de las partidas del Gobierno Federal

Gráfico 2. Flujo de remesas provenientes de Estados Unidos (Millones de dólares, Tasas de variación, período 2000 - 2020)



El flujo de remesas proveniente de España en el periodo 2000 – 2020 mostró una tendencia creciente, irregular y a la baja, al pasar de USD 210,7 millones en el año 2000 a USD 770,2 millones en 2020. Este flujo evidenció ciertas particularidades en el año 2006 que sumó USD 1.381,8 millones, el valor más importante de la serie y que representó el 44,0% del flujo remitido al Ecuador (Véase Gráfico 3), cifra que no ha vuelto a repetirse en los años posteriores, debido a la situación económica (2008) por la que atravesó este país europeo y que a 2020 constituyó el 23,8% del valor receptado en ese año. En términos absolutos el flujo de remesas procedente de España en el período 2006 – 2020 se contrajo en alrededor de USD 611,6 millones que representó una reducción de 44,3%. A partir de 2015 hasta 2019, se observa cierto restablecimiento de estos flujos, denotando signos de recuperación económica a excepción de 2020. Justamente, el Instituto de Estadística (INE) de España informó que la caída del PIB de ese país en 2020 fue de 11.0% como consecuencia del Covid-19 que paralizó por completo la economía y redujo la actividad potencial durante gran parte del año con medidas de restricción y distanciamiento social. La mayor caída anual del PIB se registró en 2009, en plena crisis financiera, con una desaceleración de 3.8%, sin embargo, la crisis sanitaria del Covid-19 batió todos los récords y 2020 ha sido el peor año para el PIB desde el inicio de la serie, en 1970.

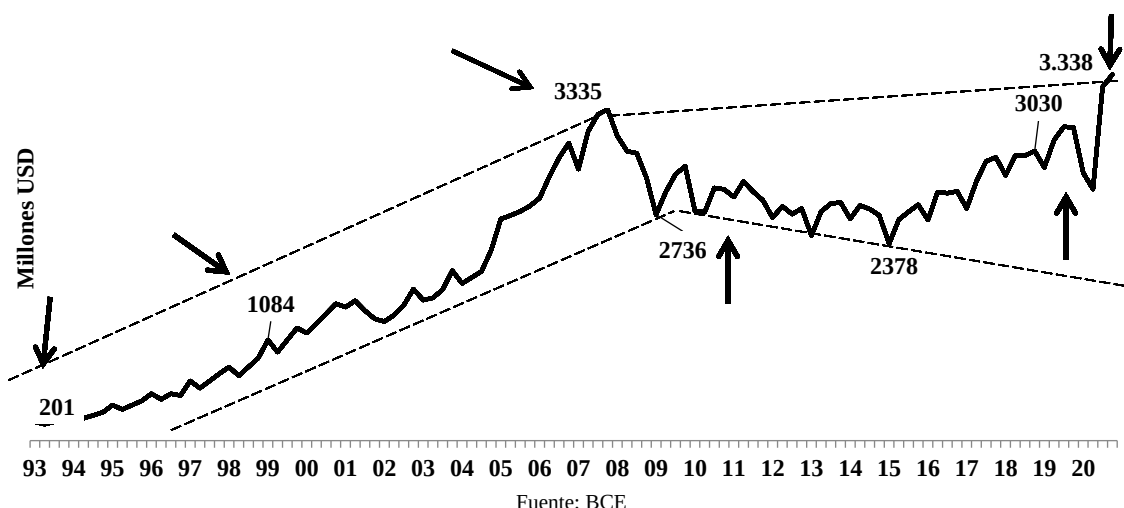
Grafico 3: Flujo de remesas provenientes de España (Millones de dólares, Tasas de variación, período 2000 - 2020)



El Banco Central del Ecuador inició la investigación de los flujos de remesas a partir de 1993, componente fundamental del financiamiento de la cuenta corriente de la balanza de pagos. La serie estadística 1993 – 2020 exhibió un comportamiento creciente hasta 1999 que mostró tasas de crecimiento anuales significativas, cuyo promedio ascendió al 32,6%, estabilizándose entre 2000 y 2007 al representar una tasa anual media de 15,7%, para luego (2008 – 2020) registrar cierta volatilidad como efecto de la crisis financiera internacional (2008) y sanitaria (2020), con una tasa de crecimiento media anual de 0,9%. Estos flujos de remesas presentan un comportamiento procíclico respecto de la actividad económica en donde residen los emigrantes ecuatorianos. En años de bonanza económica las remesas fluyen sin contratiempos; sin embargo, con el estallido de la crisis financiera, estos montos se vieron severamente afectados, principalmente en España, con el consecuente deterioro del mercado laboral para los emigrantes ecuatorianos. Sin embargo, el aumento del flujo de remesas en 2020 con respecto a 2019, obedece a los paquetes de ayuda económica otorgado por el Gobierno de Estados Unidos (EU) en la actual crisis sanitaria por Covid-19, lo que permitió a los emigrados ecuatorianos, enviar mayores flujos de dinero a sus familiares y sus comunidades.

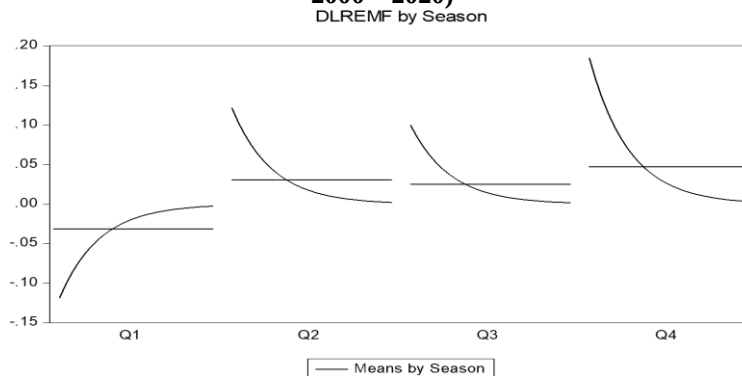
La trayectoria de los flujos de remesas (Véase gráfico 4), es analizada desde una perspectiva estadística, que identifica ciertas tendencias y movimientos estacionales. Los resultados indican que en los últimos años las remesas familiares presentan una tendencia creciente (2015 – 2020), compuesta de propensiones secundarias crecientes y decrecientes, las cuales se identifican por las líneas rectas entrecortadas sobrepuestas.

Gráfico 4: Evolución trimestral de los flujos de remesas recibidas en el Ecuador (Millones de US Dólares, período 1993-2020)



Los flujos de remesas observan una tendencia identificada por los movimientos suaves de la serie de remesas (2000 – 2020) en la cual, se evidencia un efecto estacional, en razón que los encadenamientos temporales de los flujos de remesas presentan cierta periodicidad o variación del periodo trimestral. Por ejemplo, los flujos de remesas en general durante los cuartos trimestres aumentan y en los primeros trimestres disminuyen, por tanto, la estacionalidad de estos flujos son una variación periódica y predecible de la misma, que en parte reflejaría ciertas actividades propias en sus localidades y la coyuntura económica de los países en donde se encuentran trabajando los emigrantes ecuatorianos (Véase gráfico 5):

Gráfico No. 5: Estacionalidad de los flujos trimestrales de remesas (Millones de US Dólares, Período 2000 – 2020)

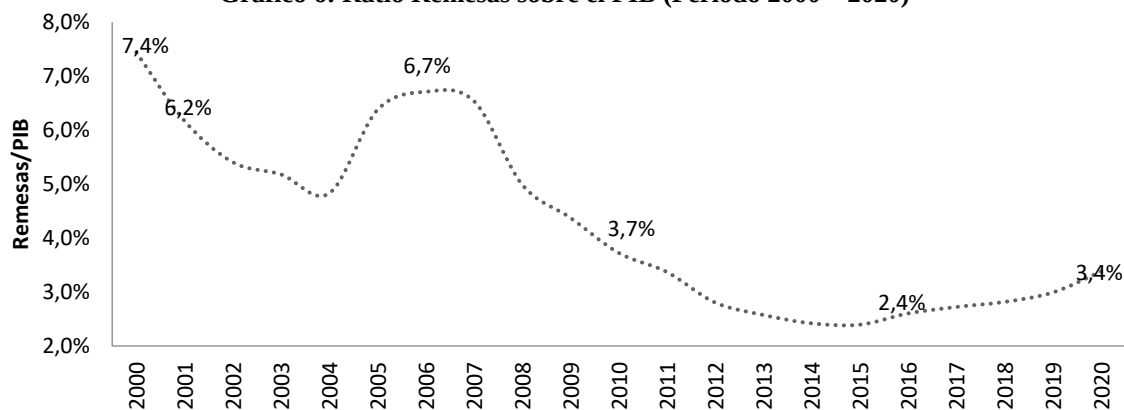


Fuente: Banco Central del Ecuador, EViews

La estacionalidad ilustrada por medio de los flujos de remesas es un abordaje que funciona para series de tiempo llanas, sin embargo, presentan ciertas dificultades prácticas al calcularla, como el caso de las fluctuaciones de los flujos de remesas que tienen un impacto sobre los emigrantes ecuatorianos, cuando existe dinamismo económico los flujos crecen y en los eventos que el ciclo económico muestra una desaceleración de la actividad económica, los flujos se contraen, por tanto, la estacionalidad está entrelazada con el desempeño coyuntural de las economías de residencia de los emigrados.

En el período 2000-2020, la media de las remesas representó alrededor de 4.3% de la producción interna (PIB), aunque cada vez su importancia ha venido reduciéndose debido al mejoramiento de la actividad económica del país (Véase gráfico 6). Sin embargo, la relevancia de estos flujos no radica en cuán significativos son los montos recibidos en ciertas comunidades del país, sino en su contribución para miles de hogares beneficiarios y su impacto en el mercado laboral. El ingreso de remesas produce un efecto multiplicador y dinamizador en las localidades por medio de las actividades económicas, pues, al ser destinados principalmente a gasto corriente genera un crecimiento económico para las empresas, por lo que son vistas como un engranaje importante para estimular la actividad productiva del país y el desarrollo local.

Gráfico 6: Ratio Remesas sobre el PIB (Período 2000 – 2020)



Fuente: Banco Central del Ecuador.

3.2. Análisis territorial de las regiones beneficiarias de remesas

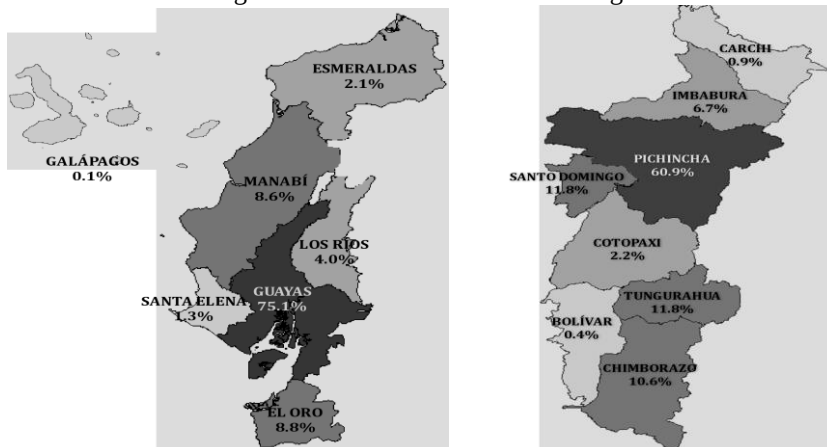
Para efectos de una mejor comprensión de los flujos de remesas recibidos en el país en forma agregada, el Banco Central del Ecuador realizó una distribución territorial en las cuatro regiones geográficas estructuradas en: Costa e Insular, Sierra Centro Norte, Amazonía y Austro. En este contexto, el monto de remesas recibidas en las regiones Costa e Insular durante 2020 representó un 38,8% del total nacional (Véase gráfico 7.A). La provincia de Guayas concentró el 75,1% del flujo zonal. En este contexto, se podría inferir que existe una alta tendencia a emigrar por parte de los ciudadanos que residen en esta provincia principalmente a España, contrariamente, la provincia

Insular de Galápagos no tendría orientación a emigrar al representar el 0,1% del flujo de remesas recibidas en esta área geográfica.

Gráfico 7: Participación del flujo de remesas

7.A Región Costa e Insular

7.B Región Sierra Centro Norte



Fuente: Banco Central del Ecuador

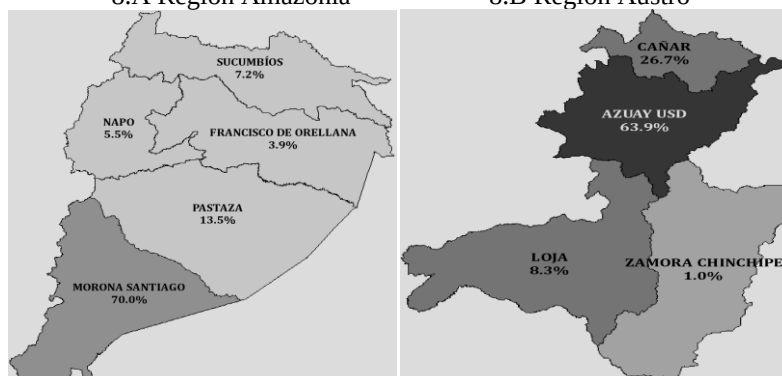
Durante 2020 el flujo de remesas que recibió la Sierra Centro Norte representó el 28,7% del valor total (Véase gráfico 7.B). La provincia de Pichincha concentra alrededor del 60,9% del flujo regional, como se observa en la intensidad de color del mapa. En este sentido, se podría aseverar que en esta provincia existe una alta predisposición a emigrar principalmente a España, inversamente, la provincia de Bolívar no tendría mayor preferencia a la emigración al representar el 0,4% del flujo de remesas recibidas en esta zona geográfica.

La Amazonía en 2020 por concepto de remesas significó el 2,6% del flujo nacional (Véase gráfico 8.A). La provincia de Morona Santiago concentró alrededor del 70,0% del flujo regional, su participación se observa en la intensidad de color del mapa. Se podría avalar que en esta provincia existe una alta disposición a emigrar a Estados Unidos y en menor proporción a España, ya sea por el efecto geográfico y cultural que mantiene con la provincia de Azuay que limita con esa área geográfica, inversamente, la provincia de Francisco de Orellana no tendría mayor inclinación a emigrar al representar el 3,9% del flujo total de remesas recibidas en esta zona.

Gráfico 8: Participación relativa del flujo

8.A Región Amazonía

8.B Región Austro

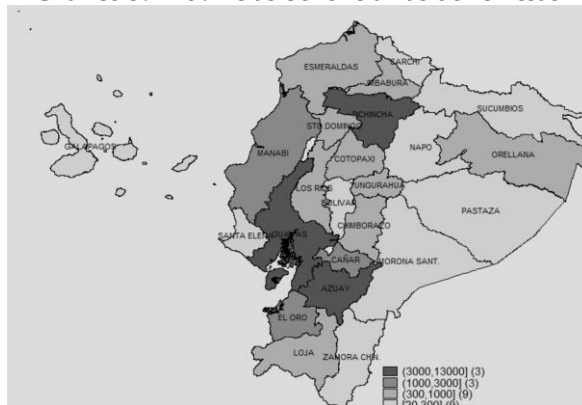


Fuente: Banco Central del Ecuador

Durante 2020 en la Región del Austro por concepto de remesas constituyó el 30,9% del flujo nacional (Véase gráfico 8.B). La provincia de Azuay centraliza el 63,9% del flujo zonal, conforme se observa en la intensidad de color del mapa. Se podría afirmar que en esta provincia existe una alta inclinación a emigrar hacia Estados Unidos, inversamente, la provincia de Zamora Chinchipe no tendría mayor directriz a la emigración al representar el 1,0% del flujo de remesas recibidas en el país.

El territorio ecuatoriano está dividido en 24 provincias, que se dividen en cantones y se subdividen en parroquias urbanas y rurales. Los flujos de remesas son receptados por los hogares beneficiarios que residen principalmente en las provincias de: Guayas, Azuay, Pichincha y Cañar, donde se registra el mayor número de habitantes según el último censo de población y vivienda (2010), esto obedecería a las oportunidades de empleo y por ciertas mejoras en servicios que brindan como educación, salud, vivienda, entre otros. Las principales provincias que en 2020 concentraron altos montos de remesas familiares fueron: Guayas, Azuay, Pichincha y Cañar, que constituyeron el 74,7% del flujo total de remesas (Véase gráfico 9). De su lado, las provincias de Sucumbíos, Napo, Carchi, Orellana, Bolívar y Galápagos, significaron el 0,9% del monto recibido de remesas, como se observa en la intensidad de color del mapa:

Gráfico 9: Provincias beneficiarias de remesas



Fuente: Banco Central del Ecuador

La revisión de las áreas geográficas (regiones, provincias, ciudades, entre otras) ponen de manifiesto, una consolidada trayectoria migratoria, especialmente hacia España y Estados Unidos. No obstante, la relación entre migraciones y desarrollo territorial a través de los flujos de remesas trasladan a realidades diferentes, variables, ámbitos, estrategias, conceptos y procesos de generación de conocimiento. Sin embargo, las remesas son considerados el mejor medio para reducir la pobreza, la vulnerabilidad o la exclusión social. Estas deficiencias observadas en los procesos de desarrollo territorial promueven una gran responsabilidad del desarrollo por parte de los emigrados. La falta de políticas públicas ante el deterioro organizacional y cohesión territorial, oportunidades productivas, inversiones gubernamentales, planificación y congruencia con las líneas de desarrollo, promueven a que los migrantes adquieran protagonismo dentro del desarrollo local y regional.

4. METODOLOGÍA

4.1. Modelos empíricos de flujos de remesas

Con el propósito de analizar las variables macroeconómicas que influirían en el envío del flujo de remesas de España y Estados Unidos a Ecuador, se expone una hipótesis fundamentada en una amplia revisión de la teoría sobre los flujos de remesas. A continuación, se efectúa un ejercicio econométrico mediante series de tiempo - tendencia secular o de largo plazo; para identificar, desde una perspectiva sintética, los determinantes de los flujos de remesas familiares que llegan desde dichos países a las diferentes comunidades del Ecuador.

Ciertos estudios empíricos enfatizan que, existe una relación inversa y significativa entre el número de emigrados y los flujos de remesas, lo cual podría ser un indicador de que la estancia de los trabajadores migrantes ecuatorianos en España y Estados Unidos serían de largo plazo y en algunos casos definitivos. Estas razones apuntan a la utilización de un modelo serial con corrección de errores estándar. Dicha técnica permite captar información de corto y largo plazos; y cuya representación formal de los modelos se expresa a partir de las siguientes especificaciones.

La función de envío de remesas de España a Ecuador se la define como:

$$\begin{aligned} \ln(R_t) = \beta_0 + \beta_1 \left[\ln \left(\text{PIB}_{(t)per_espa\tilde{n}a} \right) \right] + \beta_2 [\ln(E_{(t)espa\tilde{n}a})] + \beta_3 [\ln(W_{(t)espa\tilde{n}a})] + \\ \beta_4 [\ln(TC_{(t)euro/d\acute{o}lar})] + \varepsilon_t \end{aligned} \quad (3)$$

Donde:

$\ln(R_t)$ = Logaritmo natural del flujo de remesas recibido desde España

β_0 = Término constante del modelo

$\ln(\text{PIB}_{(t)per_espa\tilde{n}a})$ = Logaritmo natural del PIB per cápita en España

$\ln(E_{(t)espa\tilde{n}a})$ = Logaritmo natural de la tasa de empleo en España

$\ln(W_{(t)espa\tilde{n}a})$ = Logaritmo natural del costo promedio de la mano de obra por trabajador en España

$\ln(TC_{(t)euro/d\acute{o}lar})$ = Logaritmo natural del tipo de cambio (Euro / Dólar)

ε_t = Error estocástico

La recepción de flujos de remesas desde Estos Unidos en Ecuador se especifica como:

$$\ln(R_t) = \beta_0 + \beta_1 [\ln(\text{PIB}_{(t)per_eeuu})] + \beta_2 [\ln(E_{(t)eeuu})] + \beta_3 [\ln(W_{(t)eeuu})] + \varepsilon_t \quad (4)$$

Donde:

$\ln(R_t)$ = Logaritmo natural del flujo de remesas recibido desde Estados Unidos

β_0 = Término constante del modelo

$\ln(\text{PIB}_{(t)per_eeuu})$ = Logaritmo natural del PIB per cápita en Estados Unidos

$\ln(E_{(t)eeuu})$ = Logaritmo natural de la tasa de empleo en Estados Unidos

$\ln(W_{(t)eeuu})$ = Logaritmo natural del salario medio en Estados Unidos

ε_t = Error estocástico

$TC_{(t)}$ = En el Ecuador rige el régimen de dolarización, por tanto, $e = 1$

4.2. Datos

Las series utilizadas son trimestrales y comprenden el periodo: 2000: IT a 2020: IVT, formando una muestra de 84 observaciones. Los datos de los modelos especificados en las ecuaciones (3) y (4) como los flujos de remesas son oficiales publicados por el Banco Central del Ecuador, mientras que la información de Estados Unidos es tomada del Bureau of Economic Analysis (BEA) y para España es obtenida del Instituto de Estadística (INE) de España. El PIB per cápita de España y Estados Unidos se tomaron a partir de las estadísticas de la Organización para la Cooperación y Desarrollo Económico (OECD, 2020a).

Los indicadores del mercado laboral (tasa de empleo) para el caso español y americano, se obtuvieron de la OECD, 2020b. El costo laboral por trabajador para España, se obtuvo del Instituto de Estadística (INE, 2020) de España y para el caso de Estados Unidos se obtuvieron de las estimaciones del Federal Reserve Bank Of ST. Louis, cuya fuente corresponde al U.S. Bureau of Labor Statistics (FRED, 2020). El tipo de cambio Euro/Dólar se recabó del Banco de España (BdE, 2020a).

4.2.1. Filtro de Hodrick – Prescott

El filtro Hodrick - Prescott (1980) es un método que permite extraer el componente secular o tendencial de una serie temporal. Igualmente, descompone la serie observada en tendencial y cíclica. El ajuste de sensibilidad de la tendencia a las fluctuaciones a corto plazo es obtenido modificando un multiplicador λ . Es una técnica utilizada en las investigaciones sobre ciclos económicos para calcular la tendencia de las series de tiempo. La elección de λ es aleatoria, pero Hodrick y Prescott estiman que, para datos trimestrales, un valor de $\lambda = 1600$ es razonable, bajo el supuesto de que cualquier perturbación que tiene efectos durante ocho o más años tiene carácter permanente. Asimismo, Hodrick y Prescott justifican el empleo de este filtro, por su linealidad, por estar bien

definido sin elementos subjetivos, independiente de la serie a la cual se aplica. El ruido en los datos (ruido blanco) es aproximadamente Normal $\sim (0, \sigma^2)$. Para el presente caso el multiplicador del filtro H-P que se utilizó en el modelo serial es de 1600 por tratarse de datos trimestrales, de las variables examinadas.

4.2.2. Series de tiempo

Para el presente trabajo se consideró un modelo de series de tiempo - tendencia secular o de largo plazo caracterizada por el patrón gradual y consistente de las variaciones de la serie, cuya variable dependiente del modelo corresponde al flujo de remesas procedente de España y Estados Unidos. El periodo trimestral en estudio inicia en el año 2000 hasta 2020 (84 observaciones).

Los aspectos metodológicos de los modelos de series de tiempo contemplan datos estadísticos que se recopilan, observan o registran en intervalos de tiempo regulares (diario, semanal, mensual, trimestral, semestral, anual, entre otros) y cuyos estudios son aplicados a datos contabilizados en forma periódica, para el efecto, se considera la característica, tendencia secular o de largo plazo de una serie, es el resultado de factores a largo plazo, caracterizada por el patrón gradual y consistente de las variaciones de la serie, que se consideran resultados de fuerzas persistentes que afectan el crecimiento o la reducción de la misma, como: cambios en la población, características demográficas, cambios en los ingresos, en salud, en educación y tecnología. Esta técnica se ajusta a diversos esquemas. Algunas se mueven continuamente hacia arriba, otras declinan, y otras permanecen igual en un cierto período o intervalo de tiempo. Las tendencias de una serie, son lineales y no lineales, en el primer caso, vienen dadas por el movimiento general a largo plazo de la serie que muestra como la tendencia se expande o contrae a un ritmo constante. El método utilizado de mejor ajuste es el Método de Mínimos Cuadrados Ordinarios. En el segundo caso, se observa que la serie de tiempo presentó un comportamiento curvilíneo y estas funciones pueden ser polinomiales, logarítmicas, exponenciales y potencial, entre otras.

5. RESULTADOS

5.1. Estadística descriptiva de los modelos

En la tabla 1 se examina el comportamiento de las variables testeadas en el modelo [flujo de remesas, PIB per cápita, salarios medios, tasa de empleo o desempleo, tipo de cambio (Euro/Dólar)] de España y Estados Unidos, además, el número de observaciones, la media, la desviación estándar, valores mínimos y máximos de estos agregados.

Las variables utilizadas en el modelo serial con España (Véase tabla 1) cuentan con 84 observaciones trimestrales (2000: IT – 2020: IVT) y cuya variable dependiente es el flujo de remesas trimestrales procedentes de España. El PIB, la tasa de empleo, el tipo de cambio (Euro/Dólar) y los salarios de este país, son variables independientes, que permitirán determinar su influencia en el flujo de remesas enviados a Ecuador.

Tabla 1: Estadística descriptiva España

Variable	Obs.	Promedio	Desviación Estándar	Mín.	Max.
Flujo de remesas España	84	215.9519	51.69626	115.5024	297.5404
PIB España	84	30510.75	5115.083	20284.61	40469.02
Empleo España	84	59.87233	2.61232	55.71594	63.99515
Tipo de cambio Euro/Dólar	84	1.214558	0.169076	0.8532	1.5553
Salarios España	84	1726.328	201.6196	1300.984	1915.579

Fuente: INE, OCDE, INEC. Nota: * Variables aplicadas el filtro de Hodrick – Prescott

En el modelo serial con Estados Unidos (Véase tabla 2) se cuenta con 84 observaciones trimestrales (2000: IT – 2020: IVT) y consideró al flujo de remesas recibidas como variable dependiente.

De su lado, el PIB, la tasa de empleo y los salarios de Estados Unidos, constituyen las variables independientes, para determinar su influencia en los envíos de remesas al Ecuador.

Tabla 2: Estadística descriptiva Estados Unidos

Variable	Obs	Promedio	Desviación Estándar	Min.	Max.
Flujo de remesas EU	84	297.4336	69.47911	138.9285	434.0405
PIB EU	84	47758.5	7597.289	34638.43	61971.26
Empleo EU	84	70.01274	2.006486	67.17192	73.92886
Salarios EU	84	338.75	4.714296	335.4864	354.1398

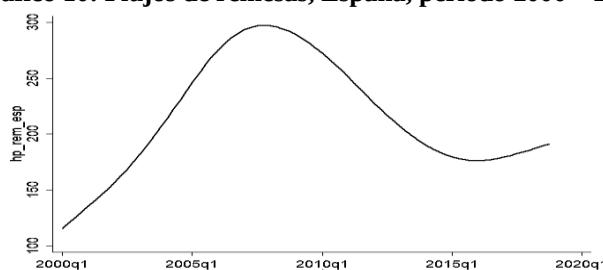
Fuente: BER, OCDE, INEC Nota: * Variables aplicadas el filtro de Hodrick – Prescott

5.2. España

En esta sección se presentan los resultados de la aplicación del modelo econométrico (series de tiempo- tendencia secular) que determinan el envío de los flujos de remesas proveniente de España (Especificación 1). La elección del modelo permitió concentrar las principales características (observadas en el gráfico de secuencia) en virtud de las fluctuaciones estacionales de la sucesión. Igualmente, la estadística descriptiva presenta una sinopsis de las observaciones a lo largo del período en estudio para establecer los determinantes de los flujos de remesas provenientes de España.

Al aplicar el modelo se alcanzó una regresión sin corrección de autocorrelación serial, en la que se determinó la presencia de correlación entre los flujos de remesas procedentes de España en sus períodos anteriores; esto, es muy frecuente en los modelos de series de tiempo ya que el término de perturbación en un instante dado, sigue una misma tendencia asociado a los trimestres anteriores, dando lugar a la autocorrelación en el modelo. En tal razón, se realizó la corrección de errores estándar por medio del procedimiento de Newey-West, que proporcionó una estimación de la matriz de covarianza de los parámetros del modelo cuando se aplican en situaciones en los que no son válidos los errores estándar o correlación en los términos de error. El gráfico de secuencia (Véase gráfico 10), presenta la evolución de los flujos de remesas de España en el tiempo; específicamente, se advierte que las principales características de estos encadenamientos, muestran una presencia tendencial e irregular.

Gráfico 10: Flujos de remesas, España, periodo 2000 – 2020



Fuente: Banco Central del Ecuador

Seguidamente, los resultados del modelo econométrico serial para España, se muestran a continuación:

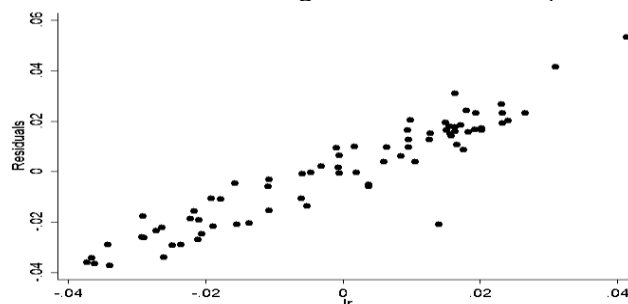
Tabla 3: Modelo Series de tiempo – Flujos de remesas recibidos de España

VARIABLES	Modelo 01	Modelo 02	Modelo 03
PIB España†	-3.561***	-3.606***	-3.606***
	(0.100)	(0.099)	(0.143)
Empleo España†	5.746***	5.896***	5.896***
	(0.116)	(0.129)	(0.123)
Tipo de cambio Euro/Dólar†	0.088**	0.077*	0.077
	(0.040)	(0.040)	(0.048)
Salarios España†	5.760***	5.719***	5.719***
	(0.165)	(0.161)	(0.238)
Dummy 01		-0.032**	-0.032**
		(0.014)	(0.014)
Constante	-24.354***	-24.182***	-24.182***
	(0.687)	(0.670)	(0.787)
Observaciones	84	84	84
R cuadrado	0.993	0.993	
R cuadrado ajustado	0.992	0.993	.

Errores estándar en paréntesis, *** p<0.01, ** p<0.05, * p<0.1, HP Filtro

El modelo (1) (Véase tabla 3) muestra la especificación (3) y cuyo R^2 ajustado es de 0.992. Sin embargo, y de acuerdo con el gráfico 3.4 se observó un posible quiebre estructural en la tendencia del flujo de remesas recibidas desde España en el cuarto trimestre del año 2007. En este contexto, el test de Chow sugiere que el quiebre estructural en la serie de tiempo es significativo. En concreto, se rechaza la hipótesis nula con un estadístico (F) de 29.14 que implica que existen diferentes comportamientos en la serie. Frente a esta problemática, el modelo (2) incorpora una variable dummy 2007 q4, obteniendo un R^2 ajustado del 0.993.

En el modelo (2) se analizó la multicolinealidad entre las variables descritas, presentándose niveles relativamente elevados de correlación entre el PIB y el costo laboral por trabajador (Véase gráfico 11). Sin embargo, estas variables son significativas, por tanto, se mantuvieron en la especificación del modelo.

Gráfico 11: Residuales frente al rezago de los residuales – (Modelo 2, tabla 3)

Fuente: OECD - BER

El gráfico 16, pone de manifiesto una posible autocorrelación serial positiva del modelo (2). Para confirmar esta problemática de datos, se testeó el estadístico Durbin - Watson, cuyo resultado es 0,12 con seis grados de libertad. Este resultado, es validado con el test de Breusch-Godfrey, que confirma la presencia de autocorrelación serial positiva de orden 1 en el modelo, rechazando la hipótesis nula (H_0 : no autocorrelación serial de orden 1) con un nivel de confianza del 99% y un estadístico Chi cuadrado de 68,56. Debido a la presencia de autocorrelación serial, los errores

estándar de los coeficientes del modelo y por tanto sus predicciones son incorrectas. Para solucionar este problema se aplicó la corrección de errores estándar según el enfoque de Newey-West (Modelo 3).

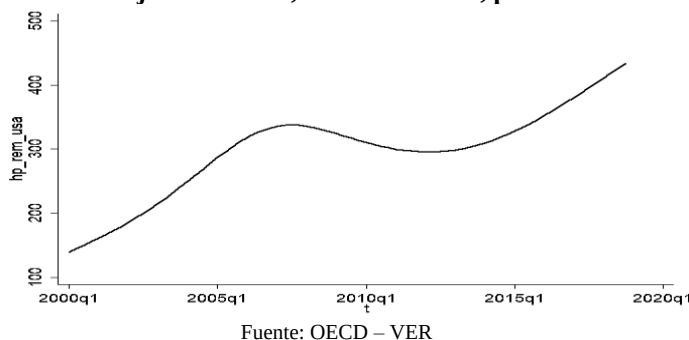
Los resultados del modelo (3) para España, muestran que el coeficiente del PIB per cápita es negativo con respecto a la variable dependiente, reflejando que una menor actividad económica en este país, repercutiría en una reducción de los flujos de remesas. Por su parte, los coeficientes de la tasa de empleo, salarios y tipo de cambio euro/dólar son significativos y positivos, lo que representaría que, ante una mejora de estas variables, se incrementarían los envíos de remesas a Ecuador. En definitiva, los hallazgos que presenta este modelo econométrico explicarían que cuando la tasa de empleo y salarios en España aumentan por una mejor coyuntura económica de este país, los flujos de remesas recibidos en Ecuador se incrementarían y marginalmente, cuando el tipo de cambio Euro/Dólar se aprecia.

5.3. Estados Unidos

El modelo econométrico aplicado para Estados Unidos, describe la evolución de las series de tiempo de largo plazo, de los flujos de remesas. La nominación del modelo permitió agregar las principales características trimestrales de los flujos de remesas observadas en el gráfico de secuencia, en virtud de la magnitud de las fluctuaciones estacionales de la sucesión que crece y decrece proporcionalmente con los crecimientos y decrecimientos irregulares de la tendencia. Asimismo, la estadística descriptiva presenta un resumen de las observaciones de los flujos de remesas a lo largo del tiempo para construir los determinantes más influyentes de los flujos de remesas enviadas por Estados Unidos a Ecuador.

El modelo arrojó una regresión sin corrección de autocorrelación serial, en la que se determinó la presencia de correlación entre los flujos de remesas de Estados Unidos en sus períodos anteriores; aspectos, muy comunes en los modelos de series de tiempo ya que el término de perturbación en un instante dado, continúa una misma senda asociada a instantes anteriores, dando lugar a la autocorrelación en el modelo. Para el efecto, se realizó la corrección de errores estándar a través del procedimiento de Newey-West, que proporcionó una estimación de la matriz de covarianza de los parámetros del modelo cuando se aplican en situaciones en las que no son válidos los errores estándar o correlación en los términos de error. El gráfico de secuencia (Véase gráfico 12), presenta la evolución de los flujos de remesas de Estados Unidos en el tiempo; específicamente, se advierte que las principales características de estos encadenamientos, muestran la presencia tendencial y creciente.

Gráfico 12: Flujo de remesas, Estados Unidos, periodo 2000 – 2020



A continuación, se presentan los resultados de las variables incorporadas en el modelo para Estados Unidos:

Tabla 4: Método: Series de tiempo – Flujos de remesas recibidos de Estados Unidos

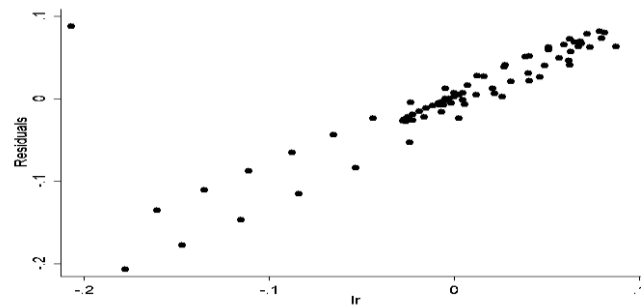
VARIABLES	Modelo 01	Modelo 02	Modelo 03
PIB Estados Unidos†	2.972***	4.032***	4.032***
	(0.298)	(0.203)	(0.227)
Empleo Estados Unidos†	5.615***	8.224***	8.224***
	(1.164)	(0.740)	(0.707)
Salarios Estados Unidos†	-12.722***	-13.255***	-13.255***
	(2.471)	(1.492)	(1.301)
Dummy 01		0.321***	0.321***
		(0.029)	(0.040)
Constante	23.931***	4.326	4.326
	(8.032)	(5.151)	(3.783)
Observaciones	84	84	84
R cuadrado	0.849	0.946	
R cuadrado ajustado	0.843	0.943	.

Errores Estándar en paréntesis, *** p<0.01, ** p<0.05, * p<0.1, HP Filtro

El modelo (1) (Véase tabla 4) muestra la especificación (4) y cuyo R^2 ajustado es de 0.843. Lo cual, mostraría que la variabilidad de las variables independientes se explica en un 84.3% la variabilidad del flujo de remesas procedente de Estados Unidos. En el gráfico de la variable dependiente se observa una tendencia positiva del flujo de remesas en el tiempo con presencia de variaciones al final del período.

En el modelo (1) (véase Tabla 4) no presenta efectos significativos en cuanto a multicolinealidad entre las variables descritas en la parte exógena del modelo.

Gráfico 13: Residuales frente al rezago de los residuales – (Modelo 2, tabla 4)



Fuente: OECD - BER

El modelo (2) presenta autocorrelación serial positiva (Véase gráfico 18). El estadístico Durbin-Watson en este caso es de 0,35 con cinco grados de libertad, confirmando que la serie sufre de autocorrelación serial positiva. Dada la existencia de esta autocorrelación serial positiva, de acuerdo con el estadístico Durbin - Watson, este resultado, es validado con el test de Breusch-Godfrey, el cual confirma la presencia de autocorrelación serial de orden 1 en el modelo, rechazando la hipótesis nula (H_0 : no autocorrelación serial de orden 1) con un nivel de confianza de 99,0% y un estadístico chi cuadrado de 47,68. Debido a la presencia de autocorrelación serial, los errores estándar de los coeficientes del modelo y por consiguiente sus predicciones son incorrectas. Para remediar este problema se aplicó la corrección de errores estándar según el enfoque de Newey-West presentados en el modelo (3) de la tabla 4.

Los resultados del modelo (3) muestran que las deducciones son estadísticamente significativas, de tal manera que los coeficientes del PIB y empleo en Estados Unidos exhiben los signos esperados, es decir, el coeficiente del PIB es positivo con respecto a la variable dependiente reflejando que una mayor actividad económica en ese país genera un aumento en los envíos de remesas a Ecuador. En tanto que, los salarios en Estado Unidos exhibieron un coeficiente negativo, lo que significaría que cuando aumenta los ingresos medios (salarios) los flujos de remesas tienden a disminuir, esto guardaría coherencia al relacionarlo con el nivel de instrucción y cualificación de los trabajadores emigrados ecuatorianos. En concreto los hallazgos del modelo (3) con relación a los Estados Unidos, señalarían que los determinantes de los flujos de remesas provenientes de este país, están en función del PIB y de la tasa de empleo.

6. CONCLUSIONES Y DISCUSIÓN

Los flujos de remesas provenientes de Estados Unidos, España y otros países, son una fuente importante de divisas para el Ecuador, cuya comprensión se realizó por medio de un análisis económico que permitió identificar los determinantes de estos flujos desde una visión macroeconómica y territorial. El estudio se inició con la revisión de la literatura y se contrastó con la realidad ecuatoriana, mediante un análisis de series de tiempo de largo plazo, utilizando información económica de España y Estados Unidos. En el período en análisis, los flujos de remesas que se recibieron en el Ecuador en el período 1993 – 2020 sumaron alrededor de USD 52,222.4 millones, que representaron un componente importante del ingreso de miles de hogares ecuatorianos, y que provinieron significativamente de Estados Unidos y España. Asimismo, estos flujos presentaron un comportamiento estacional en la serie de tiempo, que consistió en aumentos y disminuciones periódicas de las remesas, que en el caso ecuatoriano se manifiestan mayormente en los cuartos trimestres de la serie.

En la revisión de la literatura se presentaron las principales corrientes de pensamiento que estudian los determinantes de estos flujos. Adicionalmente, se observó que las remesas actúan de forma procíclica con respecto a la coyuntura económica de España y contracíclica con la economía americana, lo cual es congruente con la teoría económica y los hallazgos de los modelos que explicarían que los flujos de remesas enviados al Ecuador desde España aumentan cuando el empleo y salarios se incrementan y en menor proporción por el tipo de cambio Euro/Dólar se aprecia, por tanto, promueven el aumento de envíos de remesas familiares. Igualmente, cuando el PIB de España, es negativo reflejado por una menor actividad económica los envíos de remesas a Ecuador disminuyen. De su parte, los resultados para Estados Unidos, muestran que los coeficientes del PIB y el empleo exhibieron los signos esperados, concluyéndose que los determinantes macroeconómicos del envío de remesas a Ecuador estarían en función de estas variables (PIB tasa de empleo).

En esta investigación, se identificaron variables macroeconómicas que tienen impacto sobre los flujos de remesas enviados a Ecuador, cuyos resultados revelan que la actividad económica, la variación del salario y el nivel de empleo mostrarían su relación positiva, en la determinación del flujo de remesas procedente de Estados Unidos y España, y en menor proporción la variación del tipo de cambio Euro/Dólar, desde España. En este contexto, las variables macroeconómicas de los países anfitriones, tienen un efecto directo sobre el flujo de remesas, al juzgar por la magnitud de los coeficientes del crecimiento del PIB per cápita y los salarios de los Estados Unidos, así como, de la tasa de empleo, salarios y tipo de cambio por España.

La distribución territorial de los flujos de remesas por regiones permitió observar que la Costa es el principal destino, asimismo, las provincias que concentran los flujos de remesas fueron, Guayas, Azuay, Pichincha y Cañar. El involucramiento de los flujos de remesas en proyectos de desarrollo de sus comunidades de origen parecería ser una buena opción para fomentar la corresponsabilidad y la participación ciudadana, a la vez que mejorarían las condiciones de vida. Sin embargo, estos recursos no son la única respuesta a la pobreza de muchas localidades del Ecuador, las cuales responden a causas estructurales complejas. En ese contexto, los flujos de remesas se convierten en una herramienta útil para vincular a los beneficiarios de estos recursos con el desarrollo de sus comunidades y complementar su desarrollo sin reemplazar al gobierno, al sector privado y sus mismas comunidades.

Finalmente, los flujos de remesas desde una perspectiva territorial se han convertido en un ingreso importante de divisas al país y que en gran parte son orientados al gasto corriente, aspecto que se ha convertido en un desafío para las autoridades de la región y en particular de las ecuatorianas,

para promover que estos recursos sean canalizados hacia inversiones productivas que les permita a los hogares beneficiarios de remesas depender en menor grado. Igualmente, las remesas tienen una gran importancia en la economía (PIB, importaciones, consumo final de hogares, entre otros) y cuyos flujos son relativamente estables, sin embargo, como parte del diseño y dinámica de las políticas públicas sería importante la intervención de entidades oficiales que promuevan la inserción de estos flujos en proyectos de inclusión financiera, aspecto que queda abierto para realizar nuevas investigaciones sobre la orientación de las remesas hacia la inclusión financiera.

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Artigo submetido a 29 de Maio de 2021; versão final aceite a 9 de Março de 2022
Paper submitted on May 29, 2021; final version accepted on March 9, 2022

Covid-19 and Short-Term Rental in Portugal: Unpredictable Futures

Covid-19 e Alojamento Local em Portugal: Futuros Imprevisíveis

Sandra Marques Pereira

s.marquespereira11@gmail.com, s.MarquesPereira@iscte-iul.pt

Instituto Universitário de Lisboa (ISCTE-IUL), DINÂMIA'CET-IUL, Lisboa, Portugal

Marco Carreira

marco_Carreira@iscte-iul.pt

Instituto Universitário de Lisboa (ISCTE-IUL), DINÂMIA'CET-IUL, Lisboa, Portugal

Madalena Matos

madalena.matos@iscte-iul.pt

Instituto Universitário de Lisboa (ISCTE-IUL), DINÂMIA'CET-IUL, Lisboa, Portugal

Abstract

This article presents the results of a pioneering online survey of short-term rental (STR) hosts (N=879) in Portugal about the impact of Covid on their activity, with a sample structured into four areas (Lisbon, Porto, Algarve and the rest of the country). Despite the very high losses, especially in the cities, most of the respondents intend to continue operating in the STR sector. A massive migration from STR to long-term rental is not predicted for a number of reasons, including financial, those related to the nature of this type of supply – more temporary – and the high level of distrust of the state, specifically in terms of guaranteeing legislative stability. In the cities, medium-term rental is the alternative most commonly considered, suggesting there may be a possible restructuring of the sector. Survival capacity over the medium term will depend on the degree of losses and type of public support received during the pandemic, which has benefited hosts constituted as companies more than the sole proprietorships.

Keywords: Short-term rentals; Covid-19; Impacts; Portugal; Hosts

JEL Code: Z39; R31

Resumo

Este artigo apresenta os resultados de um pioneiro inquérito online aos anfitriões de Alojamento Local (AL) em Portugal (N=879), com uma amostra estruturada territorialmente em quatro áreas (Lisboa, Porto, Algarve e resto do país), sobre os impactos da COVID na sua atividade. Apesar das enormes perdas, sobretudo nas cidades, a maioria dos inquiridos tenciona continuar a operar no sector do AL. Não se prevê uma migração massiva do AL para o arrendamento de longa duração por várias razões: desde as financeiras, às relativas à natureza deste tipo de oferta – mais temporária – ou a elevada desconfiança em relação ao Estado, especificamente em termos de estabilidade legislativa. Nas cidades, o arrendamento de média duração é a alternativa mais considerada, sugerindo a possibilidade de alguma reestruturação do sector. A capacidade de sobrevivência a médio prazo

dependerá do grau das perdas e do tipo de apoio público recebido durante a pandemia o qual beneficiou mais os anfitriões constituídos como empresas do que os empresários em nome individual.

Palavras-Chave: Alojamento Local; Covid-19; Impactos; Portugal; Anfitriões

JEL Code: Z39; R31

1. INTRODUCTION

Covid appears in the context of the emergence of restrictive short-term rentals (STR) regulation policies following the expansion of the phenomenon and the growing perception of its contribution to dynamics of a disruptive nature which were more visible in large cities: from displacement to the unaffordability of housing (Cocola-Gant, 2016; Freytag and Bauder, 2018; Gotham, 2005; Wachsmuth and Weisler, 2018).

Because of its close relationship with tourism, STR was one of the activities most adversely affected by the pandemic, and Portugal, one of the countries highest dependent on tourism, was particularly badly affected. But, unlike with tourism (Almeida and Silva, 2020; Higgins-Desbiolles, 2021; Haywood, 2020; Jafari, 2005; Gouveia, 2021; Marques, Guedes and Bento, 2021; Martinho, 2021; Santos and Moreira, 2021), research and publications exclusively related with the impact of the pandemic on STR are fewer.

This article brings a pioneering analysis to the impact of the pandemic on the STR and the intentions/perceptions of the hosts. It is based on an online survey of STR owners and managers in Portugal (N=879), and is structured territorially into four areas (Lisbon, Porto, Algarve and the rest of the country). It seeks answers to a set of questions concerning the impact of Covid on this activity. What were the impacts during the first phase of the pandemic in terms of invoicing and occupation, and what variables explain the differentiation of these impacts? What are the hosts' expectations in respect of future activity? Does it make sense to think about a restructuring of the sector and, particularly, the eventual significant migration of STRs to traditional rental patterns? Or will it remain the same?

The article begins with a discussion of the literature on the subject, which focuses on two main themes: the short-term impacts of the pandemic on STR supply and an attempt to identify its possible post-Covid 'futures'. This is followed by the methodological details of the survey and the specification of its timings (2020), taking into account the course of the pandemic. Finally, the results are presented and discussed in two parts: one concerning the characterization of the hosts in the country and its various regions, which focuses on the respondents' profile; the other concerning the impact and expectations for the future.

2. A LITERATURE REVIEW ON COVID AND STR: IMPACTS AND POSSIBLE FUTURES

The seismic jolt the pandemic meted out to tourism globally, and the importance the sector has in today's economies and societies, justified 'a mushrooming euphoria of Covid-19 tourism-related research' (Sigala, 2020: 313). From this prolific literature the theme of the transformation of tourism post-Covid stands out. And here there has been a multiplication of approaches that understand the crisis as a transformative event: the opportunity for an ethical-political-economic break from the dominant conceptions of pre-Covid tourism (Higgins-Desbiolles, 2021).

The former Covid and STR literature essentially moves in this direction: i.e. looking for the pathways of this reality in the post-pandemic period (Dolnicar and Zare, 2020; Farmaki et al., 2020; Shen and Wilkoff 2020; Zhang et al. 2021; Cocola-Gant, 2020), focusing essentially on supply. This literature is divided into two distinct, yet overlapping, approaches.

On the one hand, approaches originating from the field of urban studies largely focuses on the potential reconversion/rebalancing of the housing sector, which is understood as one of the sectors most negatively impacted by the pre-Covid explosion of STR (Cocola-Gant, 2016; Cocola-Gant, Carvalho and Chamusca, 2021; Deboosere et al., 2019; Yrigoy, 2018; Wachsmuth and Weisler, 2018). These approaches focus on discussions of the migration from STR to standard long-term

rentals: a dynamic that is understood as the way to rebalance the sector that is in the sights of local political power (Mendes, 2020; O’Sullivan, 2020) in Portugal’s two largest cities. The text by Cocola-Gant (2020) illustrates these approaches by presenting a prospective essay that starts with the *modus operandi* and motivational framework of STR agents during the pre-Covid period (in Lisbon): “speculative objectives/profit” accumulation. In this sense, he anticipates the future will reproduce the logics of the past, in the belief that, when compared to long-term rental, it is only the flexibility of short- and medium-term rental facilitated by STR that makes it possible to achieve that motivation (“speculative objectives/profit accumulation”).

On the other hand, the approaches championed by those studying the hospitality and tourism sector have focused on its restructuring: namely, transformations in the structure of supply. Here the essential question is: ‘what kind of hosts will survive and how will this condition the supply in terms of the “sharing economy” versus “speculative/professional activity” dichotomy?’ The relationship with the previous approach is direct, as this second path (“speculative/professional activity”) is the condition for the reproduction of the previous housing market imbalances. Within these approaches we find the pioneering reflection on the topic produced by Dolnicare and Zare (2020), later updated through a comparison of the three moments: before, during and after Covid (2021). Their contribution suggests a future marked by the re-emergence of the original Airbnb ethos of the ‘sharing economy’. The conclusions of the articles by Zhang et al. (2021) and Gerwe (2021) travel in the same direction: the assumption that the impact of the pandemic varies according to the profile of the host defined on the basis of their driving motivation and the conviction that those most penalized by Covid are the “capitalist/speculator” or the “professionals” type, insofar as the opportunity for profit disappeared during this period, leading (part of) them to give up on STR.

Still, within this approach Farmaki et al. (2020) question the possible continuity of hosts on P2P accommodation platforms, which is not exactly the same as discussing the future of STR. In a qualitative study of several southern European countries (Cyprus, Greece, Croatia and Spain), the authors identify a continuum composed of six types of perception regarding future intentions to remain in or exit the platforms. These range from optimists (who will remain and invest in new strategies) to pessimists (who intend to abandon the platforms and STR). This approach contains a less Manichaean perspective, which suggests the future will be one of greater multiplicity and complexity.

The most recent literature, mainly published along 2021, focused on the short-term impacts of Covid in STR. Here, a distinction should be made between works on the direct impacts on STR activity and hosts (Dolnicare, 2021; Gyódi, 2021; Guglielminetti, Loberto and Mistretta, 2021; Liang et al., 2021) and a “collateral” literature related with indirect impacts, namely in the housing sector (Batalha, 2021; Duca, Hoesli and Montezuma, 2021; Trojanek, et al. 2021). As to the later, several studies show that rents have fallen in the most touristic areas, i.e. the (urban) areas with the highest concentration of STR (Batalha, 2021; Trojanek, et al. 2021). But, any conclusions on the structural character of this trend seem premature.

Regarding the direct study of impacts, approaches focus on the quantification and distribution of losses in territorial (different regions) and/or agency (different actors) terms. Chen et al. (2021) discuss the sharp losses of hosts in Sydney, namely in comparison with the platforms (Airbnb), re-launching the debate of the informality and lack of equity of the Gig Economy employment, and consequently of the urgent need to regularise the sector: the authors point out that the losses of hosts were further accentuated by the lack of public support, which results from the (still) informality of these jobs. In territorial terms, most studies focus on cities (Gyódi, 2021; Guglielminetti, Loberto and Mistretta, 2021; Liang et al., 2021). Nevertheless, there are clear factors that determine the degree and dynamics of loss: i. the timing of the pandemic; ii. the measures implemented by governments; iii. and the specificities of the territories and, in this regard, the extreme dependence on tourism (more evident in southern European cities) and population density (reflected in a greater vulnerability of the most populated territories such as urban centres compared to suburbs and of course rural areas) were determinant.

In fact, the literature on the impacts of the pandemic on tourism activity on the Portuguese territory (Gouveia, 2021; Martinho, 2021; Santos and Moreira, 2021) is in line with the previous comment, revealing the uneven distribution of the losses: despite the “sharp fall in all indicators of tourism activity” (Santos and Moreira, 2021: 15), the more affected areas were the most dependent on mass tourism and the densely populated i.e. major cities, the Algarve and Madeira. Following the discussions within international literature (Higgins-Desbiolles, 2021; Sharma, Thomas and Paul

2021) Santos and Moreira (2021) demonstrate that the Portuguese case requires rethinking the activity from a sustainability perspective, starting by rethinking the viability of "overtouristic" contexts.

3. METHODOLOGY AND THE TIMING OF THE RESEARCH

The methodology developed was an online survey of those holding and managing STR licences (henceforth 'hosts'), and exclusively aimed at the flats and houses section, which combined, according to National Register of Local Accommodation/STR (RNAL – Registo Nacional de Alojamento Local), represent 92% of STRs in Portugal. Unsurprisingly, in the cities there is an overwhelming predominance of flats, unlike in the rest of the country, where detached houses dominate.

The Portuguese Association of Local Accommodation (ALEP) distributed the survey by e-mail and across its social networks to around 30,000 hosts (approximately 75% of all hosts according to the association), distributed proportionally geographically and according to business type (companies and sole proprietorship). The survey received 1,109 responses, of which 879 (N) were considered valid.

In table 1 we present a comparative analysis of the distribution of our sample – a non-random sample – in relation to the estimated universe. As it is not possible to accurately estimate the size of the STR sector in Portugal, we consider the National Register of Local Accommodation (RNAL), which is a mandatory platform for the registration and licensing of STR, to a possible source for a relatively accurate estimate. However, the RNAL's reference unit is not the 'host', but rather the STR licence, which, in the case of the present survey, corresponds to a total of 3,828.

Table 1: Distribution per area and comparison between the sample and the RNAL data (number of flat and house STRs as at 31 August 2020).

National Registration of Local Accommodation/STR (RNAL)			Sample - Covid and STR Survey		
Region	n	%	n	%	Difference between RNAL and the sample
Lisbon	18 515	21.3	1 659	43.3	+22
Lisbon Metropolitan Area	7 448	8.6	248	6.5	-2.1
Porto	7 426	8.6	585	15.3	+ 6.7
Porto Metropolitan Area	2 166	2.5	61	1.6	- 0.9
Algarve	34 781	40.1	748	19.5	-20.6
Other municipalities	16 478	19.0	527	13.8	- 5.2
National	86 814	100.0	3 828	100	-

We did not considered the metropolitan areas separately from other municipalities in this survey due to the low number of responses received from the metropolitan area.

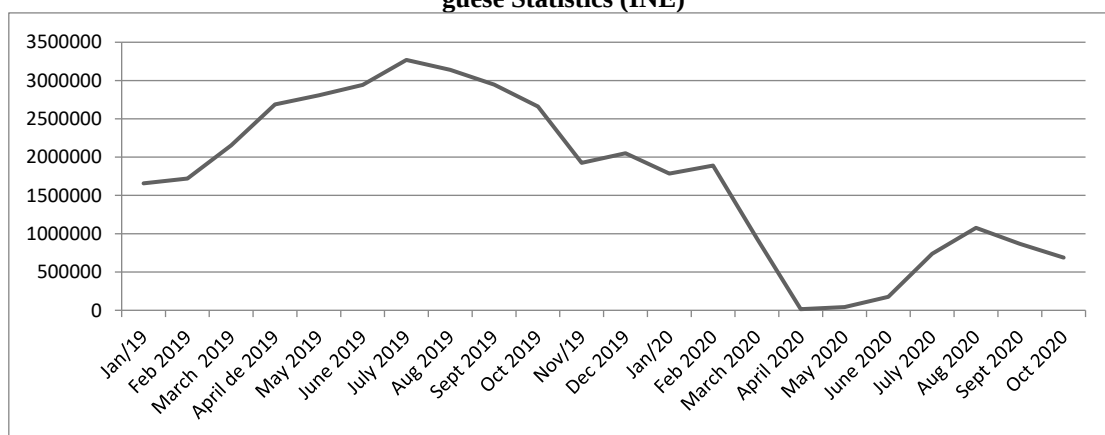
We assume our sample includes an over-representation of Lisbon (and to a lesser extent of Porto) and an under-representation of the Algarve. One probable reason for this is that the involvement and interest in actions in the sector tends to be lower in areas such as the Algarve, where the activity is distinguished by its seasonal nature.

The survey was conducted during the summer of 2020 (23 July to 2 October) and had the three main aims: i) a (unprecedented) sociodemographic and economic characterization of the STR hosts; ii) the study of the impacts during the first months of the pandemic/first wave (March to June) in terms of occupation and invoicing, changes in use (practised and equated) and policy measures (practised and evaluated); iii) explore the expectations for the future.

The first two cases of Covid in Portugal were detected in the north of the country on 2 March. Even before the president announced the introduction of a state of emergency on 18 March, the country entered a voluntary lockdown: this was in place until the beginning of May, following which the country cautiously began to reopen. Alongside, and following the global trend of enhancing international travel restrictions (Seyfi, Hall and Shabani, 2020), Portugal closed its doors to visitors by sea, air or land.

Tourism was always an important economic sector in Portugal. But it benefited from a particular boost during the Troika's financial adjustment programme. In fact, the sector grew substantially from 2012 onwards (Santos and Moreira, 2021), a growth that has also brought great economic dependence: in 2018, at 8.3%, Portugal was the European member state (EU-27) with the fifth-highest share of tourism as a proportion of GDP (Eurostat 2020). In general, the pandemic – and the first lockdown in particular – had a profound effect on tourism.

Figure 1: Passenger arrivals at Portuguese airports (January 2019–October 2020). Source: Portuguese Statistics (INE)



January and February, traditionally the weakest months for national tourism, recorded higher values in 2020 of passengers arrivals at Portuguese airports (Figure 1) compared to the same months in 2019. This normality continued during the first week of March, while the rapid implementation of forced immobility following the pandemic emergency experienced during the second and third weeks of the month, transformed it into a transition month with a 56% decrease in passenger arrivals compared to March 2019. Yet the figures for March were incomparably higher than those for the following three months.

In sum, our study of the impacts refers to the most difficult moment of the pandemic - not so much because of the intensity of infections and deaths, but essentially due the surprise and the strength of the confinement and restriction measures. Nevertheless, the moment of the survey (the summer of 2020) was marked by some recovery and an intense (but not definitive) opening that gave the sensation of some normality.

4. SHORT-TERM RENTAL SUPPLY IN PORTUGAL: A BRIEF PORTRAIT OF THE HOSTS

This survey was one of the first in Portugal to include a relatively exhaustive sociodemographic characterization of the hosts¹. Besides some qualitative studies (Semi and Tonetta, 2020), the general characterization of studies of this sector, both in Portugal (Fernandes et al. 2019) and internationally (Wu, Ma and Xie, 2017), are generally based on an analysis of data from platforms, such as Airbnb listings retrieved through AirDna (and fewer from InsideAirbnb). However, these characterizations are fragile, particularly with regard to ‘professionalization’, which in such analyses is based essentially on two criteria: the type of listing (whole house) and the number of listings per host. In respect

¹ For an analysis of all the survey's responses see the report (in Portuguese) https://4151a5c8-348c-441f-9545-a7bec6c67a9e.usrfiles.com/ugd/4151a5_17c60a8ac3154228a654582f4098f226.pdf

to the former, a whole house can have different uses at different times of year; on the other hand, the latter presents multiple situations in which the host is not the homeowner, but rather, for example, a ‘local intermediary’ (Adamiak, 2019) or (business) manager. Besides, AirDna methodology has been criticized as being biased upwards in respect of occupancy (Argawal et al., 2019).

The fundamental issue, however, is the oversimplification of the dualistic distinction between *professional* and *non-professional* (Adamiak, 2019) that demonizes the former and raises the latter to a position of moral superiority. The ‘professional’ exercise of this activity cannot be disconnected from the economic and labour context: in countries with fragile labour markets (with precariousness and low wages that also affect the most highly-qualified parts of the population) and high tourism potential, becoming a ‘professional’ in the field of STRs can be one of the few ways to obtain a minimally decent income (Balampanidis et al., 2019; Heo and Blengini, 2019; Pereira, 2020a). The typologies discussed in Section 2 differ insofar as they are based on host motivation; however, they make a punitive assumption of financial motivation, regardless of the hosts’ income. Another critical aspect of these typologies is that they give force to purist or rigid views of the hosts’ motivation, omitting the dynamism that characterizes their activities and motives over time.

To avoid this simplistic approach, we created a typology that combines two variables: the hosts’ economic dependence on STR income (its proportion of total household income) and the way in which the activity is carried out - that is, whether it is exclusive or complementary. As can be seen in Table 2, there are quite marked geographical variations resulting from the specificities of the respective territories at several levels, namely: (i) housing market; (ii) occupation duration (either continuous or seasonal); (iii) tourism profile (urban, seaside, other); (iv) status in global tourism and real estate circuits; and (v) employment/economic structure.

Table 2: Type of host according to how they exercise the activity and level of dependence. Source: Covid and STR Survey (%)

	Lisbon	Porto	Algarve	Other municipalities	Portugal
1. Exclusive dedication with extreme dependency	38.1	29.6	22.8	13.1	25.7
2. Exclusive dedication with partial dependency	10.8	7	8.7	8	8.9
3. Independent with exclusive dedication	0	0	2.2	7.3	2.7
4. Non-exclusive with extreme dependency	10.1	11.3	5.4	5.1	7.7
5. Non-exclusive with partial dependency	20.9	32.4	38	38.7	31.9
6. Non-exclusive independents	5.8	5.6	12	14.6	9.8
7. Other situations	14.4	14.1	10.9	13.1	13.2
Total	100	100	100	100	100

Note: i) extreme dependency, when the income from the STR is more than 50% of total household income; ii) partial dependence, when the income from the STR is between 10% and 50% of total household income. In both, we had two ranges - 11% to 25% and 26% to 50%; 51% to 75% and over 75% - and in both the most frequent responses fell in the upper range.

Lisbon and Porto share the same vocation (urban tourism) and STR occupation potential throughout the year. Their hosts also share a very similar demographic profile: high average age (50 and 51 in Porto and Lisbon, respectively, but the lowest compared to the total, which was 53); and a very high proportion of hosts with a university education (around 90 per cent), if compared with the population (according to the 2021 Census Lisbon has 41% of graduates and Porto 35%).

However, the structure of the sector shows that we are facing two different realities. While in all the territories there are two dominant types of host (non-exclusive with partial economic dependence and exclusive with high economic dependence – the latter close to ‘professional’), Lisbon stands out as the more ‘professional’ and dependent market, with a double ‘statutory superiority’, both on the

global tourism circuit, and in the rankings of global cities. Lisbon is, therefore, the territory with the greatest proportion of hosts who are dedicated exclusively to and therefore most dependent on STR (38%) and with the lowest proportion of hosts with a single property on STR (28%).

Lisbon is also the most unequal and diverse case, with the lowest proportion of individual holders (28%) and the highest of medium and large exclusively holders and holders/managers (11%) as shown by table 3. For this reason, it is also the most entrepreneurial: it has the higher share of companies (46%) and the lower of sole proprietorships (54%), even so these are dominant.

Table 3: Type of host according to the number of STR and operating form (holders of STR licence or/and managers of STR); Source: Covid and STR Survey (%)

	Lisbon	Porto	Algarve	Other Municipalities	Portugal
Individual Holders (1 STR)	28.3	39.3	54.5	67.1	49
Micro Holders (2-3 STR)	27.9	28.1	21.5	13.5	21.7
Small Holders (4-10 STR)	11.5	17	5.5	7.6	9.7
Medium and large Holders (+ 10 STR)	2	3.7	2	0.7	1.8
Micro and small Holders/Managers (2-10 STR)	17.2	5.9	8.5	4.8	9.3
Individual, micro and small Managers (1-10 STR)	4.1	1.5	3.5	3.1	3.2
Medium and large Holders/Managers (+10 STR)	9	4.4	4.5	3.1	5.3
Total	100	100	100	100	100

Porto occupies an intermediate position between Lisbon and the Algarve: it has a very close distribution between the “exclusive dedication with extreme dependency” type (30%) and the “non-exclusive with partial dependency” one (32%). At the same time, they are less concentrated, with 8% of medium and large holders and holders/managers, while 39% are individual holders (11% more than in Lisbon). It is in these two cities that we find the highest percentage of hosts who are extremely dependent economically on STRs, irrespective of the form in which the activity is carried out (exclusive or complementary). This can be explained both by the high property prices in these cities – particularly in Lisbon – and the aforementioned durability of the activity (potentially all year round).

In turn, the great demographic similarity of the host profiles in the two cities – the high level of educational qualification and the existence of many individuals with professions with some kind of relationship with the activity (architects, engineers or estate agents) – demonstrates how investment in STR properties has also presented itself as a professional opportunity: either as a means of overcoming the crisis of 2011-14, which was particularly hard on professionals in the construction sector, or as a way to overcome the constraints of low-paid and precarious professional occupations in Portugal, such as architecture and civil engineering (Mateus, 2017; MTA, 2020).

The Algarve is Portugal’s beach holiday destination *par excellence* where, unlike in other parts of the country, STR is a largely seasonal business: here, there is twice as many secondary housing as there is anywhere else in the country (39% according to the 2021 Census, compared to 19% for the country as a whole and 9% in the Lisbon region), which justifies the peculiarity of the structure of the STR sector in this part of the country. In the Algarve, in addition to being engaged in other activities, of those involved in STR, 38% are only partially dependent on STR income and 12% are not dependent at all on it, while 55% are individual holders. Therefore, the share of companies (21%) is less than half of that recorded in Lisbon. The Algarve is also where the hosts have the highest average age (58) and the lowest level of education – although it is still quite high. Finally, the remaining parts of the country, which are very diverse, have the lowest dependencies and degrees of exclusivity, the overwhelming majority being individual holders (67%).

5. IMPACTS AND FUTURE PROSPECTS

As already said the survey accounted for losses incurred during the first four months of the pandemic: from March to June. The data is not surprising either in terms of: 1. the size of the loss – which is extremely high, especially during the second quarter, as March was a transition month (as noted above, voluntary lockdown began in mid-March); 2. the variables explaining it – 2.1 the degree of economic dependence is an important variable and the losses were more acute among those most dependent, whether or not they were dedicated exclusively to STR (Table 4); 2.2 the second is related to the first and concerns the size, the STR number that each host has - the more STR, the greater the loss (Table 5); 2.3 finally, and in line with the conclusions of Martinho (2021) Santos and Moreira (2021), geography is decisive (Figure 2 and Figure 3) with the densest (urban) and most touristic areas suffering the greatest impacts.

Detailing now the analysis, it is clear that all the hosts, independently of their characteristics, had remarkable losses. It is worth noting that the losses in invoicing across all territories preceded and were more severe than those in occupation, which suggests there may have been a temporary reduction in prices as a means of compensating for the losses. But, it was the medium and the large (+ 10 STR) that lost the most, especially in invoicing, and, at the opposite pole, are the smaller: from April to June all medium and large holders had (year-on-year) losses of more than 50 per cent and a quite similar situation occurs among the medium and large holders/Managers (Table 5).

Table 4: Percentage of those who lost more than 50% of occupancy and invoicing during (March, April, May, June 2020), in relation to the same months of 2019, by type of host according to how they exercise the activity and level of dependence; Source: Covid and STR Survey

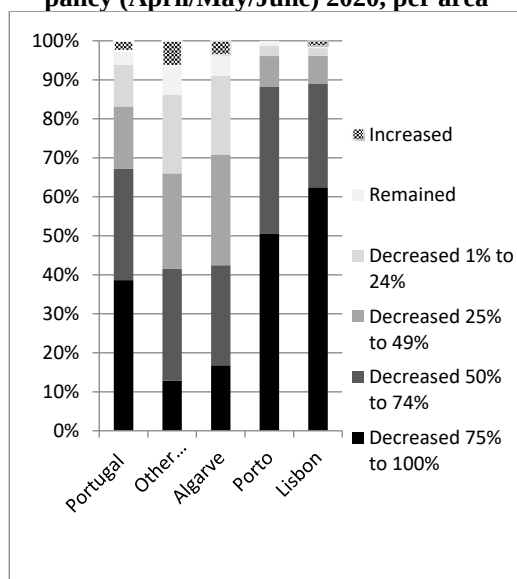
	March 2020		April 2020		May 2020		June 2020	
	Occup	Invoic	Occup	Invoic	Occup	Invoic	Occup	Invoic
Exclusive dedication with extreme dependency	42.3	71.3	84.7	94.6	89.2	98.1	87.6	95.4
Exclusive dedication with partial dependency	26.3	60.5	61.5	89.5	61.5	86.8	53.8	81.6
Independent with exclusive dedication	8.3	40.0	8.3	50	25	50	25	50
Non-exclusive with extreme dependency	41.2	68.8	85.3	97	82.4	93.9	73.5	93.8
Non-exclusive with partial dependency	27.3	59.7	64.1	83.2	66.7	83.5	73.5	85.8
Non-exclusive independents	14	50	37.2	69.2	39.5	70.3	65.1	76.3
Other situations	37.5	73.1	64.3	86.5	78.6	95.9	73.2	94
Total	31.7	63.9	66.7	86.2	71	88.3	73.2	87.9

Table 5: Percentage of those who lost more than 50% of occupancy and turnover in relation to the same months of the previous year (March, April, May, June), by Type of host according to the number of STR and operating form (holders of STR licence or/and managers of STR); Source: Covid and STR Survey

	March 2020		April 2020		May 2020		June 2020	
	Occup	Invoic	Occup	Invoic	Occup	Invoic	Occup	Invoic
Individual Holders (1 STR)	28	56.9	52.9	76.9	58.9	79	68.4	80.3
Micro Holders (2-3 STR)	34	69.4	68.9	84.8	75	88.5	75.2	85.9
Small Holders (4-10 STR)	28	60	80	93.5	82	95.7	75.5	95.7
Medium and large Holders (+ 10 STR)	25	62.5	87.5	100	87.5	100	75	100
Micro and small Holders/Managers (2-10 STR)	37	70.6	69.8	88	77.4	90	79.6	95.9
Individual, micro and small Managers (1-10 STR)	47.1	88.2	76.5	100	88.2	94.1	76.5	94.1
Medium and large Holders/Managers(+10 STR)	13.3	60	60	100	60	100	66.7	96.7
Total	30	63	62.8	84.3	68.3	86.4	72.1	86.8

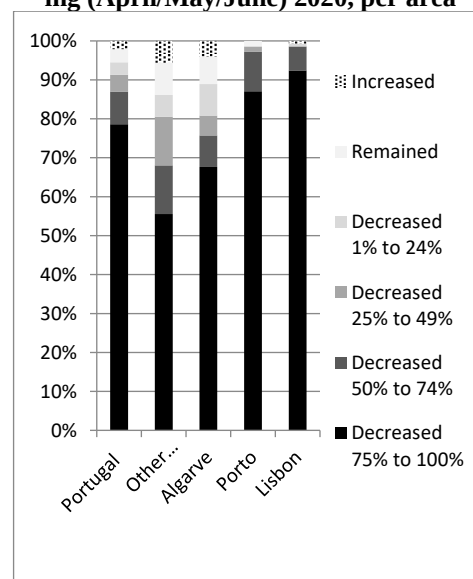
As to the third variable, geography, there is a clear hierarchy of losses as can be seen in Figures 2 and 3: first, Porto and, above all, Lisbon are more densely populated territories and, therefore, were the areas most affected by the pandemic; second, the Algarve, where the losses suffered, while quite high, did not reach the levels of Lisbon; and third, the remaining territories, which lost the least, with some remaining stable or even gaining – in fact, the desire to flee the cities, whether out of fear of contagion or simply to spend lockdown in a less densely populated space closer to nature, was a feature of the pandemic that was visible during the first lockdown (Pereira and Matos, 2020).

Figure 2: Annual rate of change (%) in occupancy (April/May/June) 2020, per area



Source: Covid and STR Survey

Figure 3: Annual rate of change (%) in invoicing (April/May/June) 2020, per area



Source: Covid and STR Survey

One of the key findings in the literature on the impact of the pandemic on the STR and tourist activity is corroborated by our survey: the uneven distribution of the impacts, pointing out a greater fragility of the more "entrepreneurial" hosts, i.e. those which concentrate a greater number of STRs and economically more dependent on the activity. But there is another factor, related to the public support to deal with these impacts (Chen et al., 2021), which introduces greater complexity to the analysis, removing credibility from the hypothesis of greater survivability/sustainability of small and less professional hosts. In fact, at the time of the survey, public support was almost exclusively aimed at those more "entrepreneurial" hosts, the companies, which represent a minority of the respondents (31%) - the majority was sole proprietorship (69%). The dominant support for companies was the layoff, although the support most used by both (companies and sole proprietorships) was the debt moratorium, a general measure for anyone with a housing credit. This explains that respondents had a negative assessment of the support measures provided by the government, either because they were excluded or because they considered them as short-term measures inducing over-indebtedness.

Even so, expectations for a normalization of the situation are the product of a remarkable optimism: 43% of respondents were optimistic that the sector would normalize in 2021; 28% remain cautious (believing normalization will not happen until at least 2022); 12% were pessimistic (believing the sector will never be the same again); while 14% did not know what the future will hold. Although the losses affected Lisbon and Porto particularly hard, the expectations of the two dominant groups in the cities are quite different. In Lisbon we see what would be expected when taking into account the hypotheses raised by Dolnicare and Zare (2020) – the most "professional" (exclusive dedication with extreme economic dependency) are slightly less optimistic (38%) than the whole, while also being more cautious (38%). However, in Porto, like the Algarve, the views expressed were the opposite (Table 6).

Table 6: Expectations towards the normalization of the situation of the two dominant types of host in Lisbon, Porto and the Algarve

		Exclusive dedication with extreme (economic) dependency	Non-exclusive with partial dependency
Lisbon	Very Optimistic	1.9	3.4
	Optimistic	37.7	51.7
	Cautious	37.7	31
	Pessimistic	11.3	3.4
	Don't know	11.3	10.3
	Total	100	100
Porto	Very Optimistic	0	0
	Optimistic	52.4	47.8
	Cautious	28.6	34.8
	Pessimistic	9.5	8.7
	Don't know	9.5	8.7
	Total	100	100
Algarve	Very Optimistic	4.8	2.9
	Optimistic	47.6	28.6
	Cautious	19	40
	Pessimistic	19	2.9
	Don't know	9.5	25.7
	Total	100	100

Source: Covid and STR Survey

This optimism was not independent of the moment of the survey: the summer of 2020, when there was a slight recovery and a certain feeling of normality after a harsh confinement, which was an unprecedented experience in the life history of all respondents.

Nevertheless, the respondents' intentions regarding the uses to be given to STR in the short term seem to be much more revealing of the possible futures of the sector and related sectors, particularly the Private Rented Sector. The overwhelming majority of hosts, including the more dependent on

this activity, stated their intention to continue operating in the STR market. Medium-term renting – for up to one year, without risking the loss of their STR licence – appears as the second option, albeit one that is more evident among those who are exclusively dedicated and who are extremely economically dependent on STR and those in the cities. Not by accident, the Flatio platform, which offers medium and short-term rentals, bought NomadX (a rental platform for digital nomads) in late 2020 in order to expand this segment in the Portuguese market.

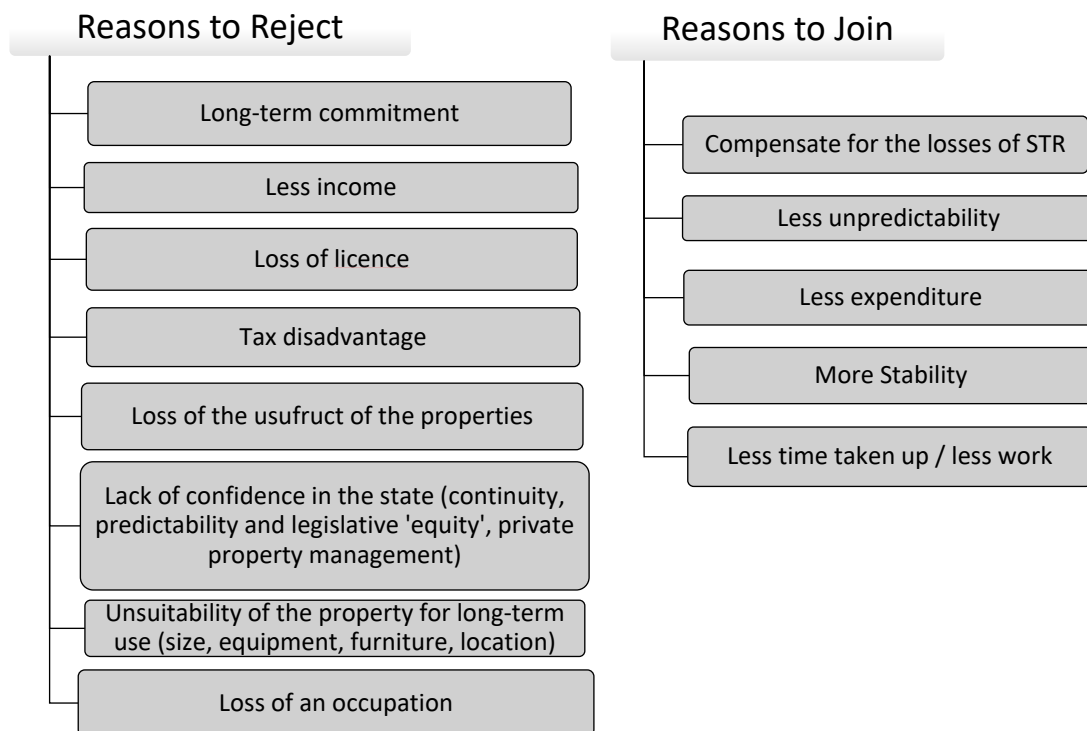
Table 7. Use intentions for the STR in the short-term by type of host (question of multiple answer; the question referred to intentions until the end of 2020); Source: Covid and STR Survey

	Exclusive dedication with extreme (economic) dependency	Exclusive dedication with partial dependency	Independent with exclusive dedication	Non-exclusive with extreme dependency	Non-exclusive with partial dependency	Non-exclusive independents
STR	82.9	71.4	50	79.4	73.1	70
Mid-Term Rental	70	62.2	14.3	59.3	46.7	39.4
Long duration rental/private	20.2	11.8	12.5	11.5	17.5	21.9
Long duration rental/public	5,7	0	0	0	1.7	6.7
Sell	21.8	14.7	12.5	18.5	12.4	10

Even considering that the intention to sell is more important among the most dependent, whether or not they exercise the activity exclusively, the eventual massive migration of STR properties to the long-term rental sector is not very likely. In fact, long-term renting is the option of a minority, one that lags far behind medium-term renting, which is an option that is clearly more evident in the cities. Public and private long-term rentals are also more visible in the cities, albeit to a much lesser extent than medium-term rentals. As far as long-term rentals are concerned, it is worth making the distinction between private rentals, which a reasonable proportion of STR hosts believe to be a viable option, and public rentals (resulting from public programmes aimed at attracting the STR hosts to the long-term rental market), with this latter option selected by only 3% of respondents. Understanding the lack of motivation for traditional renting (given the strong resistance) and the motivations guiding the minority, is crucial if we are to know the possible private rented market dynamics (Figure 4).

The financial issue (lower income and tax disadvantage) and rigidity resulting from long-term time commitments are not the only reasons hosts opt for STR over long-term rental. The loss of a personal occupation and the possibility of using the property (revealing the non-exclusiveness of these short-term properties) are also mentioned. However, there are two categories of reason deserving special mention. The first relates to the property's unsuitability for long-term occupation, a reason that includes a number of very different situations: from cases where the property was specifically designed for STR, indicating a logic of building rehabilitation that is geared strongly towards tourism, to those of territories of seasonal 'usufruct' occupation. The second reason is the most relevant, and concerns the public's negative view of the state – of a mistrust of institutions – that is particularly prevalent in Portugal (Torcal, 2014), which emerges as a factor preventing people from entering the private rental market, especially given the perception of permanent legislative discontinuity and distrust regarding the landlord's protection mechanisms.

The reasons referred by those who opted for private long-term rental indicate a curious situation: if the immediate/initial motivation seems to have been the need to compensate for losses following the pandemic, the other reasons (less unpredictability, more stability, less expenditure and less time taken/less work) point to a change in the perception of this type of rental after some experimentation. As such, the perceptions are neither true nor false; however, they may result from a concrete lack of knowledge of the reality, of a lack of experience and/or from the narratives dominating the social and professional spaces in which the individual moves, and which tend to be assumed to be irreversible convictions.

Figure 4. Reasons for rejecting and accepting long-term rental; Source: Covid and STR Survey

6. CONCLUSION

This article is a novel contribution to the literature and public policy on the impact of Covid on STR in a southern European country, an area that is particularly dependent on tourism. Distinguishing itself from initial approach to this topic, which was marked by the proliferation of more or less prophetic narratives about a post-Covid response to the human need to endure uncertainty, this article focuses on an analysis of the on-going dynamics, practices, perceptions and intentions of the supply agents: that is, the owners and managers of STR licences. This analysis identifies: (i) trends with some solidity, which differentiates them from more ephemeral dynamics that are marked by the social, health and emotional moments of the pandemic during which the analysis and enquiries develop; (ii) effective risks resulting from those trends or from other dynamics that are in progress; and (iii) factors that may condition different paths.

The trend that seems more solid at present is the (limited) migration towards private long-term rental and a relatively significant migration to medium-term rental. This latter response, as well as offering the hosts more flexibility by allowing a mixed system that could be exploited in association with STR, may become more popular in the wake of changes resulting from Covid (essentially, but not exclusively in cities): the increase of life-style migrations (Hayes, 2018) – digital nomads, investors, retired, highly qualified staff, etc. – in countries, such as Portugal, where geo-arbitrage – “taking advantage of international price differences in costs of living for personal or business purposes” (Penney and Dramowicz, 2016:1) – is promising (Pereira, 2022). Additionally, and especially in cities, the majority of STRs – whether due to their location (in historic centres with specific urban morphologies, equipment and experiences) or due to their housing typologies (minimalist housing in terms of size, comfort and facilities) – are much more suited to ‘transitory experiences’ than they are for long-term appropriation as experienced in traditional rentals.

Accordingly, the hypothesis that there will essentially be a reproduction of the sector in the post-Covid period (Cocola-Gant, 2020) does not seem completely plausible. Even less plausible is the suggestion that this sector will completely transform in some kind of ethical purification and that there will be a return to the original ethos of the sharing economy with the “disappearing” of the most professional (Dolnicar and Zare, 2020; Zhang et al., 2021). In fact, the size of the loss (which according to these authors penalizes the “professionals and speculators” more) is not the only factor, and perhaps not even the main one, in determining the future of STR. The type of public support

received during the pandemic is a key factor in determining survivability during this period. As happened in other countries (Chen et al., 2021), in Portugal, in all sectors – and STR in particular – the support offered by the state was more advantageous to companies (who could furlough staff) than it was for sole proprietorships, for whom the most significant support was the moratorium on debt (which essentially amounted to housing credit). This brings the discussion of one important risk the less fragile hosts can face in the short- and medium-term: the consequences of the end of this measure.

Still, there may be a (hypothetical) reconfiguration of the STR sector tending to its "functional dualization": on the one hand, the larger and more professional ones (essentially concentrated in cities), which have developed in a logic of mimicking hotel industry practices (Cocola-Gant, et al., 2021), may remain in the tourism activity and in the short-term renting; on the other hand, with the growth of the demand for more or less affordable housing by digital nomads or international students, the smaller ones (whose accommodations have a domestic rather than hotel identity) will be able to progressively specialize in this segment and in the medium-term renting.

If this hypothesis is confirmed, it has obvious risks: on the one side, the pressure on the housing market will tend to grow in line with the growth in demand fuelled by these lifestyle migrants; on the other side, the growing specialisation of "corporate hosts" in tourism and their "quasi-hotel identity" reinforces the unfair competition with the hotel industry, which has always been one of the main arguments of this sector to claim for tougher regulation of the STR (Cocola-Gant, et al, 2021; Pereira, 2020a).

Finally, and in addition to the factors that will condition the recovery of the economies and tourism in most European countries – such as the duration of the pandemic and vaccinations in Europe, the late implementation of recovery and resilience plans (Leali, 2021) or the rising inflation and increasing interest rates that may limit citizens' financial availability – there are other factors that may condition the evolution of the sector. These include urban policies for the functional reconfiguration of the areas most affected by Covid following their extreme dependence on tourism before the pandemic, and realistic policies to encourage long-term rental: policies that take into account the motivations and perceptions of the actors involved. However, in cases such Portugal - where, especially in the cities, STR represented an opportunity for some to improve their income or to escape unemployment - it is essential to ensure economic restructuring and the development of job creation strategies that are capable of reducing the dependency on tourism.

The approach developed is based on the awareness that, in a context marked by the non-linear nature (of the pandemic), its unpredictability and the emotional reaction to it, this analyses – while being necessarily inconclusive – is potentially ephemeral. This is one of the limitations of the research, the exclusive focus on an early stage of the pandemic. Another limitation was the selection of the sample from The Portuguese Association of Local Accommodation (ALEP): having allowed a high response rate, it excluded agents and even regions less represented by that association. The recognition of these limitations recommends the development of future research capable of following the development of the sector (in the short, medium and long term) in all its diversity, regarding multiple agents and geographies.

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Artigo submetido a 25 de Julho de 2021; versão final aceite a 4 de Março de 2022
Paper submitted on July 25, 2021; final version accepted on March 4, 2022

Do We Have to Change Our Business Models and Managerial Practice in COVID-19 Times? A Qualitative Study

Temos de Alterar os Nossos Modelos de Negócio e Práticas Gerenciais em Tempos de COVID-19? Um Estudo Qualitativo

Manuel F. Suárez-Barraza, Ph.D.

manuel.suarez@udlap.mx

International Business Department, Universidad de las Américas Puebla (UDLAP),
México

María Isabel Huerta-Carvajal, Master

isabel.huerta@udlap.mx

Department of Marketing Management, Universidad de las Américas Puebla (UDLAP)

Abstract

The new way of working that the COVID-19 pandemic has brought to all companies in the world has been a true “whirlwind” of changes to the traditional status quo of operation of each one of them. Faced with this turbulent environment, different organizations in the world have had to change their business models and traditional management practices to face the threat of COVID-19. Derived from this reality, it is preponderant to study the changes made by organizations in the context of this global pandemic. Therefore, the purpose of the research is to explore and understand how certain companies in the world have changed (or intend to) change their models of business and management practices to face the global pandemic. The methodology was qualitative in two crucial strategies, the exhaustive documentary analysis in 22 companies around the world and semi-structured in-depth interviews in the entire world, using theoretical sample. The most important findings were the identification of different clusters (4 in specific) of changes in business models and management practices characteristic of the COVID-19 pandemic. Finally, the theoretical contribution of the article is because 84% of the management practices supported by the Mintzberg (2010) model were found in the data obtained in the research. The methodology was qualitative in two crucial strategies, the exhaustive documentary analysis in 22 companies around the world and semi-structured in-depth interviews in the entire world, using theoretical sample. The most important findings were the identification of different clusters (4 in specific) of changes in business models and management practices characteristic of the COVID-19 pandemic. Finally, the theoretical contribution of the article is because 84% of the management practices supported by the Mintzberg (2010) model were found in the data obtained in the research.

Keywords: Business management; business model; managerial practices; COVID-19 pandemic; qualitative study.

JEL Codes: Códigos JEL: M10 General, M1 Business Administration, M16 International Business Administration

Resumo

A nova forma de trabalhar que a pandemia do COVID-19 trouxe para todas as empresas do mundo tem provocado um verdadeiro “turbilhão” de mudanças no tradicional *status quo* de

funcionamento de cada uma delas. Perante esse ambiente turbulento, diferentes organizações no mundo tiveram que mudar os seus modelos de negócios e práticas de gestão para enfrentar a ameaça da COVID-19. Decorrente desta realidade, importa estudar as mudanças efetuadas pelas organizações. Nesse contexto, o objetivo da presente pesquisa foi explorar e entender como certas empresas no mundo mudaram (ou pretendem) mudar os seus modelos de negócios e práticas de gestão para enfrentar a pandemia global. A metodologia usada foi de natureza qualitativa, tendo materializado em duas etapas cruciais: a análise documental exaustiva de 22 empresas ao redor do mundo; e entrevistas em profundidade semiestruturadas em todo o mundo, utilizando uma amostra teórica. Os resultados mais importantes foram a identificação de diferentes *clusters* (4 em específico) de mudanças nos modelos de negócios e práticas de gestão características da pandemia de COVID-19. Por fim, a contribuição teórica do artigo decorre de 84% das práticas de gestão sustentadas pelo modelo de Mintzberg (2010) terem sido encontradas nos resultados da pesquisa.

Palavras-chave: Gestão empresarial; modelo de negócio; práticas de gestão; pandemia de COVID-19; estudo qualitativo.

Códigos JEL: M10 General, M1 Business Administration, M16 International Business Administration

1. INTRODUCTION

The new way of working that the COVID-19 pandemic has brought to all companies in the world has been a true “whirlwind” of changes to the traditional status quo of operation of each one of them. Ritter and Pedersen (2020) studied eight business-to-business firms to understand these specific changes and found certain elements that indicate that the management practices of these companies had to change to adapt to this reality. Other authors such as Kraus et al., (2020) similarly studied 27 family businesses in Europe from a qualitative perspective. Eight of these companies radically changed their business model, another twelve made minimal transformations and seven decided to keep it.

Given this reality, it is a fact that the pandemic continues and that we have practically reached 107 million cases in the world and 2.4 million deaths as of February 11, 2021 (WHO, 2021). Therefore, several academics on the subject have expressed their arguments by indicating that global and world leadership has failed to face this global health crisis from a systematic perspective and not a specific problem (Bolden, 2020). In fact, some of these members of the academic community, such as Stahl et al., (2020) mention some examples of strict changes in people's lifestyles and the operation of companies that occurred in Taiwan, Japan, and Singapore to deal with COVID-19. In this way, the exploratory question that arises in this regard is: *will companies have to change their business models and management practices, in the face of a pandemic that seems endless and affects the operations and financial results of companies?*

The answer to this question represents the research gap in this article. Despite the fact that several academics and companies around the world have studied certain changes in certain organizations, the work is still incipient and recent due to the continuity of the COVID-pandemic 19 (Ritter and Petersen, 2020; Kraus et al., 2020; Mattera et al., 2021). The study represents a great opportunity to assess the moment that certain organizations live in a turbulent and changing environment, therefore, the general purpose of this research is to explore and understand how certain companies in the world have changed (or intend to) change their models of business and management practices to face the global pandemic. In particular, local and regional companies (Puebla, Mexico) were analyzed to observe their changes in business models and management practices. The research questions governing this study are as follows:

- *RQ1: What kind of changes have been made to the business models due to the COVID-19 pandemic by the companies studied?*
- *RQ2: What management practices were identified in the business model changes in the companies studied?*

The answers to these two research questions explained in the research findings is the result of this research that aims to explore business model changes in times of the COVID-19 pandemic. This paper is structured in four main parts. The first part sets out a conceptual framework based on two components. First, the concept of business model, management and managerial practices is defined in the academic literature on the subject. In the second component, some recent academic articles that talk about the changes in business models in the midst of COVID-19. In the second part, the methodological section that describes the collection and analysis of data from a qualitative perspective is explained. The third part are the found results of the changes in business models in the companies studied. The fourth part ends the research article with the discussion and conclusions remarks.

2. LITERATURE REVIEW

2.1 Business model, management and managerial practices

The term business models can be traced back to the 1950s and early 1960s. The first authors to indicate the term "business model" was Bellman et al., (1957) by pointing it out as an interpretation of reality for engineering simulations. The term evolved over many years as a financial term related to the NASDAQ index and even to the concept of strategy (Porter, 2001). Maggretta (2002, p. 6) defines it as: "a system, how the pieces of a business fit together". In other words, the conjunction of several elements to create a business system. With this, a modern definition of the term indicated by Da Silva and Trkam (2014) is the group of actions to go selecting the right combination of resources and associated transactions for the present circumstances, that is, the way to generate income to the company through your short-term resources. Johnson, Christensen and Hackerman (2008) agree on the definition of business model by pointing out that a business model seeks to create profits (profit formula) by seeking to add value to the customer, taking into account the resources and work processes of any organization. Practically, working on the business model through managing resources and processes to generate profit for the company.

In this way, the relationship between the business model and the management of the company is close and close. Da Silva (2003, p. 6), for his part, defines management as: "a group of activities that managers carry out in order to achieve the efficiency, efficacy and effectiveness of an organization established through its organizational purpose and of their goals". If management is working on the organization's work processes, using its resources to be efficient and effective in pursuit of organizational goals and purpose, then the business model is the platform to generate income and profit to the same organization. Mintzberg (2010), for his part, defines management as an elementary triangle made up of three vertices: 1) trade (managerial experience acquired over the years and practical learning); 2) science (knowledge acquired to perform analysis); and 3) art (business vision, creative extension, business intuition). In his terms, "if a good amount of trade is brought together with the right touch of art and science is also used a little, the result is a work that is above all a practice" (Mintzberg, 2010, p. 8). Therefore, the set of activities or practices to carry out the management of a company is known as "managerial practices" (Mintzberg, 2010). For Mintzberg (2010), management practices are made up of three levels of managerial work: 1) the information level; 2) the plane of the people; and 3) the action plan.

In the foreground we have the information level, which consists of three internal elements (frame, program control and / or direct) and one external (communicate). The term framing can be understood as the way to approach the work: making particular decisions, focusing on specific issues, developing certain strategies, determining what types of innovations, in order to establish the context for the rest of the people who work in the Unit. Meanwhile, programming can be interpreted as the development of an agenda and its fulfillment, and largely determines the manager's activities. With the controlling and / or directing element, Mintzberg (2010) seeks to channel the behavior and actions of his subordinates. Takanaka (1995) already raised this by saying that it is to generate a course between the operational activities of the work processes and the actions of the people of the unit towards them.

On the other hand, Mintzberg (2010) raises the external element of communication in terms of the manager's performance when collecting and disseminating information for its intrinsic value. Mintzberg (1973) already calculated that 40% of the time is absorbed by this management practice,

and Tengblad (2000) estimated that 23% of a manager's time was dedicated to obtaining information and more than 16% to advising and informing. Therefore, according to Mintzberg (2010), the manager's job is significantly a job of processing information: listening, seeing, feeling, in addition to speaking.

For the second plane, that of People, Mintzberg (2010) shows two elements, one external in the manager's treatment of the outside, relating, and another internal, the leadership itself. The element of relating refers to the manager's activity of building contact networks to which they dedicate a good part of their time. Thus, they are visible figures towards others, and therefore they try to spread their influence among a large group of people. Internally there is leadership, by which managers with formal authority open paths, draw a direction for others to follow consciously and unconsciously. Among its vital functions are: a) vitalize people; b) form work teams; c) develop and train its personnel; and d) strengthen an effective and efficient work culture.

Finally, the third level of managerial practices is the Plan of Action, which also consists of two elements, one internal (doing) and the other external (negotiate). In the internal component of doing, a manager as a "person of action" is actually the person who "gets it done." However, there can be three managerial activities in which the manager himself can act: 1) personally direct projects and join with others to generate proactive change; 2) manage and solve problems, reacting to the changes to which their unit is forced, for example, a problem in the process (long ignored) or the appearance of a new competitor; and 3) generate operational innovations. Also, for Suárez-Barraza, Ramis-Pujol, and Heras (2010), 21st century organizations make their managers manage problems and disturbances efficiently. In Mintzberg's model, negotiation is focused on the manager, in all types of negotiation activity with areas or companies that are external to his workplace. In this way, the action plan in the internal context is to execute and projects, and the external context is to negotiate for the benefit of its work center.

2.2 Business model changes in companies facing COVID-19 in the academic literature.

The literature on this subject is scarce, because the COVID-19 pandemic continues to this day. Therefore, finding literature that studies this topic is insufficient and practically non-existent. Among the literature that could be found is the work of Kraus et al., (2020) who studied 27 mainly European family companies to validate the different types of change that these organizations have had in the face of the COVID-19 crisis. The main management practices identified by these authors were: 1) generate a crisis management strategy, based on cost reduction, process and process innovation, and finally, perseverance (maintaining the operation in times of crisis); 2) generate health protection mechanisms (use of face masks, sanitizers, and healthy distance) and 3) finally, reduction of working hours and flexible hours including the home-office. Norris et al., (2021) describe the adaptation of restaurants to the crisis of the pandemic. Its main management practices and business model changes carried out were: 1) change the business model from face-to-face service to online service with pick-up through apps, 2) innovations in the menu (reduction to commodity dishes), and 3) use of social networks and platforms to promote sales more intensively. In both studies, many changes can be observed in both business models and managerial practices, the reality is that the literature is recent and marks several managerial actions in search of survival.

Finally, other authors have also explored the changes both in the tourism industry and in supply chains, Deniszi et al., (2021) show specific changes in the business models of the case studies (hotels) that they studied to deal with the pandemic. In particular, hotels changed the business model from sales promotions and services to services focused on cleaning, health and physical (health) safety for the guest. Therefore, all management practices shifted towards that new business model focused entirely on the crisis of the pandemic. For their part, Sharma et al., (2021) show a study of how supply chains may behave in the midst of the COVID-19 crisis. Their conclusions is this new reality requires the generation of resilient supply chains, where their management practices for retail companies are focused on diversified storage, use of backup providers, emergency supply, flexibility, and collaborative strategies. The following table shows a synthetic summary of the literature found:

Table 1. Business model change amid the COVID-19 pandemic

Authors	Main changes in the business model and managerial practices
Yeganeh (2021)	This article looks at nine trends that have occurred in business during the pandemic. Two of these trends have focused on changes in business models focused on technological innovation (delivery by apps).
Parker (2020)	COVID-19 has induced a transition to teleworking, impending office design and configuration reversals, and office working protocol re-engineering. Management strategies reflect prioritisation choices between occupational health and safety versus financial returns. Financial reporting has shifted to a more visual and electronic approach in the wake of the pandemic.
Durst et al., (2021)	The authors carry out a study in Peruvian SMEs companies, to the question of how they have reacted to the pandemic in terms of management. The answer was with changes in the short-term strategic plan, designing new sales strategies based on technological platforms and innovation in after-sales services.
Bhattacharyya, S.S. and Thakre, S. (2021)	Remote working was widely implemented, supply networks were adjusted, operations were managed with minimal resources, working capital was closely monitored and the product-portfolio was revamped to reap benefits in an essentials-only world.
Akpan et al., (2020)	Another research that studies changes in business models and management practices in SMEs. The companies studied introduce cloud computing, 'big data', and predictive analytics that can improve operations and strategic decisions, are yet to make inroads in most EMDEs. Also, disruptive computing technologies, data analytics, and the Internet of Things (IoT) required to engineer new business models, reduce overheads, enhance competitive advantages, and digitize SMEs' business operations remain untapped.

Source: By the authors.

3. RESEARCH METHODOLOGY

This research used a qualitative approach due to the recent phenomenon studied (Denzin and Lincoln, 2008). Two crucial methodological strategies were used. First, the business and management literature worldwide was analyzed to “understand” which organizations reported changes in their business models or management practices through interviews, reports or briefings published in management magazines, and official WEB pages and / or business magazines (FORBES, BLOOMBERG, among others) (Outhwaite, 1975). Second, we conducted a qualitative expert interview to answer our research questions (Neergaard and Ullhøi, 2007) based on the list found in the business and management literature. Qualitative research is adaptable and useful to analyze this type of organizational process (Bluhm et al., 2011).

In particular, we seek that the business literature will report the changes in business models and management practices caused by the COVID-19 pandemic. In other words, different organizations were determined in the form of multiple case studies to strengthen our research (Eisenhardt and Graebner, 2007; Yin, 2017). On the other hand, the detailed analysis of the literature on business models and management practices provided us with the necessary theoretical framework to search for this type of organization, and avoid a possible bias of changes made that do not focus on business models and managerial practices. This means that a qualitative methodology is required that can extend existing theory (Graebner et al., 2012).

For the sampling of the companies, the purposive sampling technique (Pettigrew, 1997; Guest et al., 2006) was used for both, the selection of the organizations in the business and management literature, and for the interviews of CEOs or managers of operations of the selected organizations. In the case of the interviews with experts, key informants from each organization were interviewed, remembering that this approach allows maximum variability following the principles of appropriateness and adequacy (Gaskell, 2000). We were able to gain insights regarding both similarities and contrasts among the cases (Guest et al., 2006). The executives who responded represent different multinational companies mainly from Mexico, the United States and some European ones (from Sweden). As it is common in qualitative research, data analysis begins at the end of each interview to validate whether there is data saturation, which means, that nothing new is found in each interview carried out. This saturation was identified in 12 interviews (Eisenhardt, 1989; Guest et al., 2006).

For the data collection in the first strategy of the analysis of the business and management literature, specialized databases (emerald insight, academic google, and the conversation) were searched for articles, notes and briefings that would indicate all companies that had made changes in their business models during the COVID-19 crisis. In total, 58 records were obtained. However, after the comparison with the theoretical framework obtained from Mintzberg (2010), the number was reduced to 22 sources (see table 2). The review work was detailed and exhaustive of the selected companies, WEB pages, reports, and promotional brochures and all material that would help to find the changes in business models and management practices in each case were analyzed. Not a simple matter for the privacy and confidentiality of the information of each organization in the world. As a next step, each of the selected cases is presented, having a “theoretical” sample trying to cover different sectors, countries and size of organizations as far as possible, and selecting those cases that had richer and deeper content based on the research question of changes in business models and managerial practices.

Table 2.- Companies selected for changes in business models and management practices in the business and management literature

Case Number	Country	Industry / Business sector	Employees number	Scope/Size	Year of foundation
1	Spain	Textile	More than 176,000	Large	1985
2	Spain	Finance/Banking	123,174	Large	1999
3	US	Internet services	135,301	Large	1998
4	US	Consumer Goods	1.13 million worldwide	Large	1994
5	MX	Publishing/Commerce	645	Large	1971
6	US	Cultural/Arts, entertainment and recreation (museum)	315	Large	1937
7	US	Food/Service (high end restaurant)	93	Medium	1887
8	MX	Hospitality/Lodging/Service	50	Medium	2009
9	MX	Food/Candies	360	Medium	2015
10	MX	Food/Service (restaurant)	30	Small	2012
11	Spain	Consumer Goods	93,500	Large	1977
12	MX Puebla	Entertainment/animals conservation center (and zoo)	400	Large	1972
13	Zurich, Switzerland	Hospitality/Lodging/Service (Luxury Business Hotel)	700 approximately	Large	1972
14	Switzerland	Banking/Finance/Trading	71,551	Large	1998
15	Amsterdam	Hospitality/Service (Grand Luxury Hotel)	200 approximately	Medium	Restoring in 2014 as hotel
16	US	Finance/Investments	More than 8,400	Large	1946
17	MX	Food/Manufacturing	127,152	Large	1945
18	MX Puebla	Cultural/Arts, entertainment and recreation (museum)	25	Small	1991
19	MX	Consumer goods/	More than 129,000	Large	1977
20	MX	Beverages/Manufacturing	17,000	Large	1991
21	UK	Consulting/Accountancy	11,200 UK 298,965 worldwide	Large	1989
22	MX Puebla	Food/Service (restaurant)	20	Small	1896

Source: by authors.

On the other hand, as indicated, semi-structured in-depth interviews were also conducted, which helped us to capture the phenomenon studied in greater depth with the directors and managers of

multinational companies that have made changes in their business models during the pandemic (Graebner et al., 2012). We were looking, in particular, for these changes through the stories told in the conducted interviews, finding vividness, concreteness and richness to the research phenomenon (Bluhm et al., 2011; Denzin and Lincoln, 2008; Graebner et al., 2012). The interviews were conducted between February 2 and May 21, 2021, most of them with CEO's and general managers in regional companies (eight interviews). These were based on an interview guide, which allowed the interviewers to spontaneously react to the respondents' statements (Eisenhardt and Graebner, 2007). The social distance and even the quarantine led to the interviews being carried out through electronic means, either by telephone or with a digital communication tool such as Zoom or Teams. The interviews were recorded for each respondent, on average the duration of each interview was 40 minutes, each of the interviews was transcribed at most 24 hours after its completion. See table 3.

Finally, during the data analysis the transcripts eliminated any "slang" words such as ("hello", "uh", "mmm", "I say", etc.) to only focus on the answers and their content. Once the transcripts of all the interviews had been completed, both authors read the texts in detail to carry out the open matter coding (Miles and Huberman, 1994; Corbin and Strauss, 2014), all this to determine how the data was carried out changes in business models and management practices forced by the COVID-19 pandemic. All the codes that emerged were analyzed iteratively on several occasions in order to ensure the reliability and validity of the findings (Sousa, 2014). At the end of the iterative analysis, a comparative exploration was carried out with the theoretical frameworks of change in business models and management practices of Mintzberg (2010) in a new final cycle to determine the final codes of the research.

Table 3.- Overview of the directors and managers interviewed

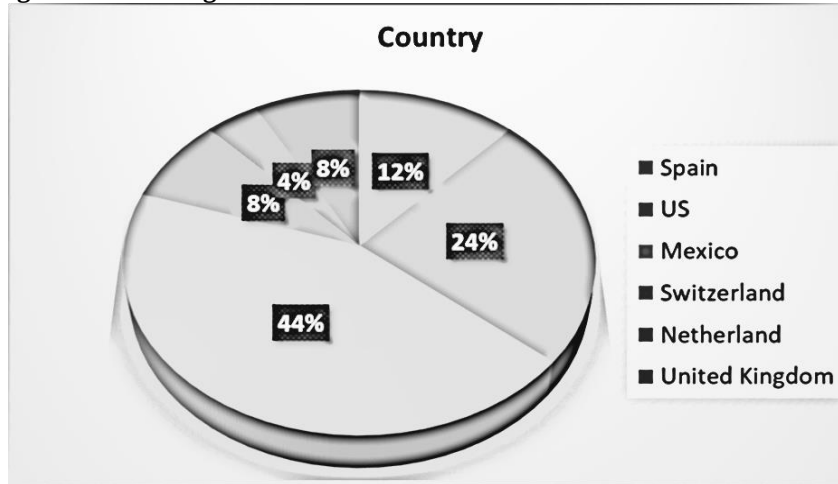
Respondent	Country	Company	Position and experience
R1	México	Candy production company	Chief Executive Officer
R2	México	High standing restaurant of beef	Chief Executive Officer
R3	Ecuador	Frozen fruit production company	International Manager
R4	México	Banking Company	Regional Operational Manager
R5	Sweden	Retailing and furniture Company	International Manager
R6	Japan	Auto parts supplier company	Supplier Manager
R7	México	Multinational auto parts supplier company	Assembly Manager
R8	México	Multinational food company	Operation Management Manager
R9	México	Supplier food company	Chief Executive Officer
R10	México	Auto parts supplier company	Chief Executive Officer
R11	México	Logistic company	Logistic Manager
R12	Singapore	Trade transport company	Logistic Manager

Source: By own

4. MAIN FINDINGS OF THE RESEARCH

The purpose of our study was to explore and understand how certain companies in the world have changed (or intend to change) their business models and management practices to cope with the global pandemic. As indicated, 22 case studies were analyzed from a documentary perspective and 12 in-depth interviews were conducted. In terms of results, graphics were made that allow analyzing the data worked in terms of countries, type of business sector and size of the companies taken as selected cases. Figures 1, 2 and 3 show the graphs of the results.

Figure 1. Percentage of countries in which the selected case studies are found



Source: by authors

For obvious reasons, the sample focuses on 44% of companies selected in Mexico due to the geographic location of the authors and for the focus in regional companies. While the second is United States 24%, 12% Spanish companies as third place in the sample due to their proximity and relationship with Mexican companies, and 8% were also studied in both the United Kingdom and Switzerland. Much of the data obtained from the selected cases is supported by the information and accessibility of the data in the reviewed sources. In this way, the graph of the size of the studied companies also shows variations according to the accessibility of the data, so that large companies represent 72% of the selected companies, which have published the most activities that have carried out during the pandemic, the same happens with medium-sized companies, but to a lesser extent (16%). Finally, small companies only accounted for 12%.

Figure 2. Percentage of size of the companies selected and analyzed.



Source: by authors

The results of the sectors of the companies studied were mainly focused on financial and banking organizations (20%), food and services (16%) and finally the hospitality industry (12%), together with manufacturing (12%). It is a fact that different sectors of companies around the world have tried different changes in their business models and management practices. In particular, companies in the banking and financial sector, and food services due to its proximity to customers, the need of change was extremely urgent. Once the demographic results of the companies studied have been analyzed, we return to the two research questions that govern this study, which are, *What kind of changes have been made to business models due to the COVID-19 pandemic of companies studied?* and *What management practices were identified in the changes of business models in the studied companies?* According to the evidence found in our study, it is reflected in the following table:

Table 4. Main results of changes in business models of the selected companies.

Case Number	Company	Industry (Industry and Business Sector)	Business Model Shifts	Findings in Managerial Practices	Source
1	Inditex	Textile	Lean business model, flexibility in adjusting orders, inventory levels and purchasing agreements (mainly with Zara); due to changes in demand of informal clothing	Developing actions and programs to support its supply chain workers and business communities to tackle the consequences of the pandemic. - Logistics and procurement capabilities available: In Spain, the distribution of PPE (personal protective equipment), ventilators, hospital tables, tests, robots to accelerate test processing. - Support for suppliers pertaining to guarantee payment for all orders and work with financial institutions for suppliers and manufacturers.	https://www.inditex.com/covid-19
2	BBVA	Finance/Banking	They change bank hours to avoid saturation in peak hours. It extremes precautions due to the new virus, open branches with minimum of staff. They ask their customers to use digital-mobile banking services, which operates 24 hours a day.	BBVA Asset Management & Global Wealth adheres to an international manifest as institutional investor, to ensure adequate funding to ensure fair and equitable access to tools to fight COVID-19. Launching the first social bonus COVID-19, as financial mechanism. In Mexico, it provides customers who request it with 4 months of deferral in the payment of their monthly payments.	https://www.bbva.com/es/actualidad/coronavirus/ https://www.bbva.com/es/bbva-am-se-adhiere-a-un-manifiesto-internacional-en-apoyo-a-una-respuesta-efectiva-justa-y-equitativa-frente-a-la-covid/
3	Google	Internet services	Testing its own capacity to work remotely. Some offices have shifted to a work-from-home status ensuring business continuity, while others are still operating as normal. Boosting the capabilities and adding resources of its tools and services to support and help their users, partners, customers and communities.	Setting up a 24-hour incident response team to make critical decisions about its offices globally. Donating ad credit to the WHO and government agencies, and funds to support relief efforts Working with the government to implement a chatbot on their website that helps answer citizens' most common questions.	https://blog.google/inside-google/company-announcements/coronavirus-covid19-response/
4	Amazon	Consumer Goods	Hiring new warehouse and delivery workers to meet increased demands for shipments. Enhanced cleaning and social distancing measures, and implemented disinfectant spraying and temperature checks across operations worldwide. Ramped-up onsite COVID-19 testing for employees. Encouraging contactless delivery to keep its customers safe. Using its logistics network to support UK Government to boost testing capacity delivering test kits to homes around the country.	Offering jobs to people who lose their jobs in other business sectors to join its teams until things return to normal. Helping vaccinate thousands of people through pop-up clinics. Investing in supporting employees, customers, and communities during the pandemic. Such as relief funds for partners, fair pricing for customers, and supporting virtual classrooms with no-cost resources from AWS (Amazon Web Services).	https://blog.aboutamazon.co.uk/amazon-actions-to-help-employees-and-customers-affected-by-covid-19 https://www.washingtonpost.com/technology/2020/10/29/amazon-hiring-pandemic-holidays/
5	Ghandi Libraries MX	Cultural/Publishing/commerce	Temporary store closures for governmental mandate. Digital store in operation, with free shipping throughout the country.	"Click and Collect" model for point of sales. Home Delivery (alliance with delivery suppliers) in Mexico City and Metropolitan areas. Finally, "Air Safe" system to design the Gandhi's olfactory logo	https://www.eleconomista.com.mx/artes-ideas/Librerias-comienzan-reapertura-de-tiendas-en-seis-

				(scent/aroma) for a sensory experience.	estados-del-pais-20200607-0062.html https://www.facebook.com/LibreriasGandhi/posts/10159651354744113/ https://www.gandhi.com.mx/ayuda/para-comprar/envios https://www.milenio.com/negocios/lectores-regresan-a-librerias-gandhi
6	Guggenheim Museum Bilbao Spain	Cultural/ Arts, entertainment and recreation (museum)	Implemented furloughs and pay reductions in an effort to contend the coronavirus pandemic. Projected a \$10 million revenue shortfall. Virtual museum exhibitions to appreciate from home, its world-famous collections online for anyone to view. It digitalized each floor to allow virtual visitors wandering its winding halls, top to bottom.	<i>During the visit:</i> Visitor capacity is reduced to 25% of maximum capacity. Mandatory to wear at all times a three-layer mask (N95 or equivalent) – all visitors over the age of two and all staff -. To maintain at least six feet of distance and one-way markers are located throughout the museum. Hand-sanitizer dispensers are stationed throughout the museum.	https://www.guggenheim.org/plan-your-visit/coronavirus-information https://ge.usembassy.gov/tour-these-american-museums-virtually-during-covid-19-pandemic/ https://www.nytimes.com/2020/04/10/arts/guggenheim-furloughs-staff.html
7	Restaurant Peter Luger US New York	Food/Service (high end restaurant)	Main change in the business model was switch its service practices from offering takeout, delivery and outdoor dining, to accept credit cards and going against its cash-only business practices.	Due to online ordering, there are lead times of 30 minutes and more. Reservations to dine with celebrity look-alikes (celebrity wax figures) in its website. New containers had to be brought in to fit food for two, instead of insisting that customers eat on-site.	https://people.com/food/peter-luger-steak-house-teams-up-with-madame-tussauds-for-star-studding-dining-experience/ https://ny.eater.com/2020/6/9/21271524/peter-luger-steak-house-coronavirus-photos-delivery-takeout
8	Hotel boutique Casa Lecanda MX Mérida	Hospitality/Service (Hotel)	It offers its guests the reservation of laboratory tests for the detection of COVID-19, according to your destination: Antigen test, (results in 2H) or PCR (results in 24h).The guests have direct service at its facilities.	Its check in, check out, guestrooms, public and common use areas, food and services processes adjustments based on strict COVID-19 protocol measures. QR codes will be used so that each guest can download it on their cell phone, there will be extra menus that, if used, must be disinfected after each use.	https://www.casalecanda.com/prueba-covid-19 https://www.casalecanda.com/en/protocol-covid
9	Candy factory MX Puebla	Food/Candies	Change operational process.	Process improvement and Kaizen effort to reduce operation cost.	http://www.la-josefina.com/site/es/index.htm
10	Los Sonorenses MX Puebla	Food service (Restaurant)	Consideration of strict hygiene and safety measures to take care of employees and customers, based on government guidance and restrictions.	The main change focused on cutting temporary staff, and of course continuing the Kaizen process improvement effort they had made before the pandemic. Therefore, the processes kept costs low at the time the pandemic caused the restaurant to close. Also, they used the home delivery “Pick up and Go”	https://m.facebook.com/lossonorensesparilla/
11	Mercadona Spain	Consumer Goods	Measures for protecting the health and safety of customers and employees, and the supply for their stores.	Only one person per household. People at-risk groups should not come to do their shopping. Staggered Shopping schedule throughout the day. Reduced shopping time spending and privileged credit card payment over cash.	https://info.mercadona.es/en/current-affairs/update-3-mercadona-is-adopting-the-following-measures-which-will-come-into-force-as-of-tomorrow-thursday-26th-march-2020/news

12	Africam Safari MX Puebla	Entertainment/animals conservation center (and zoo)	Temporary closures for governmental mandate, due to coronavirus pandemic. Only 80 out of 400 staff members (20 percent) in charge of the animals.	It asked people aid for the zoo, adopted two strategies to overcome the pandemic: Online selling of "Pasaporte 2020" with unlimited entrance after pandemic and subscribing to their Youtube channel to live streaming "Safari tras bambalinas" transmissions to observe animals and "Closed door experience" service for individuals or family members in a controlled environment.	https://www.e-consulta.com/nota/2020-12-29/sociedad/africam-safari-suspende-actividades-por-pandemia https://www.milenio.com/politica/comunidad/coronavirus-mexico-zoologicos-piden-apoyo-mantener-animales
13	Swissôtel Zürich Switzerland	Hospitality/Lodging/Service (Luxury Business Hotel)	The hotel was heavily dependent on the city's primary trade fairs. Over 60% of revenue at the Basel hotel came from trade fair bookings.	Change of market segment – from business clients to students who can get stunning views of Zurich and cheaper rooms.	https://watchesbysjx.com/2021/02/swissotel-le-plaza-basel-bankrupt.html#:~:text=Located%20just%20across%20the%20street,fairs%2C%20Art%20Basel%20and%20Baselworld.
14	UBS	Finance/Banking/Trading	The creation of a virtual reality (VR) trading floor using Microsoft HoloLens headsets.	In London, the technology helps traders to recreate the experience of being on a full trading floor from their homes.	https://www.finextra.com/newsarticle/36600/ubs-trials-virtual-reality-trading-floor https://www.reuters.com/article/us-health-coronavirus-finance-tech-insig-idCAKBN2840M2
15	Waldorf Astoria Hotel	Hospitality/Service (Grand Luxury Hotel)	Without guests or open dining rooms, hotels and restaurants in the Netherlands have had to turn to offering takeaway meals. All reservations at Waldorf Astoria Amsterdam – even non-cancellable stays – on or before June 30, 2020, are eligible for a full refund.	To provide a cleaner stay for guests with the creation of the Hilton CleanStay program, an industry-leading hygiene practice created to keep guests and employees safe. Grab & Go pre-plated and individually portioned options to breakfast and buffet service.	https://news.yahoo.com/michelin-rated-chefs-20-takeaway-123543370.html?guc-counter=1&guce_referrer=aHR0cHM6Ly93d3cuZ29vZ2x1LmNvbS8&guce_referrer_sig=AQAAAD7uZzDyzK-zdgrJ0a1O1ddnYWiNePXHzJomu5GHw-wt-PmPVwRu0ri69vKjLbms-uFIVPFMmEbgB-wGgqleAkzkDMSyJAH061e0eW13GPe-mDy-M_X-hpGi81Py108YCsH4jHLy6mKYWRjwbvRt36bapRi37_t6wVIF_yrENtZfU https://www.hilton.com/en/corporate/cleanstay/
16	Fidelity International	Finance/Investments	Due to the fact of COVID-19 pandemic, Fidelity decide to offer digital experiences for its investor and adviser network. As well as an increase of digital adoption rates for its own corporation.	Having internally explored virtual reality (VR) and augmented reality (AR) technology. Fidelity now aims to trial VR with its sales teams' interactions with clients.	https://www.investmentnews.com/fidelity-tests-virtual-reality-simulators-196697 https://www.reuters.com/article/uk-health-coronavirus-finance-tech-insig-idUKKBN2840NI
17	Grupo Bimbo MX	Food/Manufacturing	It has taken a set of measures to keep availability of products, take care of its people and give certainty to its clients and consumer amid the COVID-19 pandemic.	Prevention, health and security are the core of all its operations. Where the wellness of people are its priority, considering some preventive measures. Assuring availability of its products in Mexico and in the countries where Bimbo operates. The	https://www.grupobimbo.com/es/siempre-con-las-familias-covid-19 https://www.forbes.com.mx/coca-cola-alsea-y-femsa-se-protegen-contra-el-

			Vulnerable groups were sent home guaranteeing them payment and their jobs. The use of facemasks and protective face shields in operational, distribution and sales areas. Remote work for those whose functions allow it, and guards or special shifts.	company and its collaborators commit with all its stakeholders (consumers, clients, suppliers) that they are working to guarantee availability, fresh and safe products at the point of sale.	coronavirus-con- estas-medidas/
18	Museo Amparo MX Puebla	Cultural Recreation (museum)	The museum strengthens its virtual program and develops new contents to offer great variety of activities to all publics. Its purpose to attract them to Permanent Collection, Temporary Exhibitions and to offer them significant experiences regarding art through “El Amparo en tu casa” virtual program, that has conferences, podcasts, booklets for children, storytelling, social networks, virtual cinema cycles, among others.	In the museum’s openings amid the pandemic, it implements health and safety measures in all spaces in touch of visitors and employees. Instead of guided tours, the use of The “Amparo Plus App”, which offers audios to take a tour of the different exhibitions, is recommended.	https://museoamparo.com/en-linea https://museoamparo.com/noticias/detalle/734/reapertura-del-museo-amparo
19	OXXO MX	Consumer goods/	Oxxo has implemented a series of actions to protect its collaborators, among which: - It keeps its staff of collaborators without affecting their salaries. Over 17,000 employees belonging to groups in vulnerable situations were sent home with salary. For administrative positions, remote work for those whose functions allow it.	OXXO is contributing to the development of the community with jobs creation and vacancies availability, resulting in a 4.8% hiring rate during the contingency period. It seeks to generate economic and social value in the communities where they are present.	https://www.femsa.com/es/sala-de-prensa/comunicado/oxo-apoya-a-sus-colaboradores-ante-la-emergencia-sanitaria-del-covid-19/
20	Coca Cola México / Industria Mexicana Coca Cola MX	Beverages /Manufacturing	Prioritization of employees’ health and well-being following government sanitary directions for health and security purposes.	Coca Cola Mexico joins the DN-III plan of the Ministry of National Defense (SEDENA) delivering more than 231 thousand liters of bottled water to 35 military hospitals and the Institute of Health for Well-being, in addition to 25 thousand protective masks made with PET 100 % recycled. It promotes a #MiTiendaSegura initiative among retailers of small stores with recommendations to continue to open with confidence during the contingency period. It created #CokeStudio Sessions so that thousands of fans could see concerts, interact and donate to the Red Cross.	https://www.coca-colamexico.com.mx/impacto-positivo/covid19
21	Accountancy firm Ernst & Young (EY) UK	Accountancy/Consultancy	During lockdowns and COVID-19 restrictions, EY relies on its long-standing culture of flexible working based on a culture of trust and empowerment with their people that has been in place for many years prior to the pandemic. Based on government guidance, the company encourages people to work at home when they can, but its offices remain	Even after the coronavirus restrictions, the company will adopt a post-pandemic “hybrid working model”. It expects that its 17,000 employees will work remotely at least two days a week, EY office and clients site. On September 2021, it will initiate an experimentation stage considering a “hybrid working model” approach to ensure it meets the needs of its people, clients and other stakeholders. It will include a long-term program, to reconfigure EY offices, mainly to create more	https://www.accountancydaily.co/ey-confirms-move-hybrid-working-model https://www.ey.com/en_uk/news/2021/05/ey-confirms-move-to-hybrid-working-model

			open whenever they need to work at the office.	collaboration, meeting spaces and group working.	
22	La Chiquita MX <u>Puebla</u>	Food/Service (restaurant)	Temporary and intermittent closures during COVID-19 pandemic respecting state government measures, to prevent employees and customers getting sick caused by the spread of this virus.	The company decided to commit with its suppliers network in the delivery of its gastronomic concept to its customers. They decided to help each other maintaining sales and allowing them to overcome their economic crisis, through the collaborative work and alliance with “La Luz” potters, an artisan from Ajalpan and a “San Francisco” bread oven. Therefore, Local Consumption is part of its social responsibility.	https://www.periodico central.mx/2020/ra yas/vidayestilo/item/11929-la-chiquita-hace-alianza-con-artesanos-y-horno-de-pan-en-puebla-para-salir-adelante-en-medio-de-la-pandemia-de-la-covid-19

Source: By the authors.

As we have observed in the 22 cases studied in a documentary way, plus the 12 semi-structured in-depth interviews, there are different changes in the business models of the companies studied, as well as their management practices. On the subject of business models, changes were found from movements in the organizational structure, reduction of personnel, redesign of processes, application of new information technologies, new sales channels and even new lines of business. On the management practices side, the variety is likewise wide. Most of them, focused on preventive health measures to face COVID-19 and the approach to the client-target. On the other hand, some of these practices focused on the incorporation of information technology to continue executing the processes (zooms, teams, google -meet among several others). Supported by the findings, both the changes in business models and management practices were specifically focused on four large specific clusters that are listed below:

4.1 MANAGAMENT SYSTEM’S DESIGN CHANGES

The original business model of the companies studied had to change radically when “closing their operations due to the pandemic”. Therefore, some of these companies (Cases 1, 2, 6, 8, 13, 14, 17, 22) had to make changes to the strategic design of their business model and of course their management system on a radial basis. The vision and mission of these organizations changed radically, causing the Operation of the business model to change into a new management system that would allow them to survive. Management practices such as: opening new lines of business like home deliveries, intensifying online sales, incorporation to platforms as Amazon, Mercado Libre or Alibaba, even remodeling of specific space of its facilities to protect customers and employees (bulkheads plastic, specialized cubicles) were common.

In other cases, modifications were made to the delivery capacity of the service and / or products based on government restrictions aligned to COVID-19 preventive measures and protocols, reducing personnel for customer service, and / or making use of other modalities to delivery and distribution as "click and collect" or "pick up and go" or home delivery. In addition, some even had to make a radical change in their strategy of the market segment that the company is targeting to become its new customer, to take advantage of the company's current infrastructure and operations and avoid closure. For a manager of a Japanese company, this pandemic meant the following in terms of strategic design:

“For us, the pandemic was the biggest challenge we have had as an organization, because it changed our entire strategy, and of course our operating standards. We had to leave the traditional routines and design new alternative strategies that we never would have thought of total change (E-CE-R-6)”.

4.2 MANAGERIAL INNOVATION AND INFORMATION TECHNOLOGIES.

Management innovation supported by information technologies were critical management practices that helped change the business models of the studied companies. Within the case studies, some of them applied virtual reality (VR) and augmented reality (AR) technologies for interactions between the different work groups within the company and abroad with clients and other interest groups (stakeholders and stockholders) for the purposes of negotiations and project deliveries. Other

groups trained their staff using this technology (VR) and (AR) and created virtual visits and tours, development of digital content for courses, workshops, conferences and conversations of particular and general interest.

One of the most interesting cases found in the investigation was the company that, when applying the practice of managerial innovation, used new elements for the concept of the original business model from another industry, such as celebrity mannequins made of wax on the tables of diners to meet the required social distance measure. It became common practice to use QR codes for data visualization on smartphones or tablets, such as the menu in a restaurant, and to avoid the use of printed materials.

4.3 APPLICATION OF PREVENTIVE HEALTH SYSTEMS TO FACE COVID-19.

The most common change found in all the documentary and semi-structured interview cases was the implementation of processes and sanitary measures to face COVID-19. From sanitation control points, the promotion of hybrid or remote work, to training courses for physical presence with healthy distance. All the companies aligned themselves with these COVID-19 preventive measures and the WHO (World Health Organization) protocols, in order to take care of the health and physical integrity of all the stakeholder groups inside and outside the companies. A Mexican manager of the candy companies commented:

“Our factory has totally changed the way it operates as a result of COVID-19, we had to introduce sanitary filters for sanitary control, awareness courses, some of the support with the Mexican Institute of Social Security, the reality... is that our main concern is the health of employees, and at the same time continue our operation (E-CE-R-1)”.

4.4 HYBRID WORKING MODELS, TELEWORKING AND SOCIAL RESPONSIBILITY

Management innovation supported by information technologies were critical management practices that helped change the business models of the studied companies. Within the case studies, some of them applied virtual reality (VR) and augmented reality (AR) technologies for interactions between the different work groups within the company and abroad with clients and other interest groups (stakeholders and stockholders) for the purposes of negotiations and project deliveries. Other groups trained their staff using this technology (VR) and (AR) and created virtual visits and tours, development of digital content for courses, workshops, conferences and conversations of particular and general interest.

One of the most interesting cases found in the investigation was the company that, when applying the practice of managerial innovation, used new elements for the concept of the original business model from another industry, such as celebrity mannequins made of wax on the tables of diners to meet the required social distance measure. It became common practice to use QR codes for data visualization on smartphones or tablets, such as the menu in a restaurant, and to avoid the use of printed materials. Finally, in the cultural entertainment and recreation (cases 6 and 18), the companies decided to design virtual programs as a mean to continue interacting with their audiences. This practice led them to digitalize each floors' exhibitions as virtual tours or the use of an app replacing a guided tour on site.

5. DISCUSSION OF THE FINDINGS

It is a reality that the pandemic is starting to decrease as a result of the advance in vaccination around the world. However, new variants of the COVID-19 disease such as Delta, Gamma, Omicron have been discovered; which indicate that the pandemic may continue for a longer period. In terms of the theoretical contribution of the research, it was possible to identify with the analyzed case studies in documentary cases and interviews, some interesting insights of the changes in the business model and management practices in the midst of the COVID-19 pandemic.

Focused on changing the business model and based on the first research question: *What kind of changes have been made to the business models due to the COVID-19 pandemic in the companies*

studied? It is essential to indicate as a conclusion that, there were several changes in the organizations studied in their business models. If we observe some specific changes focused on the creation of new business lines such as: online sales, “click and collect” or “pick up and go” or home delivery, changes in supply chains and inventory systems (to reduce costs), new products adapted to the online modality, new services in the hotel industry, and the creation of other market segments and new customers. This finding fully coincides with the definition of Johnson et al., (2008) where it is indicated that the key of the business model is the creation of profit. It is a fact that the companies studied were trying to survive and generate profits despite the situation of the COVID-19 pandemic. At all times they tried to generate cash flow to continue making profits, but at the same time maintain the operation, despite the restrictions that existed in 2020 and part of 2021. In fact, our findings confirm much of the recent literature of the subject (Krauss et al., 2020; Norris et al., 2021; Deniszi et al., 2021).

For the second research question: *What management practices were identified in the changes in business models in the companies studied?* Our findings are broad for the companies studied (see table 4). In order to generate an in-depth discussion in light of the theoretical framework of Mintzberg (2010), a comparative table is shown below.

Table 5. Theoretical contribution on the subject of managerial practices

Plan and Practice (Mintzberg 2010)	Finding of the research	Case Study Observed
Information plane Mental frame planning	√	-Interviewed - All cases in terms of planning of preventive measures and restricted operation.
Program	√	-Interviewed - All cases in terms of planning of preventive measures, new lines of business and restricted operation.
Internal communication outside of the manager's area.	-	Little evidence of this managerial practice.
Control-Direction	√	-Interviewed - Virtually all of the scarce especially those evolved into remote work, hybrid models, Kaizen projects, and online sales.
Negotiation with the outside	√	-Interviewed - In particular, the cases that had operations with supply chains such as cases 13,15,21,22.
People plane Vitalize people	-	Little evidence of this managerial practice.
Create work-teams	√	Virtually all of the scarce especially those evolved into remote work, hybrid models, Kaizen projects, and online sales.
Develop and train staff	√	All the cases studied that incorporated sanitary measures, and other cases that focused on new technologies.
Strengthen an effective and efficient work culture	√	-Interviewed - Companies that worked on Lean and Kaizen; and hybrid models. The cases found were: 4,5,10,11,12,21.
Action plane Manage special projects	√	All the cases studied that incorporated sanitary measures, and other cases that focused on new technologies.
Manage and solve problems	√	All the cases studied that incorporated sanitary measures, and other cases that focused on new technologies.
Generate operational innovations	√	In particular, the cases studied such as cases 5, 7, 8, 9, 13, 15, 16, 18, 20 and 21.

Source: Authors

As it can be seen in the light of the theoretical comparison, 84% of the management practices of the Mintzberg Model (2010) were used by the cases studied and the interviews carried out. Which answers the research question in our study.

6. FINAL CONCLUSION

According to the evidence found both in the interviews and in the cases found in the documentary information, it is feasible to answer the question that governs our research: *Do we have to change our business models and managerial practice in COVID-19 times?* The answer of this important question, it is yes as a final conclusion, therefore it is necessary to change the business model because the world environment has changed due to a strong and forceful exogenous variable, the COVID-19. Thus, changing the business model and management practices of the organizations studied is a matter of survival and competitiveness. The lessons learned that emerged during our research work are listed below.

1. The companies studied both in a documentary way and in a semi-structured interview made changes in their business models. All sought the generation of profits from new perspectives and / or lines of business derived from the restrictions caused by COVID-19. It is a certainty that these organizations changed their core-business and their strategic vision at the time as evolving into new ways of producing income for the organization. In fact, according to Krauss et al., (2020) several of these changes in business models could last after the pandemic. Our findings confirm this argument by validating the same argument in the interviews carried out.

2. Similarly, the management practices of the Mintzberg (2010) model were applied in practically all the cases studied (except for two specifically - 84% -). It should be noted that in conclusion, all the management practices studied were applied in a profound and disciplined manner, probably due to the "crisis" that the organizations were in the midst of the COVID-19 pandemic. However, this finding has to further be investigated.

3. Each studied company showed that when there is a crisis (the COVID-19 pandemic), the reduction of operating costs is essential in the creation of financial value of the same. In particular, this finding was found in regional companies derived from the restrictions of the government of Puebla and Mexico.

4. The systematic, standardized, and professional implementation of managerial innovation and information technologies as managerial and technical practices that not only copes with the COVID-19 pandemic, but also as strategic mechanisms that generates value added for all stakeholders in each organization.

Finally, the article has several limitations that restrict the generalizability of the results. A theoretical generalization is possibly supported in the context of the data obtained. However, much more research and a much more in-depth look at the documentary cases remains to be done, when the conditions of the COVID-19 pandemic permits. In other words, the case study method can be applied for the 22 documentary cases and 12 in-depth interviews. Furthermore, the design of a global quantitative research approach in the global environment of the pandemic could begin to be created. As authors, we are aware of these restrictions, but we know that this research is a first step to understand more deeply how the COVID-19 pandemic affected companies in terms of changes in business models and management practices.

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Artigo submetido a 31 de Julho de 2021; versão final aceite a 29 de Março de 2022
Paper submitted on July 31, 2021; final version accepted on March 29, 2022

CoViD-19 During the First Pandemic Wave in Mexico Valle and Mexico City: A Spatial Analysis Approach in Small Areas

CoViD-19 Durante a Primeira Onda Pandêmica no Valle de México e na Cidade do México: Uma Abordagem de Análise Espacial em Pequenas Áreas

Jaime Alberto Prudencio Vázquez

japv@azc.uam.mx

Departamento de Economía, Universidad Autónoma Metropolitana, Unidad Azcapotzalco

José Antonio Huitrón Mendoza

jose_eco71@comunidad.unam.mx

Facultad de Economía, Universidad Nacional Autónoma de México

Abstract

The first cases of the CoViD-19 disease in Mexico came from abroad in February 2020. Communitarian propagation accelerated the infection in the big metropolitan areas of Mexico, such as Valle de México Metropolitan Zone (VMMZ), where were located the biggest people concentration in the country. In this study, we evaluate the spatial distribution of the positive cases and deaths in VMMZ at municipality level through a spatial econometric model that include socio demographic and economic variables, besides we explore the active cases in México City at neighborhood level. We found significant spatial effects, most notably in positive cases, that could help to explain the stage of the disease, in both municipality and neighborhood. The model shed light to observe how the CoViD-19 hits harder at the municipalities more densely populated and where the urbanization process was deeper, compared with those peripheral, nevertheless, worst living conditions also exhibit a positive relationship, in both positive cases and deaths.

Keywords: CoViD-19, spatial econometric analysis, Valle de México.

JEL classification: I14, R19, C59

Resumo

Os primeiros casos da doença CoViD-19 no México vieram do exterior em fevereiro de 2020. A propagação comunitária acelerou a infecção nas grandes áreas metropolitanas do México, como a Zona Metropolitana do Vale do México (VMMZ), onde se localizava a maior concentração de pessoas na região. Neste estudo, avaliamos a distribuição espacial dos casos positivos e óbitos em VMMZ em nível municipal por meio de um modelo econométrico espacial que inclui variáveis sociodemográficas e econômicas, além de explorarmos os casos ativos na Cidade do México em nível de bairro. Encontramos efeitos espaciais significativos, principalmente nos casos positivos, que poderiam ajudar a explicar o estágio da doença, em ambos os níveis município e bairro. O modelo lançou luz ao observar como o CoViD-19 atinge mais fortemente os municípios mais densamente povoados e onde o processo de urbanização foi mais profundo, em comparação com os periféricos, no entanto, as piores condições de vida também apresentam uma relação positiva, tanto nos casos positivos como nos óbitos.

Palavras-chave: CoViD-19, análise econométrica espacial, Vale do México

Código JEL: I14, R19, C59

1. INTRODUCTION

The vaccine program in Mexico started on December 23rd, 2020, nevertheless, up to June 22nd 2021, almost 2.5 million cases of CoViD-19 and 231.3 thousand deaths were reported in Mexico (Dong, Du and Gardner, 2020). As in the other countries but China, in Mexico the novel coronavirus, SARS-CoV-2, came abroad in February 2020. After some weeks, the communitarian propagation accelerated contagion in the big metropolitan areas of Mexico, such as México Valle Metropolitan Zone (VMMZ). The risk of exposure of the virus and hence the risk of death by CoViD-19 are associated with geographical, social, economic, and even climate and pollution factors (Coccia, 2020; Qiu et al., 2020; Sannigrahi et al., 2020).

The VMMZ is an extremely inequal metropolitan area where the gap between the highest and the lowest municipality per capita income is almost 6 times in 2015 (PNUD, 2019). There is evidence that these sociodemographic disparities have contributed to explain the differences at positive cases and death at a local level. Jaramillo (2021) shows how the poorest settlements in Mexico City have registered the highest number of cases compared to the neighborhoods where people of a higher socioeconomic level live. Hernández (2020) presents evidence of the high rate of infections among the population that shares the following characteristics: low schooling, inadequate nutrition, comorbidities, living with a certain degree of overcrowding and in localities where there is a deficit of access to basic services, all this combined with precarious economic conditions, forced them to have breaking the confinement and exposing themselves to contagions. These ideas about how the population with the greatest economic limitations are those that are most exposed to contagions and their consequences are also present in several studies (Rivero, 2020; Guillón, 2021; Galindo, 2020 and Rivera, 2020).

At the same time, the geographical characteristics of the disease spread have been a research topic in epidemiology a long time ago as well as the use of spatial analytical tools in epidemiology and other disciplines. From the famous cholera map by John Snow (1813-1858), father of modern epidemiology, various methodologies and techniques have been developed where geographic analysis is used to understand the processes of spread of infectious diseases. This is documented by Cliff et al., (1981) where, from a multidisciplinary perspective, a historical review is offered on the centrality of geographical elements in the analysis of the dynamics of epidemics. In the same direction, Smallman-Raynor and Cliff (2004) detailed, from a historical perspective, disease spread patterns in military and civil conflicts. The key argument here is that geography is a node that connects epidemiology with other disciplines, in such a way that its analytical capacities are enhanced.

Regarding the CoViD-19 pandemic, there have been attempts to explore the spatial effects of the transmission. Multiple studies use geographical information systems (GIS), to explore the spatial patterns of concentration of infections associated with the characteristics of the population, as well as multiple variables associated with the urban environment (Ghosh and Cartone, 2020; Cordes and Castro, 2020; Sun et al., 2020; Kang et al., 2020, Franch-Pardo et al., 2020; Molallo et al., 2020). The differences at socioeconomic level like income and poverty (Sannigrahi et al., 2020) and specific occupational sectors (Mongey and Weinberg, 2020) have been mentioned as relevant characteristics to explain the spread of infections and risk of contracting the disease. Moreover, the spatial relations between the infection and socioeconomic characteristics are also part of the discussion (Maroko et al., 2020).

In geographical studies and in other disciplines such as medicine there is a problem called ecological fallacy (Schwartz, 1994; Piantosi et al., 1988; O'Sullivan and Unwin, 2010: 39-40; Harris, 2006). In a nutshell, this problem could be characterized as follows: results from geographic data at a certain aggregation level could not be correct when they are extended to others aggregation levels due to the heterogeneity presented in the data and could carry to inexact inferences.

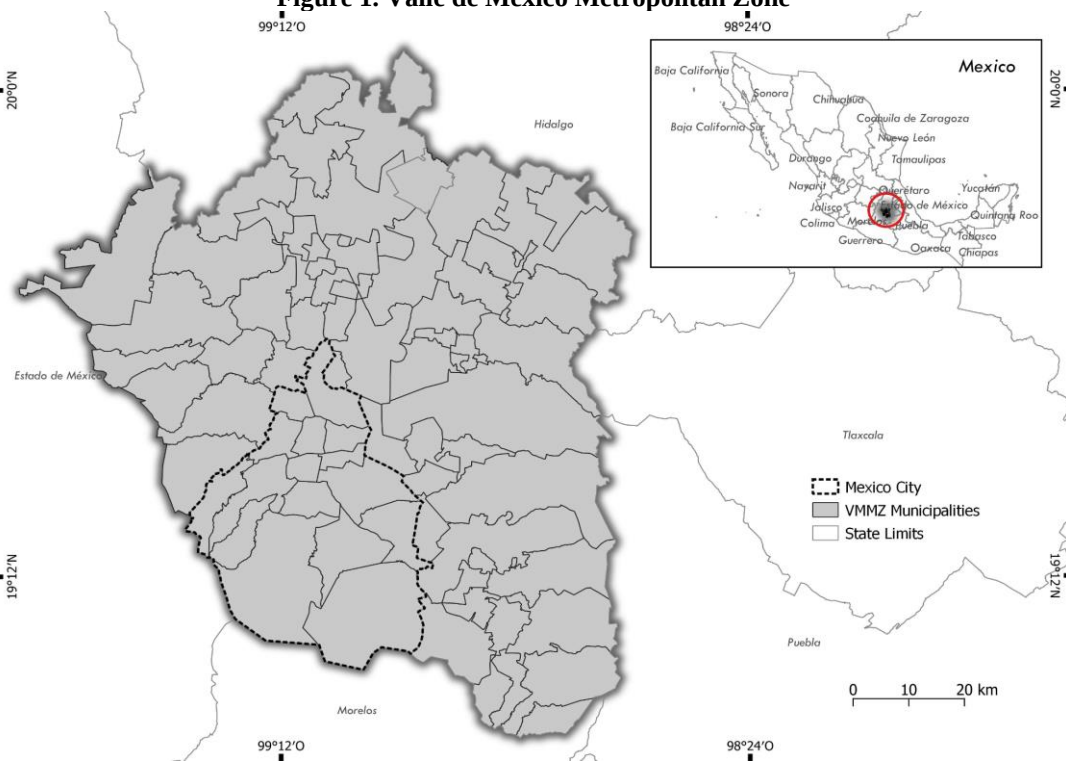
In this context, there are two objectives in this paper. First, we evaluate the spatial distribution of the positive cases and deaths in VMMZ at municipality level. Secondly, we explore the active

cases in México City at neighborhood level. The remaining document is structured as follows. The next section shows a general picture of the first pandemic wave at VMMZ and explores the presence of spatial autocorrelation through classical measures. Then, we propose an econometric spatial model in search of capture the geographical effects of the disease at municipality level and its association with economic and social characteristics of the spatial area units between February and September 2020, when the first pandemic wave took place. The next section is dedicated to the spatial exploration of the active cases at neighborhood level only for México City where we compare and comment on the results of this and the previous section in the context of the ecological fallacy problem. The fifth section is dedicated to the discussion of our results and some recommendations.

2. THE PANDEMIC COURSE OF VALLE DE MÉXICO METROPOLITAN ZONE

With a population of almost 22 million people by 2020, VMMZ is the biggest metropolitan area in Mexico and one of the most in the world. The VMMZ is integrated by 76 municipalities, a local administrative delimitation in Mexico, that belongs to three different states (intermediate administrative level): México City, Estado de México, and Hidalgo.

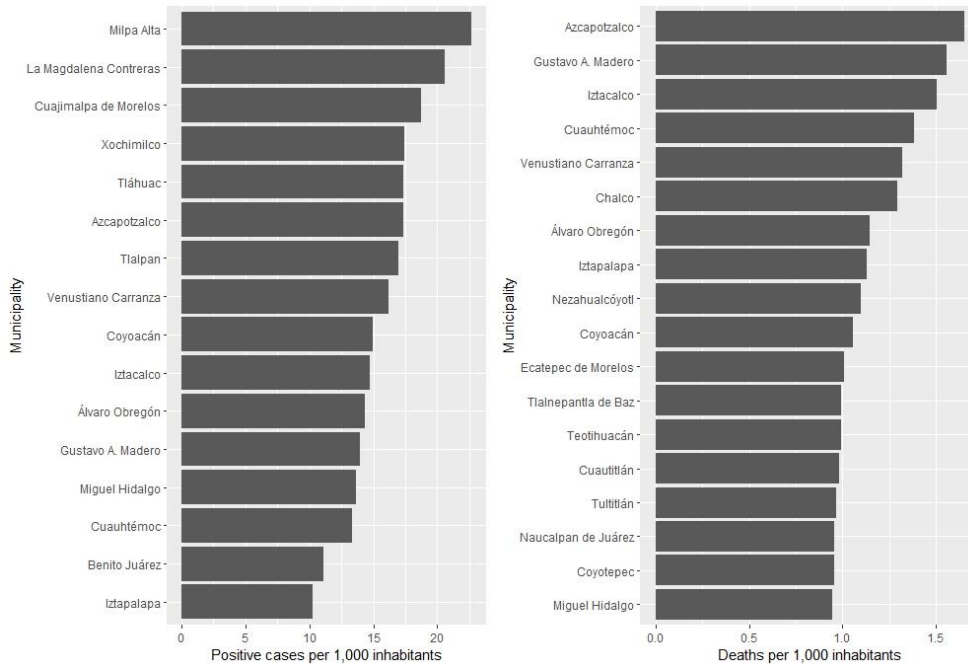
Figure 1. Valle de México Metropolitan Zone



Source: Own elaboration based on INEGI (2020). National Geostatistical Framework.

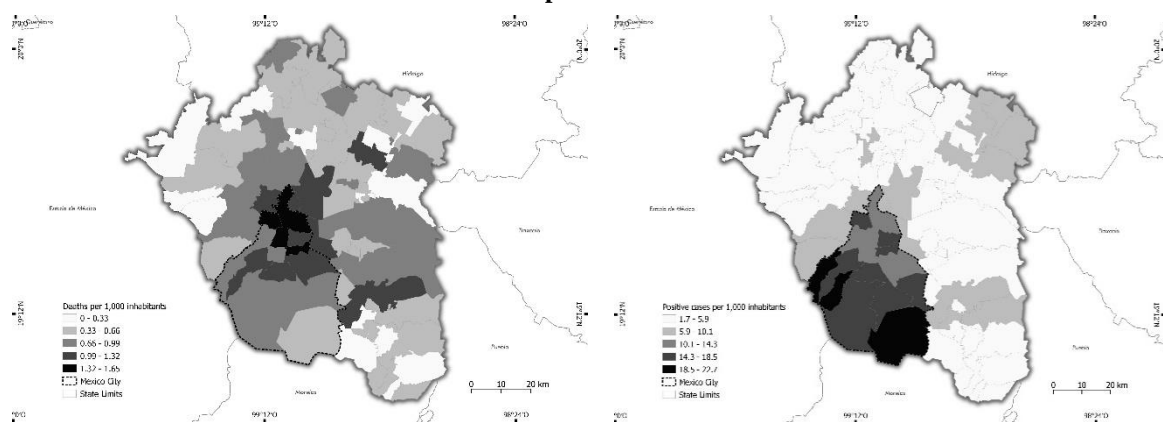
Between March 1st to September 30th 2020, 198 thousand 664 positive cases of CoViD-19 and 20 thousand 497 deaths caused by this disease were recorded at VMMZ, the most in México City. The municipalities of Milpa Alta, La Magdalena Contreras and Cuajimalpa de Morelos, showed the higher number of positive cases while on the other hand, Azcapotzalco, Gustavo A. Madero and Iztacalco, showed the higher number of deaths per thousand people respectively. Moreover, the spatial distribution of both variables differs: whereas the positive cases are in the southern (figure 2 and 3), the deaths are grouped in the center municipalities, with some North and Northeast municipalities in the third classification group.

Figure 2. Positive cases and deaths per 1,000 inhabitants in Valle de México between March 1st to 30th September 2020



Source: Based on National Epidemiological Surveillance System (SINAVE), Mexican Government.

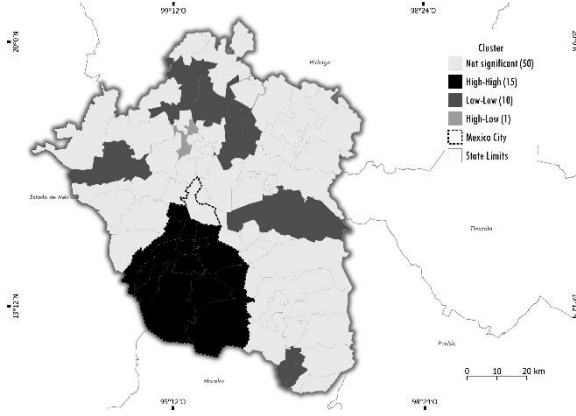
Figure 3. Positive cases and deaths per 1,000 inhabitants in Valle de México between March 1st to 30th September 2020



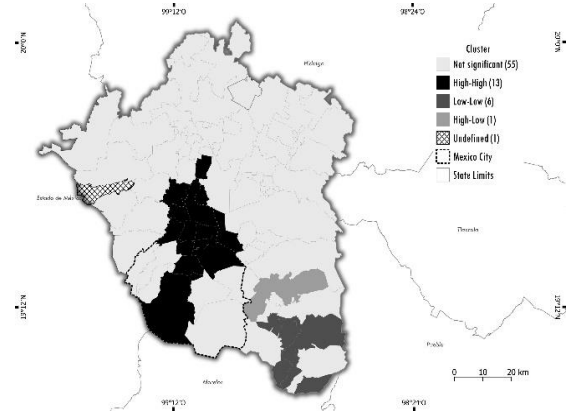
Source: Based on National Epidemiological Surveillance System (SINAVE), Mexican Government.

In order to statistically verify the concentration of data on positive cases and deaths, the Local Indicators of Spatial Association (LISA) were estimated (Anselin, 2020). LISA identifies hot-spots and cold-spots by grouping and evaluating local autocorrelation. This lets us know which municipalities exhibit a spatial relationship with the positive cases and deaths and this can be used to explain the whole process. The results appear in figure 4.

Both positive cases and deaths exhibit a positive statistically significant Moran Index. The null hypothesis (H_0) of no spatial autocorrelation is rejected in favor of the alternative hypothesis (H_a) of spatial autocorrelation. This is because the values of the estimated index are far from the value of the simulated index, the pseudo p-value is close to zero and the z values are high. Beyond statistical significance, the point to be highlighted in the analysis is that spatial effects are identified in infections. This is evidence of the relevance of capturing those effects on a model, like we tried in the next section.

Figure 4. Clusters of positive cases and deaths in the ZMVM**Cluster map of positive cases per 1,000 inhabitants**

Moran Index: 0.659 | Simulated Moran Index: -0.0130 | Pseudo-P-value: 0.00001 | Z:8.83 | SD: 0.0761 | Permutations: 99,999, Spatial weights contiguity configuration: queen first order.

Cluster map of deaths per 1,000 inhabitants

Moran Index: 0.486 | Simulated Moran Index: -0.0135 | Pseudo-P-value: 0.00001 | Z:6.83 | SD: 0.0771 | Permutations: 99,999, Spatial weights contiguity configuration: queen first order.

Source: Own estimates based on data from the Ministry of Health, Mexico.

3. THE SPATIAL ECONOMETRIC APPROACH AND RESULTS

Spatial econometrics offers some advantages compared to the simple cross-sectional, both technical and theoretical (Baltagui, 2001). On one hand, from the technical point of view, by estimating a spatial model would be possible to solve the problem associated with the errors correlation with an ordinary least squares (OLS) conventional estimation. On the other hand, it is possible to incorporate the spatial nature of such a phenomenon like diseases (Musa, 2013; Rezaeian et al., 2007). Besides the linear model estimated with OLS, we present the results of two different spatial models: lag model (Lag, equation 1) and error model (Err, equation 2). Lag incorporates as an explanatory variable the weighted average of the interest variable, *spatial lag*, through an instrument that captures the spatial relation of the municipalities, spatial weights matrix. Error use the spatial structure to incorporate the autocorrelation through the error terms (Helhorst, 2006: 6):

$$Y = \delta WY + \alpha 1_N + X\beta + \varepsilon \quad (1)$$

$$Y = \alpha 1_N + X\beta + u \quad (2)$$

$$u = \lambda Wu + \varepsilon$$

In the Lag model, Y corresponds to the vector of dependent variable, X represents the matrix of explanatory variables, β stands for the estimated coefficients associated with each of the independent variables, W is the spatial structure in both cases, we define the spatial structure through an order one queen spatial weights matrix and WY represents the spatial lag or weighted average of the Y value of the neighbors, δ is the associated coefficient and ε is the error term. Meanwhile, λ refers to the estimated coefficient that captures the spatial autocorrelation through the errors of the model, and ε is the usual pure aleatory error (see Anselin, 2005 and Helhorst, 2006 for details).

We seek to explain the level of the first pandemic wave in VMMZ, positive cases and deaths per thousand inhabitants between March 1st to September 20th, 2020, through four types of variables: i) social, ii) urban and housing, iii) occupational structure and iv) average salaries, such as appears in Table 1.

Table 1. Sociodemographic and economic determinants

<i>Dependent variables</i>		
COVID19	pos dth	Positive cases per thousand people Deaths per thousand people
<i>Sociodemographic</i>		
Social	ss	Population with health services (%).
	hgr	Population >12 yo with higher education (%).
	im	Marginalization 2020 (index).
Urban and housing	den	Population density (people per km ²)
	memb8	Population living in households with 8 or more members (%)
	bdr3	Population in dwellings with 3 bedrooms or less (%)
	rm1	Population in dwellings with only one room (%)
<i>Economic</i>		
Occupational structure	poind	Employed personnel in industry (electricity, construction and manufacturing)
	pocom	Employed personnel in commerce (wholesale and retail)
	poss	Employed personnel in services (remaining sectors except agriculture)
Average salaries	rmind	average salaries in industry (electricity, construction and manufacturing)
	rmcom	average salaries in commerce (wholesale and retail)
	rmss	average salaries in services (remaining sectors except agriculture)

Positives cases and deaths per thousand people were constructed based on the National Epidemiological Surveillance System (SINAVE) provided for Mexican central government, sociodemographic and economic variables were obtained from the Population Census 2020 and Economic Census 2019, both published by the National Institute of Statistics and Geography (INEGI). We use R software (R core team, 2013) and their packages *spdep* (Bivand, et al. 2018) and *spatialreg* (Bivand et al., 2021) to evaluate spatial dependence and to estimate spatial econometric models, respectively. Based on equation 1 and 2, we propose two different models, the first one for the positive cases and the second one to the deaths, both in logarithmic form:

$$pos_i = \alpha + \delta W pos_i + \beta_1 ss_i + \beta_2 hgr_i + \beta_3 rm1_i + \beta_4 poss_i + \beta_5 rmind_i + u \quad (3)$$

$$u = \lambda Wu + \varepsilon$$

$$dth_i = \alpha + \delta W dth_i + \beta_1 im_i + \beta_2 den_i + \beta_3 memb8_i + \beta_4 bdr3_i + \beta_5 poind_i + \beta_6 pocom_i + \beta_7 poss_i + u \quad (4)$$

$$u = \lambda Wu + \varepsilon$$

When in equation 3 and 4, $\lambda = 0$ we have a Lag model, and when $\delta = 0$ it is an Err model. Following Anselin (2005), we test a linear model estimate with OLS, Lag and Error models and the spatial diagnosis, as usual. The results, and diagnostics appear on Table 2 and Table 3.

Table 2. Models for positive cases

Variable	OLS	Lag	Err
Intercept	3.939 0.75604 ***	1.382 0.723 *	2.411 0.940 **
ss	1.388 0.68321 **	0.774 0.553	0.874 0.632
hgr	0.508 0.24592 **	0.224 0.204	0.185 0.247
rm1	0.301 0.13658 **	0.107 0.112	0.019 0.146
poss	0.662 0.28587 **	0.315 0.240	0.557 0.245 **
rmind	0.197 0.09208 **	0.175 0.0742 **	0.157 0.071 **
delta (δ)		0.565 0.098 ***	
lambda (λ)			0.678 0.094 ***
sqr R	0.551	0.683	0.695
Adj sqr R	0.519	ND	ND
Akaike C.	105.2	87.0	82.6
N	76	76	76
<i>Spatial Diagnosis OLS</i>			
Moran		0.278	
LM-Lag		17.74 ***	
LM-Err		12.19 ***	
LM-Lag rob		5.54 **	
LM-Err rob		0.000	

Note: *** Significant at the 99% level, ** Significant at the 95% level, * Significant at the 90% level.

Table 3. Models for deaths

Variable	OLS	Lag	Err
Intercept	-34.770 13.204 **	-35.194 12.485 ***	-34.771 12.492 ***
im	9.374 3.375 ***	9.445 3.189 ***	9.377 3.193 ***
den	0.147 0.046 ***	0.155 0.047 ***	0.147 0.044 ***
memb8	0.726 0.232 ***	0.719 0.218 ***	0.728 0.218 ***
bdr3	3.805 1.817 **	3.762 1.716 **	3.816 1.720 **
poind	0.515 0.1603 ***	0.510 0.152 ***	0.515 0.152 ***
pocom	0.497 0.287 *	0.483 0.271 *	0.499 0.271 *
poss	1.397 0.416 ***	1.394 0.394 ***	1.399 0.393 ***
delta (δ)		-0.054 0.122	
lambda (λ)			0.006 0.167
sqr R	0.663	0.664	0.663
Adj sqr R	0.627	ND	ND
Akaike C.	69.0	70.8	69.0
N	76	76	76
<i>Spatial Diagnosis OLS</i>			
Moran		0.002	
LM-Lag		0.183	
LM-Err		0.001	
LM-Lag rob		0.428	
LM-Err rob		0.245	

Note: *** Significant at the 99% level, ** Significant at the 95% level, * Significant at the 90% level.

3.1 Positive cases

All the proposed variables in the OLS model, equation 3, for positive cases are positive and significant and the explanatory variables can explain nearly 50% of the variability of them. The OLS model presents autocorrelation (Moran equal to 0.27), which is an indicative for the relevance of a spatial model. The spatial diagnostic reveals that the Lag model is the best as is shown by the Lagrange multiplier test in their robust form.

The model reveals a positive relation between people with access to health services (ss) and positive cases. This fact perhaps reflects that greater access to social security is linked to an effective detection of cases, which could prevent them from evolving into death. Besides, this variable has the biggest coefficient of all explanatory variables.

It is possible to note a positive association between the places with populations with higher education (hgr) and positive cases, nevertheless it is relevant to keep in mind the fact that there are several municipalities in the VMMZ with people living in semirural areas at peripheral places. So, the identified relation could be explained because this first wave took place fundamentally in larger urban areas, as it is shown in Figure 3, where the people usually have a higher formal education.

The Mexico central government, as in many countries around the world, recommended keeping physical distance to prevent the contagion but it is not always possible to keep adequate physical distance at home when one of the family members catches the virus if there are not enough rooms at the house. So, our model reveals that the greater the proportion of people that live in houses with only one room (rm1), the higher the number of positive cases is.

Like many other big cities, the VMMZ is predominantly a service city with 55% of the occupied people laboring in this sector. The proportion of people occupied in the service sector (poss) has the second bigger coefficient associated with positive cases. Again, the central municipalities exhibit a higher proportion of occupied persons at services and are more densely populated.

Finally, between the economic structure the average salaries at industry (rmind) evince a direct relation with positive cases. While the spatial distribution of the industry salaries does not follow the same pattern as positive cases, this is indicative of the relevance of the economic structure.

Regarding the spatial models, not only the sign of the estimated coefficient associated to the spatial lag, delta, is positive and highly significative, besides it helps to elevate the explanatory power of the model, nevertheless, the other variables are not significant anymore, except the industrial salaries. Something similar occurs with the Error model, where the coefficient lambda is

positive and highly significant, too. The spatial diagnosis, according to the Lagrange multipliers, makes clear that between Lag and Error models, we would accept Lag. This result is consistent with Gosh and Cartone (2020), and with our exploratory analysis and shows the importance of considering the spatial correlation present in the context of local transmission of the disease.

3.2 Deaths

The picture revealed by the deaths model, equation 4, is something different, particularly about the spatial models. Like in the positive cases model, all the explanatory variables of the linear model estimated with OLS are positive and significant. Marginalization index (im) shows that high values of the index correspond to low degree of marginalization: the higher the index is, the better the living conditions are. The positive relation between deaths and this index indicates that were in the center places, where the living conditions are better compared with the semirural areas, were where the virus hit stronger.

In the deaths model, we have three different variables linked to urban and housing conditions: population density (den), population living in households with 8 or more members (memb8) and population in dwellings with 3 bedrooms or less (bdr3). These three variables show that the inner home living conditions and the urban context have remarkable consequences in the outcome of the disease because all of them are associated with deaths in a positive way.

We could compare the different importance of the three considered sectors in the course of the pandemic. The results show that the municipalities with the higher proportion of occupied persons in services have a higher number of deaths per thousand persons, followed by the proportion of people in industry sectors, and finally people in commerce.

The spatial diagnosis shows that there is no autocorrelation in the OLS estimation, even more, the coefficients linked to the spatial versions of the models are close to zero and not significant as Lag and Error models reveal. So, it seems that the model that explains in a better way the proportion of deaths in the first pandemic wave at VMMZ is a linear model estimated with OLS.

Through these two models, equation 3 and 4, we incorporate the spatial autocorrelation and point out the relevance of the local transmission of CoViD-19 in VMMZ, remarkably with the positive cases, in the relatively most densely populated places. Notwithstanding, it is important to consider the transmission dynamic linked to the people's mobility patterns, the possibility to work from home, and many other factors that, of course, could enrich these results and we do not incorporate here.

In the introductory section, we refer to the so-called ecological fallacy. It is time now to consider this problem in the next section, not with a model because of the data availability, instead of that we present some explanatory analysis at neighborhood scale.

4. ECOLOGICAL FALLACY: HETEROGENEITY OF DATA IN MEXICO CITY

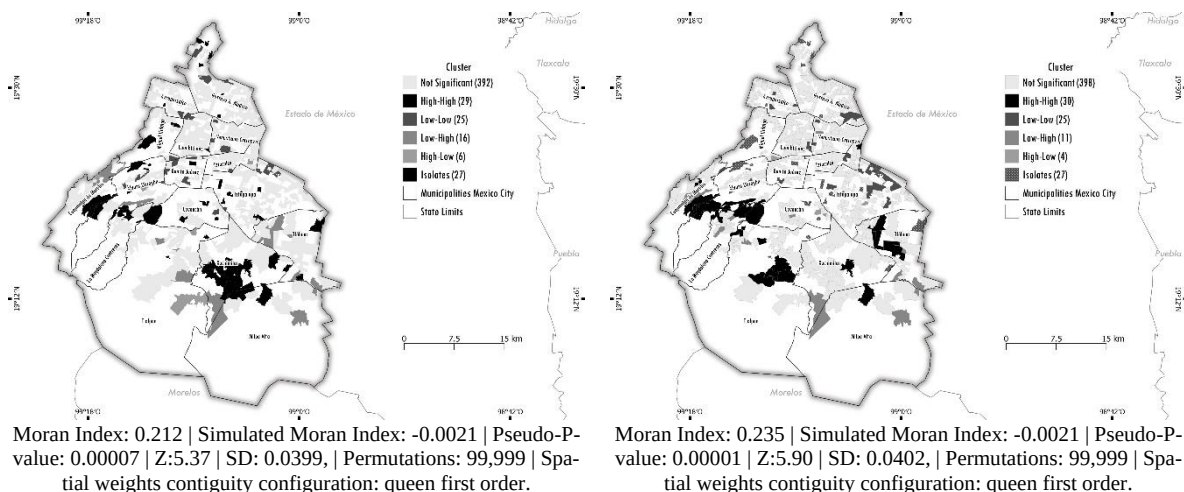
We will turn our attention now to a lower desegregation level conducting an exploration of spatial data on a smaller scale than the municipal one. The government of Mexico City has systematized the CoViD-19 active cases data by neighborhood. Active cases are defined as cases that meet the following: i) test definitive result is positive, ii) symptoms start in less than 15 days, iii) deaths are discarded. Additionally, for privacy issues, the data set considers neighborhoods that have more than 5 cases. We consider an estimation of total active cases by neighborhood for two periods: a) June 29th to July 29th, 2020, and b) between August 31st to September 29th 2020 due the availability information. This allows us to construct a sample of 495 neighborhoods for which there are also sociodemographic data from the Population Census 2020 and economic data from the National Statistical Directory of Economic Units (DENEUE), both published by INEGI.

The exploratory analysis at this level allows us to observe from a quantitative and qualitative point of view the spatial patterns of average active cases on a smaller geographical scale, associating them with some social and economic characteristics. We do not propose a model at this scale for the following reasons: i) there is not complete information for all the polygons at the neighborhood level of the VMMZ, and ii) the set of variables used at the municipal level are not the same at this scale of analysis. However, the available information allows us to treat some ideas regarding with ecological fallacy problem.

Figure 5. Clusters (LISA) of active cases for a sample of 495 neighborhoods in Mexico City

Period A: June 29 to July 29, 2020

Period B: August 29 to September 31, 2020

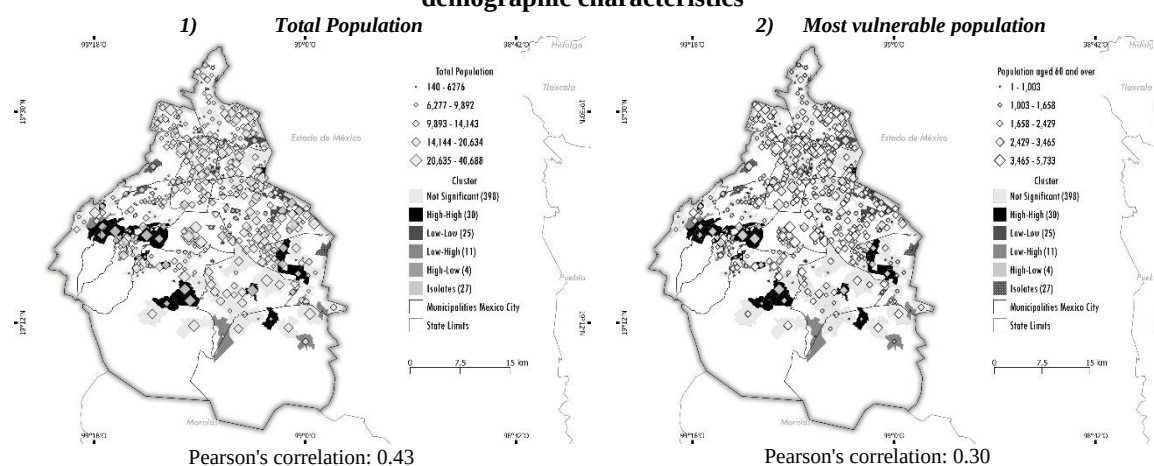


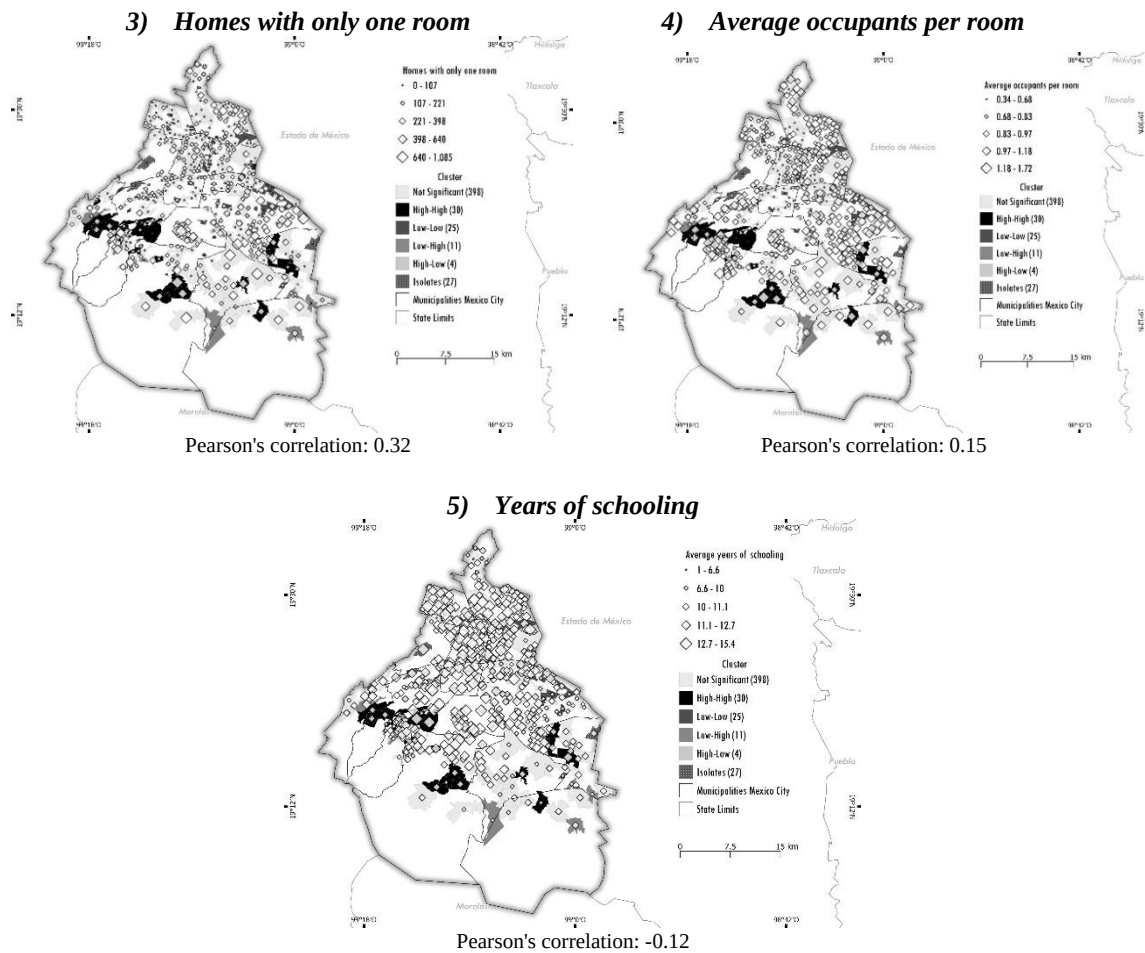
Source: Own estimates based on data from Mexico City Government.

At the municipal level, we found that almost all the spatial units of Mexico City form a high-high cluster for positive cases and deaths. However, when increasing the scale of analysis at the neighborhood level, what is observed is that the hotspots correspond only to some areas in the south of the city. About low-high and high-low clusters, given the spread pattern of the infections, these clusters could be source of spread of the disease at any pandemic moment.

Now, in Figure 6, we present some insights about patterns and spatial relations between active cases between August 31st to September 29th, 2020, and demographic and socioeconomic characteristics.

Figure 6. Clusters (LISA) of active cases for a sample of 495 neighborhoods in Mexico City and socio-demographic characteristics



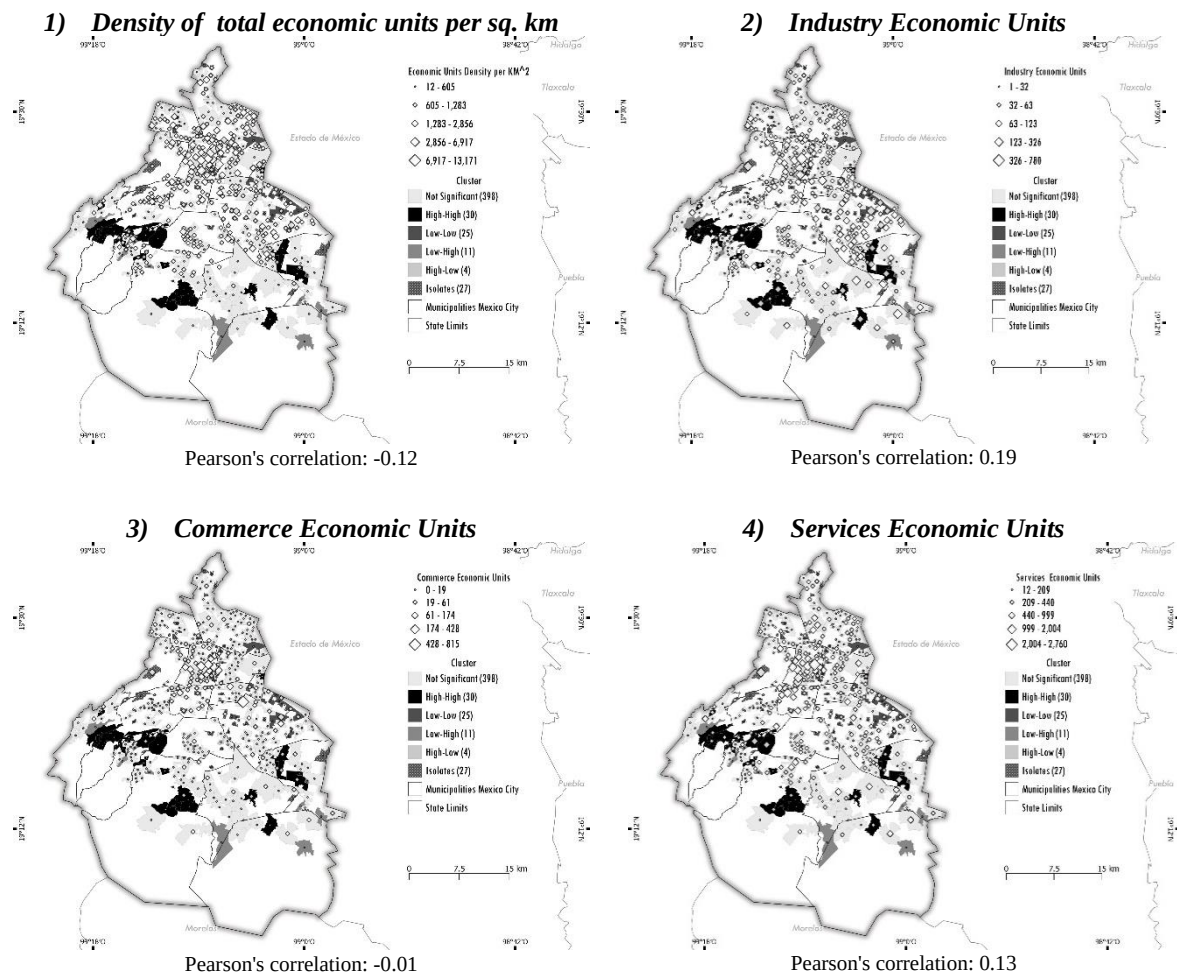


Source: Own elaboration based on data from Mexico City Government and INEGI. Population Census 2020. The correlation coefficients are constructed within active cases between August 31st to September 29th and the corresponding point variable in each panel figure.

The patterns observed at Figure 6 could be summarized as: i) for each neighborhood, the greater population is, the more probability of positive cases have, which could require some actions by the policy makers; ii) the relationship between the active cases and the population aged 60 years and over could also be considered strong, particularly because for the period of analysis there were not yet available vaccines; iii) the neighborhoods where there are dwellings with only one bedroom influence largely for the increase in active cases, as we observe in the model for positive cases, equation 3; iv) the average members living in households exhibit a lower association, probably because of the heterogeneity; v) the small negative association between formal education and active cases contrast with the results obtained in the models, this could mean that population with a higher educational level has sometimes better material conditions, more information and respect the rules of confinement, among other advantages.

The results in Figure 7, according now to economic conditions, describe in some sense how the confinement rules act at Mexico City, that is, the closure of non-essential activities. The density of economic units per square kilometer implies in this analysis a low, but negative, incidence in the appearance of contagion cases, which means that the closure measures due to confinement had a moderate impact. In the case of industrial and service economic units, among which are many of those considered essential activities, they had a positive impact on infections, not so in the case of commercial activities, which have a negative relationship. In short, to a greater or lesser extent, the closure of the economy had the expected effects in terms of containing the pandemic in the city. Although it would be relevant to analyze data related to informal activities such as street markets, which could have an inverse impact to the one analyzed here.

Figure 7. Clusters (LISA) of active cases for a sample of 495 neighborhoods in Mexico City and economic characteristics



Source: Own elaboration based on data from Mexico City Government and INEGI. National Statistical Directory of Economic Units. The correlation coefficients contemplate the active cases in period B and the corresponding point variable in each map.

5. DISCUSSION AND FINAL REMARKS

The tracking of this global pandemic is very complex: each wave has their own characteristics on specific areas. Of course, the sociodemographic and economic factors affect that path, but there are many other influence factors like mobility patterns, specific occupations, and specific medical conditions. All these factors are part of the social extraction: catching CoViD-19 when people can afford adequate hospital expenses could have a different ending if not. In this work we present an exploration of the sociodemographic and economic factors that could explain the first pandemic wave in the most populated area in Mexico and explore their spatial characteristics.

The model results depict evidence of spatial association in our two dependent variables: positive cases and deaths. In this first pandemic wave, the most deaths per thousand people took place at north center municipalities (Azcapotzalco, Gustavo A. Madero and Iztacalco), but the places with the higher living conditions were far from the first places (Miguel Hidalgo and Benito Juárez, with high-income neighborhoods took the 18th and 25th place in deaths rank).

We incorporate the spatial relations identified in the exploratory analysis through spatial econometric models. The best model to explain the positive cases in VMMZ at municipality level is the Lag model. The model shed light in order to see how the CoViD-19 hits harder at the municipalities more densely populated and where the urbanization process was deeper, compared with those peripheral: worst living conditions exhibit a positive relationship, both positive cases and deaths, as we observed in relation to urban and housing.

On the other hand, the results could help to explain that economic structure plays a relevant role in the state of the pandemic, like the service sector and industrial occupation reveal. A more detailed study about the specific occupation structure and the jobs that can be conducted at home could help to understand this in depth.

Nevertheless, it is not all a specific territory where the pandemic took place, like a municipality, so we did an exploratory analysis in order to identify the neighborhood's positive cases and their socioeconomic conditions. Although the municipality and neighborhood results are not directly comparable, the last one could help to understand the state of the pandemic at a very low geographical scale.

At the neighborhood level, it was possible to observe how the main cluster of infections and deaths at the municipal level presents a heterogeneous behavior measured with active cases. The geographical conditions of population concentration, overcrowding and some other living conditions have a positive relation on the active cases. Local economic structure measured by proportion of sectoral economic units show that the measures for the closure of non-essential activities is negative associated to active cases.

The results of our econometric models go against what was found in other studies (Jaramillo, 2021; Hernández, 2020), which may be linked to the level of disaggregation used, so they should be taken with caution until reliable information is available with a higher level of detail that allows contemplating the proposed models.

In addition, in Mexico and particularly in urban areas, there is a labor informality rate of close to 50% (INEGI, 2020), which suggests the need to incorporate these elements in our study, to the extent that these types of activities imply a greater risk of exposure due to the greater interaction. A more detailed study of the occupational structure and the jobs that can be done from home can help to understand this in greater depth.

Another aspect that is completely outside what is contemplated by our model is the mobility patterns in this metropolitan zone, present in other studies like Badr, et al (2020) for the USA: incorporating this information in the future is a pending task.

We hope that the results of this paper could shed light to contribute with some ideas in the designing of policies against the economic and social consequences of this and future pandemics, mostly if they consider the necessary presence of spatial effects. We thought that a Comprehensive National Epidemiological Information System with the most possible disaggregation level, as mentioned in Huitrón-Mendoza and Prudencio-Vázquez (2020) not only for CoViD-19, but also for other possible infectious diseases is a key element to construct policies with a multidisciplinary content to save lives.

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Artigo submetido a 13 de Agosto de 2021; versão final aceite a 15 de Março de 2022
Paper submitted on August 13, 2021; final version accepted on March 15, 2022

Entrepreneurial Intention of Unemployed People and the Need for Training and Financial Support for Self-Employed Workers in Times of COVID-19

Intenção Empreendedora dos Desempregados e Necessidade De Formação e Apoio Financeiro aos Trabalhadores Independentes em Tempos de COVID-19

Grace Carolina Guevara Rosero

carolina.guevara@epn.edu.ec

Department of Quantitative Economics, Escuela Politécnica

Marcela Elizabeth Guachamin Guerra

marcela.guachamin@epn.edu.ec

Department of Quantitative Economics, Escuela Politécnica

Bernardo Xavier Alquina Chuquimarca

bernardo.alquina@epn.edu.ec

Department of Quantitative Economics, Escuela Politécnica

Abstract

The COVID-19 pandemic caused a severe economic crisis that has led to instability in the labor market. Some workers fell into unemployment and self-employed workers had to face a partial or total stoppage of their activities. This paper aims to study the entrepreneurial intention of unemployed people and the need for training and financial support of self-employed workers. To do so, Probit models are estimated using a survey with workers in Ecuador. The results show that the underlying characteristics that motivate entrepreneurial intention differ across existent unemployed people and people who became unemployed during the COVID-19 lockdown. Women who became unemployed during the COVID-19 lockdown are more likely to have entrepreneurial intentions than men. Less educated existent unemployed people are more likely to have entrepreneurial intentions than more educated ones. People who need financial support also need training support and vice versa. The level of the effects of COVID-19 on economic sectors has a relevant effect on the need for financial support.

Keywords: entrepreneurship, unemployment, COVID-19, self-employment, financial support

JEL Codes: J01, L26

Resumo

A pandemia da COVID-19 desencadeou uma grave crise económica que levou à instabilidade no mercado de trabalho. Alguns trabalhadores caíram no desemprego e os trabalhadores autónomos tiveram que enfrentar uma paralisação parcial ou total das suas atividades. Este estudo tem como objetivo investigar a intenção empreendedora dos desempregados e a necessidade de formação e apoio financeiro dos trabalhadores por conta própria. Para isso, são estimados modelos *Probit* usando uma amostra de trabalhadores do Equador. Os resultados empíricos obtidos mostram que as

caraterísticas subjacentes à intenção empreendedora dos indivíduos diferem entre aqueles que já se encontravam desempregados e os que ficaram desempregados durante o período da COVID-19. As mulheres que ficaram desempregadas durante o período da COVID-19 são mais propensas a ter intenções empreendedoras do que os homens. Os desempregados existentes menos instruídos são mais propensos a ter intenções empreendedoras do que os mais instruídos. As pessoas que precisam de apoio financeiro também precisam de apoio de formação e vice-versa. O nível dos efeitos da COVID-19 consoante os setores económicos tem um efeito relevante na necessidade de apoio financeiro.

Palavras-chave: empreendedorismo, desemprego, COVID-19, auto-emprego, apoio financeiro.

Códigos JEL: J01, L26

1. INTRODUCTION

The COVID-19 pandemic has caused many changes both in health and economic terms. In Ecuador, the existent harsh economic situation has been aggravated by a 2.6% increase in unemployment from 4% in 2019 to 6.6% in September 2021 (INEC, 2021). In addition, workers' income has been reduced. The deteriorated economic panorama in Ecuador has shrunk recruitment and changed labor conditions to more flexibilization. Given this scenario, workers who fell into unemployment and already unemployed people might see entrepreneurship as a viable option to maintain or increase their income. According to a survey conducted by Escuela Politécnica Nacional during the pandemic, 86.43% of unemployed people expressed that they intended to start a business. This share was higher for people who lost their jobs during the COVID-19 lockdown (91.23%) as compared to the average (86.63%). Additionally, it is important to keep in mind that a high share of the labor market corresponds to self-employed people who are generally informal. These workers have been severely affected by the pandemic as they lost their daily sustenance. Self-employed workers were most affected by the lockdown since 89% of them saw their income reduced while 60% of private workers and 36% of public servants experienced a reduction in their income. For this reason, self-employed people need support for their economic reactivation (63%) to a larger extent than private (43.80%) and public workers (37.93%). They need capital injection through loans, technical assistance, training or technological upgrading. According to the survey, 33.87% of self-employed people need financial support and 27.99% need training support.

In the case of Ecuador, most microentrepreneurs have a survival perspective, and existent and newly unemployed people may have a defensive attitude to escape unemployment. Then, micro-entrepreneurship has a "refuge effect" (Vivarelli, 2004; Thurik et al, 2008). However, the motivations and conditions of unemployed people might differ according to the duration of their unemployment and their opportunity costs. Existent unemployed people could have had more time to analyze the options of entrepreneurship while people who became unemployed during the COVID-19 lockdown have had less time to do so. In addition, existent unemployed people might have made decisions about human capital investment that people who became unemployed during the COVID-19 lockdown are only just beginning to think about. Therefore, the research questions are: What are the factors that drive the entrepreneurial intention of unemployed people? Do these factors differ across types of unemployed people, namely, existent unemployed people and newly unemployed people during the COVID-19 lockdown? With respect to self-employed people who already undertook entrepreneurial activities, it is important to identify what kinds of support they need to sustain their business and stay in the market. The question is: who needs financial support or training support to face the crisis and start a business or keep operating an existent business?

To answer these questions, the objectives of the research are: i. to identify the factors that drive the entrepreneurial intention of both existent unemployed workers and people who became unemployed during the COVID-19 lockdown, and ii. to determine the characteristics of self-employed people who needed training and financial support during the COVID-19 pandemic. To do so, data from a national survey carried out by the Escuela Politécnica Nacional of Ecuador during the pandemic is used. This database accounts for 3,868 observations. To determine the probability of entrepreneurial intention and the need for financial and training support, Probit models are estimated.

Entrepreneurial intention is analyzed for two types of unemployed people, namely existent unemployed people (referred as such, hereafter) and newly unemployed people during the COVID-19 lockdown. The need for training and financial support is analyzed for self-employed people. Socio-demographic characteristics, family conditions and financial aspects are considered as explanatory variables.

This article is organized as follows. Section 2 offers a literature review on entrepreneurial intention. Section 3 describes data and methodology. The results are presented in Section 4 and Section 5 concludes.

2. LITERATURE REVIEW

In crisis management, entrepreneurship has acquired a key role as it enhances employment and growth (Audretsch & Fritsch, 2002; Fölster, 2000). Entrepreneurship is a mechanism that contributes to the continuity of the productive system, maintaining the flow of goods and services and generating confidence for other business owners and the population in general (Herbane, 2010). At the same time, the development of entrepreneurship can be affected by the socioeconomic and political context of a country (Groszkowski & Stryjewski, 2015).

Within a crisis framework, entrepreneurship can be seen from two perspectives. On the one hand, entrepreneurship is an important driver of economic reactivation and a way out of unemployment. On the other hand, the entrepreneurship diaspora that already exists needs to be protected and enhanced. Given this, entrepreneurial intention has caught attention in literature. Within the field of psychology, intention has been defined as the state of mind of a person that makes her/him prone to taking action to do something to achieve goals (Bird, 1988). In this sense, entrepreneurial intention is an important predictor of behavior (actual entrepreneurship) (Thompson, 2009; Panescu et al. 2018). It has been largely studied focusing on university students (Akanbi & Onyema, 2011; Bakotić & Kružić, 2010; Maheshwari, 2021; Sánchez, 2019) with few exceptions focusing on unemployed people (Fedáková et al. 2018).

To study entrepreneurial intention, it is important to define an entrepreneur. In the 12th century, an entrepreneur was defined as a person who carries out an economic activity using production factors, transforming them and combining them to generate a new product or service skills (Baumol, 1993 & Braude; 1985). According to the conventional theory, an entrepreneur is defined as a person who undertakes an activity by taking risks and aiming to get profits from it (Berner et al. 2008). This broader definition includes both people who innovate and people who do not create new products or services. Within this framework, entrepreneurs can be survival driven or growth driven. Survival entrepreneurs, however, are more likely to diversify their economic activities to minimize risk. If they experience income loss, they could face starvation, especially in developing countries (Gómez, 2008).

Engagement in entrepreneurship depends on different factors related to individual characteristics and the social environment. In one instance, entrepreneurial intention stems from the internal disposition of the entrepreneur to initiate changes reflected in innovative opportunities (Herruzo, 2019). Likewise, Arrighetti et al. (2016) characterize the entrepreneur as a person who could identify business opportunities to be independent through entrepreneurship. In other words, entrepreneurship is a process that involves identifying and taking advantage of opportunities to carry out a business project in the context of a certain degree of uncertainty (Silveira et al. 2017). Individual characteristics are important variables in explaining entrepreneurial intention (GEM-ESPAE, 2020). Those characteristics are related to the psychological and behavioral traits of individuals (Souza et al. 2017), such as risk aversion, spirit of innovation, strategic attitude (Petuškienė & Glinskienė, 2017; Torres et al. 2017) and creativity (Capella et al. 2016; Ríos-Manríquez et al. 2018), as well as other individual characteristics such as age, educational instruction, labor environment, professional experience and managerial skills (Alvarez, 2019; Donovan & Labonte, 2020; Silveira et al. 2017). Some studies indicate a positive relationship between the level of education and entrepreneurship (Alvarez, 2019; Block et al., 2020), i.e. the higher the knowledge, the higher the entrepreneurial intention. On the other hand, Díaz & Cancino (2014) and Arrighetti et al. (2016) mention that people decide to become entrepreneurs out of necessity despite having a low level of education. In times of crisis, Civera et al. (2020) identified that people with a higher level of education have greater job opportunities and consequently less intention of becoming entrepreneurs. Education in specific areas

might not be a sufficient condition to start a business; entrepreneurial education is needed. According to an experiment conducted by Sánchez (2019), an entrepreneurship education (EE) program increased students in the treatment group's intention toward self-employment. Financial education is a channel, but entrepreneurial education is needed. In addition, Arrighetti et al. (2016) showed that age and gender do not matter in developing entrepreneurship in times of crisis.

An individual's personal motivation can also be related to the labor need, financing opportunities, access to material or clients, knowledge, social relations (leadership), contacts, among others (Kantis, 2003; Gómez, 2009; Alonso & Galve, 2008; García, Martínez & Fernández, 2010). People undertake entrepreneurship to get out of unemployment as a "refuge effect" (Thurik et al., 2008). In fact, an increase in unemployment rates leads to an increase in the rates of business creation (Williams & Shepherd, 2016). Other individuals decide to start a business as a survival strategy. Sometimes entrepreneurs start out with limitations and do not analyze the needs of a market. At the start, they do not see their business as part of their life plan (Ayala & Manzano, 2016). The social environment related to economic, financial, institutional and cultural factors also influences entrepreneurial intention (OCDE, 2000). Indeed, these factors can support the entrepreneurial process directly or indirectly (Kirzner, 1999). Governments can influence these contextual factors through laws or norms related to the creation of firms.

As for the success of entrepreneurs, different types of support are necessary: economic, training, technological and motivational. The probability of success is high when entrepreneurs have expertise in a specific area since this can promote productivity. However, in many cases, the lack of knowledge or experience is an obstacle to achieving objectives (Aranguren, Larrea & Peña, 1999).

In addition, in some countries there is legal and regulatory support for entrepreneurship, and technical and financial support may come from government and multilateral organizations, private financial institutions or the informal sector. These forms of support can generate a learning process according to Urbano-Pulido et al. (2007).

Financial support is an important resource since the use of one's own funds and maintaining adequate levels of liquidity are key to the survival of an entrepreneurial business (Arias et al., 2007; Block et al., 2020). According to Block et al. (2020), being in good financial condition is one of the first steps in starting a new business. Although there is the option of bank financing, in the beginning, new firms' access to financing is limited due to the requirements for collateral and guarantees, so most of them opt for self-financing (Bosma, 2014; Papaoikonomou et al., 2012). The possibility of obtaining credit for those who wish to start a business is low because of their size and the initial scope of their business (Canedo, Stone, Black & Lukaszewski, 2014). People with the greatest intention of starting a business are those who do not use financial tools (Arrighetti et al., 2016).

3. DATA AND METHODOLOGY

To determine the factors influencing entrepreneurial intention and support for entrepreneurship, data from a national survey conducted by Escuela Politécnica Nacional of Ecuador during the pandemic are used. Specifically, data collection was conducted online during the months of April and May 2020 when the government established Emergency Decree No. 1017 to prevent mass infection of COVID-19 and imposed a lockdown on all non-essential activities. With this decree, it was ordered, among other things, to restrict pedestrian and vehicular traffic as well as the operation of activities involving crowds such as movie theaters and shopping centers, among other measures. The survey consisted of approximately 60 questions, which were divided into three modules: socio-demographic, economic and financial.

Since two different populations are analyzed, two datasets are used. For the analysis of entrepreneurial intention, two sub-samples corresponding to existent unemployed people and people who became unemployed during the COVID-19 lockdown are considered. The former accounts for 801 observations whereas the latter accounts for 741 observations. As for the analysis of entrepreneurial support, the sample corresponding to self-employed people records 493 observations.

3.1 The dependent variables

The first model is estimated using entrepreneurial intention as a dependent variable. This variable corresponds to the question: Are you interested in starting a new business? While previous literature

about entrepreneurial intention mainly focuses on university students (Akanbi & Onyema, 2011; Bakotić & Kružić, 2010; Maheshwari, 2021; Sánchez, 2019), this study focuses on the unemployed. For people who have lost their jobs, entrepreneurship is an important alternative to keep their standard of living, especially in the context of crisis where the demand for labor is lower (Fédaková et al. 2018). The survey results show that in Ecuador, 91.23% of people who were unemployed before the lockdown and 82.03% of people who lost their jobs due to the COVID-19 lockdown expressed that they intend to start a business.

The second model is estimated using entrepreneurial support as a dependent variable. The question related to this variable in the survey is: Do you need support to recover your economy or to adapt or change your business? Self-employed people responded to this question in the framework of the economic crisis brought on by the COVID-19 pandemic. In addition, they express the aspects in which they urgently need support. Here, training and financial support are analyzed. These variables are dichotomous variables that take the value of 1 if they express a high level of urgency and 0 otherwise. Using this analysis, this study seeks to determine who needs support and which kind of support in order to reactivate economically. Financial support is analyzed since businesses have lost liquidity due to the lockdown imposed during the COVID-19 pandemic. Training support is also analyzed to determine the need for aid from educational institutions. According to the survey, 27.99% of self-employed people (493 people) require training support and 33.87% need financial support.

3.2 Methodology

To determine the probability of entrepreneurial intention and the probability of needing support for economic reactivation, Probit models are estimated. The model specifications are as follows:

$$P(y = 1|x) = G(\beta_0 + \beta_1 x_1 + \dots + \beta_k x_k) = G(\beta_0 + x\beta) \quad (1)$$

Where $G(\cdot)$ is a function taking on values strictly between zero and one, $0 < G(z) < 1 \forall z \in \mathbb{R}$. In these Probit models, G is the standard normal cumulative distribution function (Wooldridge, 2012). The latent variable, y is one if $y^* > 0$, and y is zero if $y^* \leq 0$. For this study, the latent variables y_i are defined as follows:

$$\begin{aligned} y_1 &= \begin{cases} 1 & \text{if the respondent expresses having entrepreneurial intention} \\ 0 & \text{otherwise} \end{cases} \\ y_2 &= \begin{cases} 1 & \text{if the respondent needs training support to reactivate economically} \\ 0 & \text{otherwise} \end{cases} \\ y_3 &= \begin{cases} 1 & \text{if the respondent needs financial support to reactivate economically} \\ 0 & \text{otherwise} \end{cases} \end{aligned}$$

The explicative variables in all models are grouped into three categories: COVID-19, individual characteristics and financial conditions. The vector of COVID-19 variables includes variables related to the level of effect derived from the COVID-19 pandemic on labor status, income variation and expenditure variation. The vector of individual characteristics includes age, gender, education level, whether the person is in a relationship, labor status, income level, whether the person is foreign born, whether the person has medical insurance, whether the person has training, the number of household members, and the number of income earners in the household. The vector of financial variables includes an index of financial knowledge, whether the person has savings, whether the person has formal or informal credit and whether the person needs credit. The specific description of the independent variables is shown in Table 1.

As the resulting coefficients are not directly interpretable, the marginal effects are used.

Table 1: Description of independent variables

Variable	Description	Models
Age range	Categories:	All models
	18-24 years old	
	25-34 years old	
	35-45 years old	
	Over 45 years old	
Gender	Dichotomous variable set to one if the person is male, zero otherwise.	All models
Education level	Dichotomous variable set to one if the person reached higher education, zero otherwise.	All models
Being in a relationship	Dichotomous variable set to one if the person is in a relationship, zero otherwise.	All models
Household members	Number of members in the household.	All models
Medical insurance	Dichotomous variable set to one if the person has medical insurance, zero otherwise.	All models
Province's capital	Dichotomous variable set to one if the canton is the capital of the province, zero otherwise.	All models
Income earners	Number of income earners in the household.	All models
Financial literacy index	Index of financial knowledge that takes values between [0;1], with 0 indicating no financial knowledge and 1 indicating high knowledge of financial tools.	All models
Workers in the company	Categories:	Models: Financial support; Training support
	Reference category: More than 6 workers	
	Workers [2-5]	
	Sole proprietorship	
Credit Amounts	Categories:	Models: Financial support; Training support
	Doesn't need credit	
	High credit amount	
	Medium credit amount	
	Low credit amount	
Expenditure variation due to COVID-19	Categories:	Models: COVID-19 unemployed; Existent unemployed; Financial support
	Expenditure increased	
	Expenditure remains unchanged	
	Expenditure decreased	
Credit type	Categories:	Models: COVID-19 unemployed; Existent unemployed
	Formal credit	
	Informal credit	
	Both credits	
Training	Number of training courses acquired	Models: COVID-19 unemployed; Existent unemployed; Financial support
Savings	Dichotomous variable set to one if the person has savings, zero otherwise.	All models
Ecuadorian	Dichotomous variable set to one if the person is Ecuadorian, zero otherwise. This variable is included only in the entrepreneurial intention models.	Models: COVID-19 unemployed; Existent unemployed
Effect on economic activities	The categories of effect level are recovered from the study conducted by (ILO, 2020).	Models: Financial support; Training support
	High effect: This category includes sectors such as: Manufacturing industry, administrative and support service activities and support activities, wholesale and retail trade, restaurants, mobile food service activities and event catering.	
	Medium-high effect: This category includes sectors such as: Transportation and storage, construction, information and communication.	
	Medium-low effect: This category includes sectors such as: Agriculture, forestry and fishing, mining and quarrying, electricity, gas and water supply, waste management.	
	Low effect: This category includes sectors such as: professional, scientific and technical activities, administrative and support service activities, education.	
Income variation due to the lockdown	Categories:	All models
	Increased income during the lockdown	
	Unchanged income during the lockdown	
	Income reduction between 0 and 50% during the lockdown	
	Income reduction between 50% and 100% during the lockdown	
Income level	Categories:	All models
	No income before lockdown	
	Unified basic salary (UBS)	
	Income of 2.5 UBS	
	Income over 2.5 UBS	
Labor status change due to COVID-19	Categories:	Models: Financial support; Training support
	The person keeps the job	
	The person may lose the job	

	The person has lost the job	
	The person worked fewer hours	
Need for credit	Dichotomous variable set to one if the person needs credit, zero otherwise.	All models
Need for training support	Dichotomous variable set to one if the person needs training support, zero otherwise.	All models
Need for financial support	Dichotomous variable set to one if the person needs financial support, zero otherwise.	All models

3.3 Descriptive statistics

In tables 2 and 3, descriptive statistics about entrepreneurial intention and training and financial support by individual and financial characteristics are shown, respectively.

In terms of age range, the highest proportion of people who have entrepreneurial intentions in both the unemployed groups (those who became unemployed during the COVID-19 lockdown and existent unemployed people) corresponds to young people between 18 and 24 years old. The number of unemployed people with entrepreneurial intentions decreases as the age range increases. Women expressed that they intended to start a business more than men did. In the case of the unemployed during the COVID-19 lockdown and who have entrepreneurial intention, 55.11% are women. In the case of the existent unemployed, 56.94% of those who intend to start a business are women. In addition, unemployed people with higher education are more likely to intend to start a business than unemployed people with lower levels of education.

With respect to the relationship status of the respondents, people who are not in a relationship represent a higher percentage of both those unemployed during the COVID-19 lockdown (65.47%) and existent unemployed people (72.53%). In terms of the location of individuals, most unemployed people who desire to start a new business live in the capitals of provinces. Regarding nationality, 85.29% of foreigners that fell into unemployment due to the COVID-19 pandemic intend to start a business and 88.89% of existent unemployed foreigners do. As a result of becoming unemployed, many people were forced to stop contributing to social security. Thus, of those who have intentions of starting a business, 83.33% of the people who became unemployed during the COVID-19 lockdown and 80% of existent unemployed people do not have any type of health insurance. Regarding financial conditions, approximately 80% of both types of unemployed people with entrepreneurial intentions do not have savings. This situation causes concern due to drastic income reductions during the crisis (Alvarez-Sousa, 2019). With regards to the people who became unemployed during the COVID-19 lockdown and have entrepreneurial intention, 56.76% experienced an income reduction between 50% and 100% while 18.02% experienced an income reduction of less than 50%. With respect to the existent unemployed with entrepreneurial intention, the same pattern is observed: 36.88% of the respondents experienced an income reduction between 50% and 100% and 27.01% of the respondents experienced an income reduction lower than 50%.

The highest percentage of unemployed people who intend to start a business corresponds to those who have an income equal to the unified basic salary (60.34% for people who became unemployed during the COVID-19 lockdown and 52.43% for existent unemployed people). Among those with entrepreneurial intentions, 78.68% of the COVID-19 unemployed and 63.73% of the existent unemployed require a loan. The amount of credit that is most needed is between USD 2,500 and USD 10,000.

Financial education is an important aspect for entrepreneurs. The mean number of financial education training courses of those who became unemployed during the COVID-19 lockdown is 0.67 and of existent unemployed people is 0.59. This result shows an evident lack of financial education among the unemployed. In addition, people who became unemployed during the COVID-19 lockdown and who have entrepreneurial intention record on average an index of 19% for financial knowledge while the existent unemployed people with entrepreneurial intention record an index of 12%.

In the case of people who require support for entrepreneurship, 38.41% of those who require training support and 35.93% of those who require financial support are older than 45 years.

Regarding gender, 53.62% of those that require training support and 58.08% require of those that require financial support are men.

Regarding the family conditions of self-employed workers, 52.90% of those who require training support do not have a partner and 47% of those who need financial support do not have a partner. The average number of household members is 4. In addition, a higher percentage of people who need training support and financial support have a high education level. The need for financial knowledge is evident since people who require training support and financial support record an index of 23% and 25% of financial knowledge, respectively. Although savings might constitute an initial equity for entrepreneurs, 75.36% of the people who require training support do not have savings, and 72.46% of the people who require financial support do not have savings. In addition, most self-employed workers who need training (59%) or financial support (54%) do not have medical insurance. Most self-employed workers who need support experienced a drastic income reduction between 50% and 100%. Regarding the size of the business, the self-employed workers who need training and financial support are those that run a business themselves. Furthermore, the majority of self-employed workers who need training and financial support are those that work in sectors that have been highly affected by the COVID-19 pandemic.

Table 2: Entrepreneurial intention of existent unemployed and people who became unemployed during the COVID-19 lockdown

Variables	COVID-19 lockdown unemployed with entrepreneurial intention		Existent unemployed with entrepreneurial intention	
	Frequency	Percentage	Frequency	Percentage
Age range				
18 to 24 years old	218	32.73%	343	52.93%
25 to 34 years old	176	26.43%	119	18.36%
35 to 45 years old	138	20.72%	82	12.65%
Over 45 years old	134	20.12%	81	16.04%
Gender				
Male	299	44.89%	279	43.06%
Female	367	55.11%	369	56.94%
Education level				
No higher education	314	47.15%	288	44.44%
Higher education	352	52.85%	360	55.56%
Relationship status				
In a relationship	230	34.53%	178	27.47%
Not in a relationship	436	65.47%	470	72.53%
Province's capital				
If the canton is the capital of the province	457	68.61%	415	64.04%
Otherwise	209	31.38%	233	35.95%
Covid Expenditure				
Expenditure increased	289	43.39%	262	40.43%
Expenditure remain unchanged	171	25.68%	193	29.78%
Expenditure decreased	206	30.93%	193	29.78%
Savings				
Savings	120	18.02%	124	19.14%
No savings	546	81.98%	524	80.86%
Need for credit				
Need credit	524	78.68%	413	63.73%
Do not need credit	142	21.32%	235	36.27%
Credit amount				
Doesn't need	219	25.29%	358	44.69%

Entrepreneurial Intention of Unemployed People and the Need for Training and Financial ...

Low	282	32.56%	221	27.59%
Medium	260	30.02%	151	18.85%
High	105	12.12%	71	8.86%
Medical insurance				
Have medical insurance	111	16.67%	129	19.91%
No medical insurance	555	83.33%	519	80.09%
Ecuadorian				
Total unemployed foreigners/Total foreigners	29	85.29%	8	88.89%
Ecuadorians with intention/National total	637	77.59%	640	81.95%
Credit type				
Both credits	103	21.82%	62	18%
Formal credit	195	41.31%	150	45%
Informal credit	174	36.86%	124	37%
Income variation due to the lockdown				
Income increased in lockdown	7	1.05%	8	1.23%
Income remained the same in lockdown	161	24.17%	226	34.88%
Income reduction between 0 and 50% during the lockdown	120	18.02%	175	27.01%
Income reduction between 50% and 100% during the lockdown	378	56.76%	239	36.88%
Income level				
No income before lockdown	4	0.62%	126	26.64%
Unified basic salary (UBS)	391	60.34%	248	52.43%
Income of 2.5 UBS	213	32.87%	67	14.16%
Income over 2.5 UBS	40	6.17%	32	6.77%
Quantitative variables				
	mean	Min	mean	Min
Financial literacy index [0;1]	0.19	[0-0.75]	0.12	[0-0.62]
Household members [1;10]	4.53	[1-10]	4.61	[1-10]
Income earners [0;10]	1.4	[0-9]	1.33	[0-9]
Training [0;8]	0.64	[0-5]	0.59	[0-5]

Table 3: Training and financial support of self-employed people

Variables	Training support (self-employed people)		Financial support (self-employed people)	
	Frequency	Percentage	Frequency	Percentage
Age range				
18 to 24 years old	9	6.52%	11	6.59%
25 to 34 years old	30	21.74%	40	23.95%
35 to 45 years old	46	33.33%	56	33.53%
Over 45 years old	53	38.41%	60	35.93%
Gender				
Male	74	53.62%	97	58.08%
Female	64	46.38%	70	41.92%
Education level				
No higher education	59	42.75%	52	31.14%

Higher education	79	57.25%	115	68.86%
Relationship status				
In a relationship	65	47.10%	88	52.69%
Not in a relationship	73	52.90%	79	47.31%
Province's capital				
If the canton is the capital of the province	94	68.12%	123	73.65%
Otherwise	44	31.88%	44	26.35%
Expenditure Covid				
Expenditure increased			56	33.53%
Expenditure remain unchanged			57	34.13%
Expenditure decreased			54	32.34%
Need for credit				
Need credit	107	77.54%		
Do not need credit	31	22.46%		
Savings				
Savings	34	24.64%	46	27.54%
No savings	104	75.36%	121	72.46%
Medical insurance				
Have medical insurance	56	40.58%	77	46.11%
No medical insurance	82	59.42%	90	53.89%
Income variation due to the lockdown				
Increased income during lockdown	2	1.45%	3	1.80%
No income variation during lockdown	17	12.32%	16	9.58%
Income reduction between 0 and 50% during the lockdown	29	21.01%	34	20.36%
Income reduction between 50% and 100% during the lockdown	90	65.22%	114	68.26%
Income level				
No income before lockdown	8	5.80%	6	3.59%
Unified basic salary (UBS)	46	33.33%	45	26.95%
Income of 2.5 UBS	61	44.20%	71	42.51%
Income over 2.5 UBS	23	16.67%	45	26.95%
Labor status change due to COVID-19				
The person keeps their job	34	24.64%	35	20.96%
The person has worked fewer hours	32	23.19%	45	26.95%
The person may lose their job	23	16.67%	34	20.36%
The person lost their job	49	35.51%	53	31.74%
Number of workers				
One worker	80	57.97%	93	55.69%
2-5 workers	43	31.16%	53	31.74%
More than 6 workers	15	10.87%	21	12.57%
Economic activity				
Low effect	35	25.36%	35	20.96%
Medium effect	6	4.35%	8	4.79%
Medium-high effect	37	26.81%	43	25.75%
High effect	60	43.48%	81	48.50%

Need for training support				
Need for training support			167	33.87%
No need			326	66.13%
Need for financial support				
Need for financial support	138	27.99%		
No need	355	72.01%		
Quantitative variables	mean	Min-Max	mean	Min
Financial literacy index [0;1]	0.23	[0-0.75]	0.25	[0-0.75]
Household members [1;10]	4.22	[1-10]	4.33	[1-10]
Income earners [0;10]	1.72	[0-8]	1.72	[0-5]
Training [0;8]			1.08	[0-5]

4. RESULTS

Tables 4 and 5 show the Probit estimations determining the factors that influence unemployed people's entrepreneurial intention as well as self-employed people's need for support to reactivate economically to keep their businesses running, respectively.

Regarding entrepreneurial intention, Table 4 shows the results for existent unemployed people in column (1) and people who became unemployed during the COVID-19 lockdown in column (2). In general, according to the ROC curve, the discrimination ability of the models for people who became unemployed during the COVID-19 lockdown and for existent unemployed people is high at 93% and 92%, respectively. The model for existent unemployed people correctly predicts 98% of the positive values and 38% of the negative values. The model for people who became unemployed during the COVID-19 lockdown predicts 99% of the positive values and 18% of the negative values.

Table 4: Probit estimations of the entrepreneurial intention of people who became unemployed during the COVID-19 lockdown and existent unemployed people

	COVID-19 unemployed		Existent unemployed	
Variables	Model	Marginal Effect	Model	Marginal Effect
INDIVIDUAL CHARACTERISTICS				
Reference category: More than 45 years old				
18 to 24 years old	-0.0771	-0.00514	-0.265	-0.00806
	(0.345)	(0.0240)	(0.455)	(0.0168)
25 to 34 years old	0.0199	0.00127	-0.304	-0.00985
	(0.299)	(0.0189)	(0.386)	(0.0162)
35 to 45 years old	0.167	0.00988	0.657	0.0116
	(0.314)	(0.0174)	(0.647)	(0.00744)
Male	-0.545**	-0.0375*	0.212	0.00547
	(0.191)	(0.0158)	(0.287)	(0.00690)
Higher education	0.180	0.0117	-1.089**	-0.0272**
	(0.197)	(0.0130)	(0.331)	(0.0147)
In a relationship	0.335*	0.0206*	0.984*	0.0282*
	(0.220)	(0.0128)	(0.387)	(0.0160)
Household members	0.0380	0.00244	0.176	0.00460
	(0.0593)	(0.00378)	(0.0941)	(0.00309)
Medical insurance	-0.0610	-0.00406	0.0214	0.000552
	(0.257)	(0.0176)	(0.347)	(0.00883)
Ecuadorian	0.428	0.0399		
	(0.422)	(0.0529)		

Province's capital	-0.264	-0.0152	-0.0686	-0.00174
	(0.249)	(0.0119)	(0.345)	(0.00849)
FINANCIAL VARIABLES				
Need for credit	3.170***	0.754***	1.747***	0.159*
	(0.521)	(0.152)	(0.390)	(0.0756)
Number of income earners/ household	-0.221	-0.0142	0.0300	0.000781
	(0.118)	(0.00805)	(0.206)	(0.00534)
Financial literacy index	-2.745*	-0.176*	-1.041	-0.0272
	(1.218)	(0.0708)	(1.349)	(0.0373)
Reference category: Doesn't need credit				
High credit amount	-1.365	-0.218	-0.379	-0.0133
	(0.810)	(0.245)	(0.519)	(0.0263)
Medium credit amount	-1.616**	-0.185	0.135	0.00334
	(0.566)	(0.121)	(0.496)	(0.0117)
Low credit amount	-1.970***	-0.265*		
	(0.504)	(0.133)		
Savings	0.904*	0.0340***	0.257	0.00560
	(0.352)	(0.0101)	(0.359)	(0.00726)
Reference category: Both credits				
Formal credit	0.173	0.0108	-0.586	-0.0172
	(0.250)	(0.0149)	(0.468)	(0.0178)
Informal credit	-0.204	-0.0139	-0.693	-0.0249
	(0.345)	(0.0251)	(0.514)	(0.0256)
COVID-19 VARIABLES				
Reference category: Income remained same during lockdown				
Income reduction between 0 and 50% during the lockdown	0.00558	0.000357	-0.326	-0.0105
	(0.352)	(0.0224)	(0.473)	(0.0185)
Income reduction between 50% and 100% during the lockdown	-0.568*	-0.0353*	-0.329	-0.0102
	(0.253)	(0.0161)	(0.467)	(0.0173)
Reference category: Unified basic salary (UBS)				
No income before lockdown			-0.574	-0.0236
			(0.503)	(0.0310)
Income of 2.5 UBS	0.368	0.0220 °	0.604	0.0107
	(0.224)	(0.0120)	(0.455)	(0.00778)
Income over 2.5 UBS	0.315	0.0157	-0.765	-0.0414
	(0.478)	(0.0183)	(0.654)	(0.0558)
Reference category: Expenditure remained unchanged				
Expenditure increased	0.284	0.0175	0.265	0.00685
	(0.252)	(0.0158)	(0.325)	(0.00826)
Expenditure decreased	-0.124	-0.00838	0.864*	0.0162
	(0.234)	(0.0166)	(0.404)	(0.00924)
Training	0.115	0.00738	0.0146	0.000381
	(0.133)	(0.00850)	(0.139)	(0.00366)
Observations	495		281	
McFadden's	30%		44%	
Specificity	18%		38%	
Sensitivity	99%		98%	
Correctly classified	93%		92%	
Value ROC curve	89,17%		93,79%	

Standard errors are in parenthesis. * p<0.05, ** p<0.01, *** p<0.001

According to the results, the underlying characteristics that motivate entrepreneurial intention differ between the existent unemployed and people who became unemployed during the COVID-19 lockdown. During the COVID-19 economic crisis, men are significantly less likely to start a business than women. By contrast, gender does not play a role in the entrepreneurial intention of the existent unemployed.

Regarding age, no difference in entrepreneurial intention is found across age ranges in either of the two groups of unemployed people. Among existent unemployed people, those with higher education are less likely, by 2.7 percentage points, to have entrepreneurial intentions than people with lower levels of education. In the case of people who became unemployed during the COVID-19 lockdown, the level of education does not influence entrepreneurial intention.

Another demographic characteristic that increases the probability of entrepreneurial intention for both existent unemployed people and people who became unemployed during the COVID-19 lockdown is being in a relationship.

Regarding financial characteristics, both types of unemployed people who need credit record higher entrepreneurial intentions than those who do not need credit. People who became unemployed during the COVID-19 lockdown and who have savings are more likely, by 3.4%, to engage in entrepreneurship than those who do not have savings. Those people with a high level of financial knowledge are less likely to start a new business. People's debt condition does not influence their need for training support.

Regarding the effect of COVID-19, the results show that people who became unemployed during the COVID-19 lockdown and who experienced a drastic income reduction are less likely, by 3.5%, to have entrepreneurial intention with respect to those unemployed people during the COVID-19 lockdown whose income was not affected.

Surprisingly, the level of income is not significant in determining the entrepreneurial intention for existent unemployed people or people who became unemployed during the COVID-19 lockdown.

Table 5: Probit estimations of the training and financial support for self-employed people

Variables	Training support		Financial support	
	Model	Marginal Effect	Model	Marginal Effect
INDIVIDUAL CHARACTERISTICS				
Reference category: More than 45 years old				
18 to 24 years old	-0.301	-0.0817	0.154	0.0567
	(0.300)	(0.0726)	(0.276)	(0.104)
25 to 34 years old	0.0185	0.00562	0.444*	0.167*
	(0.204)	(0.0621)	(0.192)	(0.0742)
35 to 45 years old	0.0756	0.0231	0.154	0.0557
	(0.166)	(0.0511)	(0.155)	(0.0568)
Gender	-0.0301	-0.00910	0.0755	0.0269
	(0.149)	(0.0452)	(0.143)	(0.0509)
Higher education	-0.558**	-0.181**	0.207	0.0724
	(0.173)	(0.0591)	(0.166)	(0.0567)
Relationship	-0.102	-0.0310	-0.172	-0.0617
	(0.149)	(0.0455)	(0.145)	(0.0522)
Household members	-0.0302	-0.00913	0.0782	0.0279
	(0.0458)	(0.0139)	(0.0464)	(0.0165)
Medical insurance	-0.153	-0.0462	0.151	0.0538
	(0.152)	(0.0459)	(0.144)	(0.0514)
Province's capital	-0.210	-0.0660	0.0656	0.0232
	(0.182)	(0.0596)	(0.176)	(0.0617)
FINANCIAL VARIABLES				
With debt	0.317	0.0908		

	(0.175)	(0.0473)		
Income earners	0.0245	0.00738	-0.184*	-0.0659*
	(0.0843)	(0.0255)	(0.0782)	(0.0278)
Financial literacy index	-0.413	-0.125	0.406	0.145
	(0.448)	(0.135)	(0.415)	(0.148)
Reference category: More than 6 workers				
Workers[2-5]	0.172	0.0532	-0.170	-0.0597
	(0.257)	(0.0814)	(0.234)	(0.0805)
Sole proprietorship	0.00336	0.00101	-0.232	-0.0834
	(0.247)	(0.0746)	(0.223)	(0.0810)
Savings	-0.0787	-0.0236	-0.348*	-0.121*
	(0.168)	(0.0498)	(0.155)	(0.0518)
Need for financial support	1.099***	0.360***		
	(0.142)	(0.0469)		
COVID-19 VARIABLES				
Reference category: Income remained same during lockdown				
Income increased during lockdown	-0.458	-0.114	0.0108	0.00387
	(0.526)	(0.104)	(0.491)	(0.176)
Income reduction between 0 and 50% during the lockdown	-0.221	-0.0640	-0.0955	-0.0337
	(0.287)	(0.0794)	(0.291)	(0.102)
Income reduction between 50% and 100% during the lockdown	-0.219	-0.0673	0.183	0.0645
	(0.265)	(0.0833)	(0.275)	(0.0956)
Reference category: Unified basic salary (UBS)				
No income before lockdown	0.778	0.284	1162 *	0.437 *
	(0.586)	(0.233)	(0.711)	(0.225)
Income of 2.5 UBS	-0.185	-0.0554	0.150	0.0538
	(0.172)	(0.0509)	(0.173)	(0.0621)
Income over 2.5 UBS	-0.430	-0.120*	0.355 *	0.130 *
	(0.231)	(0.0593)	(0.220)	(0.0822)
Reference category: Sectors of low effect				
Sectors of high effect	-0.387*	-0.113*	0.549**	0.200**
	(0.192)	(0.0533)	(0.180)	(0.0658)
Sectors of medium-high effect	-0.362*	-0.103*	0.0986	0.0355
	(0.192)	(0.0512)	(0.190)	(0.0692)
Sectors of medium-low effect	-0.719	-0.164**	-0.147	-0.0507
	(0.373)	(0.0581)	(0.299)	(0.0996)
Reference category: The person keeps job				
The person may lose their job	-0.546*	-0.143**	-0.0448	-0.0159
	(0.243)	(0.0542)	(0.235)	(0.0827)
The person has lost their job	-0.408	-0.115	-0.0881	-0.0312
	(0.229)	(0.0598)	(0.216)	(0.0757)
The person worked fewer hours	-0.472*	-0.133*	-0.0537	-0.0191
	(0.217)	(0.0564)	(0.211)	(0.0747)
Reference category: Expenditure remained unchanged				
Expenditure increased			0.0675	0.0242
			(0.174)	(0.0629)
Expenditure decreased			-0.120	-0.0426

		(0.166)	(0.0581)
Trainings		0.0273	0.00976
		(0.0664)	(0.0237)
Need for training support		1.103***	0.410***
		(0.150)	(0.0531)
Observations	474	474	
McFadden's	21.00%	18%	
Specificity	93.04%	88%	
Sensitivity	41.86%	50%	
Correctly classified	79.11%	75%	
Value ROC curve	79.40%	76.77%	

Standard errors are in parenthesis. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

As for the models of the necessity of training and financial support for self-employed people, shown in Table 5, their discrimination ability is high with 79% and 76.7%, respectively. The training support model correctly predicts 93% of the positive values and 41% of the negative values. The financial support model predicts 88% of the positive values and 50% of the negative values.

The results show that the characteristics of self-employed people who need support to reactivate economically differ depending on the type of support that they need. For instance, young people between 25 and 34 years old are more likely to need financial support than people older than 45 years. Gender makes no difference in terms of the need for training or financial support. As expected, highly educated people are 18% less likely to need training support than people with low levels of education. The same result was expected for financial support. However, a non-significant effect of the level of education is found.

Regarding financial variables, the probability of the need for financial support reduces as the number of income earners increases. People with savings are less likely, by 12%, to need financial support than people without savings. Income level is also an important determinant of the need for financial support. Our results indicate that this financial necessity is relevant for self-employed workers with extreme income levels, namely, no income and the highest income. Self-employed workers with no income before the lockdown are 43 percentage points more likely to need financial support than people earning one unified basic salary. The number of workers in self-employed people's businesses is indifferent for the need for financial and training support.

Self-employed workers who operate in sectors highly affected by the crisis are more likely, by 20%, to need financial support than those who operate in sectors of low effect, but are less likely, by 11%, to need training support. In addition, the results show that self-employed people who worked fewer hours due to the COVID-19 lockdown and those that thought that they may lose their job are less likely to need training support. These circumstances are not relevant in determining the necessity of financial support. Finally, self-employed people who need financial support are 36 percentage points more likely to need training support with respect to self-employed workers who do not need financial support, and conversely, people who need training support are 41 percentage points more likely to need financial support than those that do not need training support.

5. DISCUSSION OF RESULTS

5.1 Entrepreneurial intention

During the COVID-19 economic crisis, women are more likely to start a business since women may lose their jobs disproportionately with respect to men. This result contrasts with many studies (Alvarez-Sousa, 2019; *GEM-ESPAE*, 2020; Schlaegel & Koenig, 2014) that obtained that men are more likely to become entrepreneurs than women. However, women as household heads may search more intensively for income than men when their own family members are suffering or do not have adequate conditions (George et al. 2016). In our survey, 54.73% of women lost their jobs compared to 45.27% of men. This also may be related to the level of effect the pandemic had on industries where women mostly work. In the most affected sectors, women represent 45.02% of the labor force. In addition, an increase in caretaking responsibilities could make women reduce their labor supply

in the formal labor market or make them prefer to undertake a productive activity from home in order to attend to domestic activities, including children's online learning (Donovan & Labonte, 2020).

Although education is a key internal resource that more qualified workers have when undertaking entrepreneurial activities (Fedáková et al. 2018; Alvarez-Sousa, 2019), they are more likely to seek formal jobs instead of starting their own business while unqualified workers engage in entrepreneurship because they likely have fewer possibilities to find formal jobs (Akanbi & Onyema, 2011). As for unemployed people with lower levels of education, they are more prone to engaging in necessity-driven entrepreneurship rather than growth-driven entrepreneurship (Díaz & Cancino, 2014). More educated people are more likely to have success in entrepreneurial activities if they also have entrepreneurship education (Bakotić & Kružić, 2010). Unemployed people in a relationship are more likely to start a business. According to Aldo & Salem (1996) and Manea & Nichita (2019), the family network plays a strategic role since it functions as social capital and is fundamental in the beginning of an enterprise in times of crisis.

Both types of unemployed people with a need for credit are more likely to have entrepreneurial intentions. Liquidity, obtained by means of credit, is a necessary condition to start a new business and it is crucial for survival entrepreneurs (Block et al., 2020). However, Bosma (2000) points out that bank financing is sometimes not considered the most viable option for new companies due to its uncertainty. For this reason, a large number of new ventures resort to self-financing through personal savings (Bosma, 2000; Papaoikonomou et al., 2012). This is consistent with the fact that people who became unemployed during the COVID-19 lockdown and who have savings are more likely to engage in entrepreneurship than those who do not have savings.

People with higher intention to start a business are those that know less about financial tools (Arrighetti et al., 2016). Nevertheless, Campos (2018) and OECD (2009) argue that knowledge of financial tools increases the success of a new business.

People who became unemployed during the COVID-19 lockdown and who experienced a drastic income reduction are less likely to have entrepreneurial intention. This could be explained by their duration of unemployment. As they fell into unemployment recently, they immediately searched for jobs, leaving the decision to start a new business aside. Thus, the opportunity cost of undertaking entrepreneurial activities can be high for people who became unemployed during the COVID-19 lockdown.

5.2 Need for training and financial support

The characteristics of self-employed people who need support to reactivate economically differ depending on the type of support they need.

Young people between 25 and 34 years old are more likely to need financial support than people older than 45 years. This result is consistent with a higher propensity for entrepreneurship during the age range of 25 to 34 (Alvarez-Sousa, 2019). Although highly educated people need training support to a lower extent than people with low levels of education, for Sánchez (2019), entrepreneurial education is very important when starting a business.

When the number of income earners increases, there is a high summative household income, which leads to more financial stability in the household (Mora & Escardíbul, 2008; Sundin, 2014) and therefore, a lower probability of the need for financial support. Additionally, as more income earners exist, consumption smoothing is more likely. In the same sense, when the level of savings is high, it is less likely that self-employed people need financial support. This effect is supported by a result obtained by López et al. (2011) for Ecuador that indicates that the majority of respondents (81%) financed their ventures with their own capital and few of them used formal sources of financing (12%). Self-employed workers earning more than two times the unified basic salary are also more likely to need financial support. This situation shows that financial support is a key element not only to help vulnerable people reach a minimum standard of life, but also to help entrepreneurs reactivate economically.

Most importantly, the level of effect of the COVID-19 pandemic is relevant for the necessity of training and financial support of self-employed people. Specifically, those self-employed workers who operate in highly affected sectors such as manufacturing, wholesale and retail trade, and accommodation and food service activities need more financial support to reactivate economically

with respect to sectors less affected such as professional, scientific and technical activities. By contrast, self-employed people in highly affected sectors need training support to a lesser extent than self-employed people in sectors with a low level of effect. This indicates that the most urgent necessity of microentrepreneurs is financial support, rather than training support. According to Kantis et al. (2020), Latin American entrepreneurs have liquidity problems since they do not have financial reserves. Further, only one in four entrepreneurs can access financing and 71% of the entrepreneurs surveyed need a working capital loan. Of those needing a capital loan, 80% need a seed amount of credit to reactivate economically. In addition, 66% of those surveyed need training and technical assistance in the use of technological services.

Finally, the need for financial support is accompanied by the need for training support. It could indicate that entrepreneurs need to implement selling strategies that would require gaining new knowledge, particularly in the technological field, such as digital payments. For technological implementation, they need both training and financial support.

6. CONCLUSIONS

This study investigated two important situations during the COVID-19 lockdown: i. the entrepreneurial intention of unemployed people distinguishing between existent unemployed people and people who became unemployed during the COVID-19 lockdown, and ii. Self-employed people's need for training and financial support. The study concludes that the underlying characteristics that motivate entrepreneurial activities are different across types of unemployed people. While the less educated people among the existent unemployed are more prone to undertaking entrepreneurial activities than the more educated unemployed people are, the level of education among people who became unemployed during the COVID-19 lockdown is not relevant. Likewise, people who became unemployed during the COVID-19 lockdown who have financial education are less likely to have entrepreneurial intention than those who do not know about financial tools. Since existent unemployed people with low levels of education and people who became unemployed during the COVID-19 lockdown with low financial knowledge are more likely to start a business, it could be deduced that they are going to engage in entrepreneurial activities with a survival perspective rather than a growth perspective. However, laws related to economic reactivation exist only to support entrepreneurs with growth perspective and neglect the needs of survival entrepreneurs. This study, then, makes emphasis and call for attention to policy makers to assist these people who seek a way out of unemployment in the framework of this time of crisis.

In addition, the underlying characteristics of self-employed people who need training and financial support were identified. The findings show that self-employed workers who need training also need financial support and vice versa. However, those who need financial support more urgently are mainly young people between 25 and 34 years old and people who work in the industries most affected by the COVID-19 pandemic. An interesting insight about financial support is that it is needed both by people with no income before the lockdown and by people with high income levels, demonstrating that funding is a key element in reactivating the economy. As expected, self-employed workers who need training support have not only a lower level of formal education but also a low level of financial education. Additionally, mechanisms of consumption smoothing, such as savings and more income earners in a household, allow self-employed workers to face the economic crisis without financial support.

While interesting findings are obtained, this study is not without limitations. Since the survey was conducted online, there could be a bias towards people with internet access. Moreover, information on entrepreneurial attitudes and family entrepreneurial history is not included as it not available in the survey. This study could be enlarged by analyzing actual entrepreneurship statistics on activity during COVID-19 times. Altogether, important policy recommendations can be driven from these results. First, a training program including financial education is required for self-employed workers to keep their businesses alive. Second, policy actions should focus on self-employed workers to help them to reactivate economically. It is worth mentioning, however, that national regulations discourage self-employed workers from registering as microentrepreneurs due to high taxes for them. Additionally, microcredits in the formal banking system are extremely expensive with interest rates that range from 20% to 28%. This restricts self-employed workers' access to formal

credit. Therefore, new financial products for emergent credits with lower interest rates need to be created by the formal bank system.

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Artigo submetido a 173 de Agosto de 2021; versão final aceite a 9 de Março de 2022
Paper submitted on August 17, 2021; final version accepted on March 9, 2022

Vulnerabilidades Territoriais, Pandemia e Emprego: Uma Análise Exploratória de Perfis Socioeconómicos Municipais e Impactos da COVID-19 em Portugal¹

Territorial Vulnerabilities, Pandemic and Employment: An Exploratory Analysis of Municipal Socioeconomic Profiles and Impacts of COVID-19 in Portugal

João Ferrão

joao.ferrao@ics.ulisboa.pt

Universidade de Lisboa, Instituto de Ciências Sociais Lisboa, Portugal

Hugo Pinto

hpinto@ces.uc.pt

Faculdade de Economia, Centro de Investigação em Turismo, Sustentabilidade e Bem-Estar, Universidade do Algarve Faro, & Centro de Estudos Sociais, Universidade de Coimbra, Coimbra, Portugal

José Maria Castro Caldas

castro.caldas@colabor.pt

Centro de Estudos Sociais, Universidade de Coimbra & COLABOR. Lisboa, Portugal

Renato Miguel do Carmo

renato.carmo@iscte-iul.pt

Iscte - Instituto Universitário de Lisboa, CIES-Iscte, Lisboa, Portugal

Resumo

A pandemia originou um conjunto de impactos de diferentes magnitudes no território. Este artigo apresenta uma abordagem exploratória para compreender como a existência de determinadas vulnerabilidades no momento pré-crise conduziu a diferentes impactos nos territórios em Portugal. Partindo da escala municipal, a análise define uma tipologia de territórios vulneráveis em função dos graus de exposição e suscetibilidade que apresentam, e compara os distintos grupos de municípios dessa tipologia com os impactos territoriais da crise pandémica em termos das dinâmicas de desemprego. Os resultados atestam a existência de vulnerabilidades acrescidas em territórios muito dependentes do turismo e dos que integram áreas metropolitanas, cujas estruturas socioeconómicas redundaram em situações de maior crescimento do desemprego em 2020. O artigo tem implicações para a reflexão sobre vulnerabilidade territorial, resiliência e políticas públicas para transformar a economia portuguesa no período pós-pandemia.

Palavras-chave: pandemia, emprego, território, vulnerabilidade, exposição, suscetibilidade, resiliência, Portugal.

¹ **Agradecimentos:** Este estudo insere-se nas atividades do projeto de investigação “EmployALL – A crise do emprego e o Estado Social em Portugal: deter a produção de vulnerabilidades sociais e de desigualdades” (referência PTDC/SOC-SOC/30543/2017), financiado pela FCT - Fundação para a Ciência e a Tecnologia através de fundos nacionais. Hugo Pinto é apoiado pela FCT (Estímulo ao Emprego Científico DL57/2016/CP1341/CT0013 e UIDB/04020/2020). Agradecimento a Fernando Honório pelo apoio prestado na análise de *clusters*. Consulte uma versão interativa deste estudo em: <https://vulnerabilidades-territoriais.datalabor.pt/>

Códigos-JEL: C38; E24; H12; 010; P48

Abstract

The pandemic originated a set of impacts of different magnitudes in the territory. This article presents an exploratory approach to understand how the existence of certain vulnerabilities in the pre-crisis moment led to different impacts on territories in Portugal. Starting from the municipal scale, the analysis defines a typology of vulnerable territories according to the degrees of exposure and susceptibility they present, and compares the different groups of municipalities in this typology with territorial impacts of the pandemic crisis in terms of unemployment dynamics. The results attest to the existence of increased vulnerabilities in territories highly dependent on tourism and those that are part of metropolitan areas, whose socioeconomic structures resulted in situations of higher unemployment growth in 2020. The article has implications for reflection on territorial vulnerability, resilience and policies to transform the Portuguese economy in the post-pandemic period.

Keywords: pandemic, employment, territory, vulnerability, exposure, susceptibility, resilience, Portugal.

Codes-JEL: C38; E24; H12; 010; P48.

1. INTRODUÇÃO

A pandemia revelou nos últimos dois anos um conjunto alargado de vulnerabilidades na sociedade contemporânea. Para além da situação dramática de saúde pública, tornou visível fragilidades de vários territórios e setores económicos. Alguns territórios, entendidos como complexos socioeconómicos, estão a revelar-se mais *vulneráveis* do que outros à pandemia e importa saber porquê. A desigual incidência territorial do desemprego registado é uma decorrência dessa diversidade de situações de vulnerabilidade territorial associada a diferentes estruturas sociais e económicas (Tavares, Cândido, Caleiras e Carmo, 2021).

O caso português não é distinto. É visível que os territórios têm tido uma capacidade diferenciada de se ajustarem à crise. As vulnerabilidades territoriais são geradas por processos institucionais e políticos e por deliberações coletivas, a que se adicionaram riscos inerentes a diferentes tipos de inserção das atividades económicas em cadeias de produção globais (Reis, 2020a). O país perdeu nas últimas décadas um peso muito importante em setores industriais dinâmicos em termos de produtividade, alterando radicalmente o padrão de especialização nacional, com o turismo a ganhar forte destaque no peso na economia, no crescimento do próprio setor como um todo, nas dinâmicas de muitas cidades e ainda nas expectativas de recuperação e relançamento da economia (Caldas, 2020). O território sofreu ainda com uma desatenção das políticas públicas que levou à formação de um modelo unipolar, concentrando recursos e atividades na área metropolitana de Lisboa e convertendo o resto do país em periferia (Reis, 2020b).

A conceção de vulnerabilidade utilizada neste artigo é inspirada por outras mais estabilizadas, como, por exemplo, as definições sugeridas pelo Painel Intergovernamental sobre Mudanças Climáticas (2019). As metáforas epidemiológicas, mesmo nas aceções leigas, podem ser úteis para clarificar conceitos. O novo Coronavírus, como tem sido dito e repetido, não é discriminatório. No entanto, existem indivíduos e grupos sociais particularmente *vulneráveis* não só ao contágio como aos seus efeitos. São vulneráveis, porque mais *suscetíveis*, os indivíduos com comorbilidades ou idade avançada (e as coortes correspondentes), mas também são vulneráveis os indivíduos e os grupos sociais que estão mais *expostos* ao contágio por diferentes razões, entre as quais as condições de habitação, a necessidade de trabalharem presencialmente ou o imperativo de se moverem entre territórios em diversas escalas.

Aqui a noção de *vulnerabilidade* é entendida como consequência da interação entre duas dimensões: o grau de robustez interna das estruturas socioeconómicas, designada de *suscetibilidade*, e o grau de permeabilidade a circunstâncias externas adversas, designada de *exposição*. Sendo originária

da epidemiologia, a noção de vulnerabilidade tem vindo a ser adotada em outros domínios disciplinares e outras problemáticas, nomeadamente na análise das consequências socioeconómicas da crise financeira de 2008 (Ferrão, 2013) e da COVID-19 (Caldas et al., 2020).

A estas dimensões de vulnerabilidade é comum juntar uma outra, atualmente bastante em voga: a *resiliência*. Utilizada muitas vezes sem precisão, pode transformar-se num conceito ambíguo que pouco oferece ao entendimento de qualquer fenómeno ou às políticas públicas (Simmie e Martin, 2010; Davoudi et al., 2012). A resiliência é um conceito que tem sido debatido, principalmente, colocando a ênfase na capacidade de resistência e de retorno aos estados de equilíbrio pré-choque. Esse é o entendimento mais comum de resiliência: a capacidade de *resistência* de um sistema em manter a sua estrutura face a choques e perturbações externas e, posteriormente, a capacidade de *recuperação* para voltar a equilíbrios pré-choque. Estas duas vertentes são essenciais para a compreensão do regresso à “normalidade”. Mas a resiliência deve ser também entendida como a capacidade de adaptação (*reorientação*) e de geração de novos caminhos (*renovação*) (Pinto et al., 2019; Carmo e Ferreira, 2019). Estas duas últimas vertentes de resiliência são cruciais quando não se pretende voltar ao “normal” – porque esse “normal” é parte do problema. São as fontes para o salto em frente, para a criação de um “novo normal”. Assim, a noção de resiliência permite pensar no momento a seguir a uma crise, após o choque. Esta é a abordagem de muita da investigação recente sobre resiliência regional (Boschma, 2015) e que parte da geografia económica evolucionista (Zhu et al., 2019) para compreender o conceito como dimensão fundamental para a transformação das economias (Giovanni et al., 2020).

Este artigo apresenta, de forma exploratória, um trabalho em curso que pretende associar a existência de vulnerabilidades territoriais diferenciadas com os impactos da pandemia no emprego em Portugal. A análise utiliza informação estatística pré-crise ao nível do município para traçar perfis territoriais de acordo com as vulnerabilidades existentes. São selecionados indicadores considerados cruciais para a suscetibilidade e a exposição à crise pandémica. As tipologias de municípios em relação a esses dois aspetos são calculadas com base numa análise de *clusters*. Seguidamente, o perfil territorial de vulnerabilidade, que resulta do cruzamento das duas dimensões anteriores, é comparado com a evolução do desemprego em vários períodos temporais de 2020, permitindo refletir sobre a capacidade de resiliência dos territórios em diferentes momentos.

O artigo organiza-se nas seguintes partes. Na secção 2 identifica-se e explica-se a seleção de indicadores de suscetibilidade e de exposição úteis para uma análise das vulnerabilidades territoriais. Na secção 3 apresentam-se os resultados da análise das vulnerabilidades territoriais pré-crise realizada para os 308 municípios do país. Na secção 4 efetua-se, inicialmente, um breve retrato do impacto da crise da COVID-19 no contexto nacional, para, seguidamente, detalhar esses impactos em termos de desemprego, cruzando-os com a tipologia de territórios vulneráveis identificada na secção anterior. O texto termina com algumas conclusões e reflexões sobre os múltiplos sentidos da resiliência territorial.

2. OPÇÕES PARA O ESTUDO DE VULNERABILIDADES TERRITORIAIS E DE RESILIÊNCIA

Uma das componentes essenciais deste trabalho é a reflexão sobre as variáveis que podem contribuir para um melhor entendimento das vulnerabilidades territoriais. A caracterização da vulnerabilidade potencial dos territórios às consequências socioeconómicas da COVID-19 requer uma seleção prévia das componentes analíticas das dimensões de *suscetibilidade* e de *exposição*. Dada a natureza prospetiva do exercício, relacionado com consequências que apenas estão em vias de materialização, essa seleção é um exercício *a priori* baseado numa formulação hipotética de vínculos causais entre, por um lado, circunstâncias e características estruturais socioeconómicas do território e, por outro, consequências da pandemia, neste caso em termos de emprego, num horizonte de curto e médio prazo.

As componentes analíticas da dimensão *suscetibilidade* identificadas como relevantes e selecionadas incluem: (a) desemprego; (b) rendimento; (c) desigualdade; (d) fragilidade do tecido empresarial; (e) precariedade laboral (Tabela 1).

O *desemprego*, cuja incidência já era territorialmente bastante desigual no período anterior à pandemia, constitui, pela sua insuficiente cobertura pela Segurança Social, uma fragilidade importante quer dos indivíduos quer das comunidades face ao choque sanitário. Frustrando esforços na

procura de emprego, a recessão tende a prolongar o tempo de privação de atividade remunerada (desemprego), assim delapidando capacidades, ou, em alternativa, a expulsar indivíduos em idade ativa do território (emigração). O *rendimento* individual ou familiar é em grande medida determinante do tempo que é possível suportar em circunstâncias de desemprego, término ou declínio da atividade económica sem incorrer em situação de privação ou pobreza. Tendo em conta que o rendimento médio é uma medida imperfeita da componente analítica 'rendimento', a desigualdade da sua distribuição é considerada como critério de avaliação complementar da capacidade de resistência a situações de desemprego e de suspensão total ou parcial da atividade económica. A *desigualdade* na repartição interpessoal do rendimento, como outras desigualdades, condiciona a capacidade de ação coletiva das comunidades e, portanto, as suas respostas sociais e empresariais. A capacidade de resistência das empresas ao declínio da procura ou à suspensão ou redução do nível de atividade depende da sua solidez financeira prévia e do acesso ao crédito e capitais, fatores muito associados à dimensão da empresa. É de admitir, por isso, que quanto maior é o peso das microempresas na estrutura produtiva (medido pelo peso do emprego em microempresas no emprego total), maior a *fragilidade do tecido empresarial*. A maior ou menor facilidade com que a relação laboral é quebrada pela entidade patronal determina em grande medida o nível de risco de desemprego e/ou privação de rendimento do trabalhador – uma relação confirmada pela vincada destruição de emprego de trabalhadores com vínculos precários ao longo da pandemia. A prevalência de contratos não definitivos é, a par de outros indicadores possíveis que refletem facetas da *precariedade laboral* igualmente relevantes, mas pior documentadas nas estatísticas, uma dimensão plausível para o exercício a desenvolver.

Tabela 1: Dimensões e Indicadores de Suscetibilidade

Dimensão	Indicador	Fonte
Desemprego	Desemprego registado fevereiro de 2020 / População residente em idade ativa [15-64 anos], 2019	(a) IEFP, Estatísticas Mensais do Mercado de Emprego, Desemprego registado, Estatísticas - IEFP, I.P.; (b) INE, População residente (N.º) por Local de residência (NUTS - 2013), Sexo e Grupo etário [15-64 anos]; 2019, Portal do INE
Rendimento	Rendimento bruto declarado por sujeito passivo, 2018	INE, Rendimento bruto declarado por sujeito passivo (€) por Localização geográfica (NUTS - 2013); 2018, Portal do INE
Desigualdade	Desigualdade na distribuição do rendimento, 2018 (Rendimento bruto declarado deduzido do IRS dos sujeitos passivos - P90/P10)	INE, Desigualdade na distribuição do rendimento bruto declarado deduzido do IRS liquidado dos sujeitos passivos (P90/P10) (N.º) por Localização geográfica (NUTS - 2013); 2018, Portal do INE
Fragilidade do tecido empresarial	Pessoal ao serviço nos estabelecimentos [categoria 0-9 trabalhadores] / Total de pessoal ao serviço, 2018	INE, Sistema de Contas Integradas das Empresas
Precariedade laboral	Número de trabalhadores por conta de outrem com contrato com termo certo, termo incerto e outras situações nos estabelecimentos / Número de trabalhadores por conta de outrem nos estabelecimentos (outubro 2018)	GEP/MTSSS, Quadros de Pessoal, 2018

Fonte: Elaboração Própria

As componentes analíticas da dimensão *exposição* identificadas como relevantes e selecionadas incluem: (a) dependência do turismo; (b) dependência de atividades exportadoras em refluxo; (c) dependência de atividades imobiliárias e da construção (Tabela 2).

Fruto das condicionantes à mobilidade de pessoas, as atividades associadas ao *turismo*, cuja distribuição no território é muito diferenciada, foram, e continuarão a ser por um tempo indeterminado, as que sofreram o mais forte impacto da pandemia. Dado que as atividades turísticas não são as únicas expostas a procura externa em declínio, justifica-se considerar também o peso relativo do emprego em ramos muito dependentes dos mercados externos que sofreram as maiores *quebras nas exportações*. A combinação de dependência das exportações e quebra das mesmas, ainda que

temporária, é uma medida da pressão que estão a sofrer as empresas e o emprego. As *atividades imobiliárias e da construção* beneficiaram fortemente, no período de recuperação económica anterior à pandemia, do impulso do turismo e de fluxos de capitais externos em busca de valorização imobiliária. Embora ambas as fontes de expansão do imobiliário e da construção se encontrem em refluxo, as consequências ainda não se manifestaram nos preços praticados no mercado e nas atividades de construção civil. O efeito de um processo desinflationista no setor imobiliário é ambíguo. Traduz-se, por um lado, em melhores condições de acesso à habitação (por aquisição ou arrendamento) para a maioria da população, mas resulta, por outro, numa punção da riqueza dos particulares e numa ameaça à solvabilidade dos bancos. Globalmente, a eclosão da bolha imobiliária tende a convergir com outros fatores para a perda do emprego no setor (incluindo construção de edifícios) e para o aprofundamento e prolongamento da recessão.

Tabela 2: Dimensões e Indicadores de Exposição

Dimensão	Indicador	Fonte
Dependência do turismo	Número de pessoas ao serviço nos estabelecimentos nas atividades associadas ao turismo (componente turística) / Número de pessoas ao serviço nos estabelecimentos (31 de outubro 2018)	GEP/MTSSS, Quadros de Pessoal, 2018 (Ver Anexo 1 – Emprego em atividades associadas ao turismo)
Dependência de atividades exportadoras em refluxo	Número de pessoas ao serviço nos estabelecimentos nas atividades expostas à quebra das exportações / Número de pessoas ao serviço nos estabelecimentos (31 de outubro 2018)	GEP/MTSSS, Quadros de pessoal, 2018 (Ver Anexo 2 – Atividades expostas à quebra das exportações)
Dependência de atividades imobiliárias e da construção	Número de pessoas ao serviço nos estabelecimentos associados a atividades imobiliárias e da construção / Número de pessoas ao serviço nos estabelecimentos (31 de outubro 2018)	GEP/MTSSS, Quadros de Pessoal, 2018 (Ver Anexo 3 – Emprego em atividades expostas às dinâmicas do imobiliário)

Fonte: Elaboração Própria

O indicador de *resiliência* utilizado foi a variação do desemprego, uma opção que ecoa muita da literatura sobre resiliência regional que confere ao mercado laboral um papel central na sua compreensão (Bristow e Healey, 2018). Aprofundar a análise da resiliência implica que esta seja considerada como um fenómeno dinâmico. O que é suscetível de ser entendido como um sinal de resistência e de recuperação rápida pode não ter afinal sustentação para se manter durante muito tempo, ocultando ou criando fragilidades graves para momentos posteriores. Deste modo, a resiliência foi medida pela variação do desemprego registado (utilizando dados mensais do IIEFP ao nível do município), mas tendo em consideração diferentes períodos: um de choque imediato, que procura compreender essencialmente a resistência das economias às incertezas do primeiro confinamento, medindo a variação do desemprego entre fevereiro de 2020, considerado o mês 0 da crise pandémica em Portugal, e abril de 2020; um segundo, entre fevereiro e junho de 2020, centrado essencialmente na recuperação; e um terceiro, de fevereiro a dezembro de 2020, que já permite ter em conta vários processos de adaptação em curso nos territórios.

3. VULNERABILIDADES TERRITORIAIS E IMPACTOS DA PANDEMIA NO EMPREGO

3.1. Geografia das vulnerabilidades territoriais

Existe uma significativa diversidade territorial das estruturas económicas e sociais dos municípios do país. Será, por isso, expectável que a incidência territorial das dimensões de *suscetibilidade* e de *exposição*, e consequentemente de *vulnerabilidade*, seja bastante diversificada.

Tendo como objetivo averiguar a geografia daquelas duas dimensões, calculou-se, para cada uma delas, um índice que permite agrupar os vários municípios em três escalões conforme o grau de suscetibilidade e exposição que possuem: elevado, médio e baixo. A definição desses três escalões

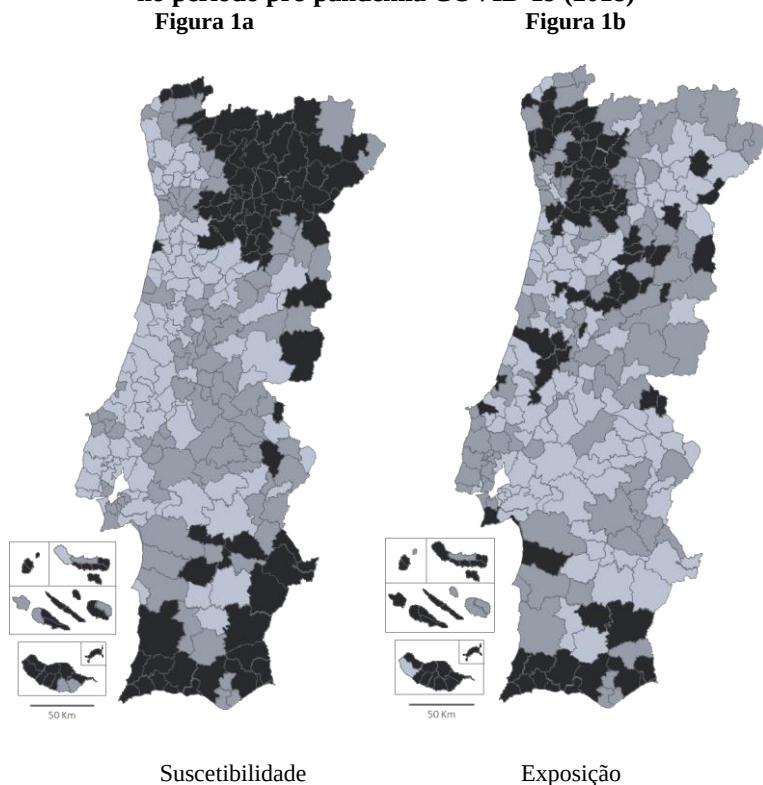
resultou da seguinte sequência de procedimentos: (a) normalização dos resultados de cada um dos indicadores numa escala de 0 a 100; (b) somatório dos resultados normalizados dos indicadores de cada uma das dimensões; (c) divisão do valor obtido pelo total de indicadores em causa, isto é, 5 para a dimensão *suscetibilidade* e 3 para a dimensão *exposição*; (d) ordenação descendente dos municípios em função do índice final; e (v) agregação dos municípios em três escalões com igual número de ocorrências (1/3 do total).

A Figura 1 apresenta os resultados relativos às duas dimensões consideradas.

A Figura 1a evidencia duas grandes manchas de municípios com elevado grau de suscetibilidade: Norte interior e Algarve, com prolongamentos para a Região Centro, no primeiro caso, e para o Baixo Alentejo, no segundo. A estas manchas de maior dimensão há ainda que adicionar a Região Autónoma da Madeira, várias ilhas dos Açores e diversos municípios fronteiriços. É de salientar, por contraste, que, à exceção de Vila Real, as cidades de média dimensão do continente e das regiões autónomas têm valores de suscetibilidade baixos (a maioria) ou médios, mas inferiores aos que se verificam nas regiões de que fazem parte (caso de Bragança, Faro e Funchal). Recorde-se que o índice agregado de suscetibilidade inclui cinco componentes analíticas (desemprego, desigualdade, rendimentos baixos, fragilidade do tecido empresarial e precariedade laboral). Assim sendo, o mapeamento de três escalões de suscetibilidade é útil para identificar as áreas do país globalmente mais frágeis do ponto de vista socioeconómico, mas insuficiente para sugerir explicações para as várias situações detetadas.

A Figura 1b, relativa ao grau de exposição dos municípios a circunstâncias externas negativas (dependência do turismo, de atividades exportadoras em refluxo e de atividades imobiliárias e da construção), revela um padrão territorial distinto, tanto em termos de concentração (manchas mais reduzidas de incidência máxima) como de distribuição (p.e. importância da região do Noroeste externa à área metropolitana do Porto e de várias subáreas da Região Centro). Há, no entanto, um conjunto significativo de municípios do Tâmega e Sousa, do Algarve e das regiões autónomas dos Açores e da Madeira onde um grau de exposição elevado coincide com um grau de suscetibilidade igualmente elevado.

Figura 1: Estrutura socioeconómica e emprego: graus de *suscetibilidade* e de *exposição* por município no período pré-pandemia COVID-19 (2018)²

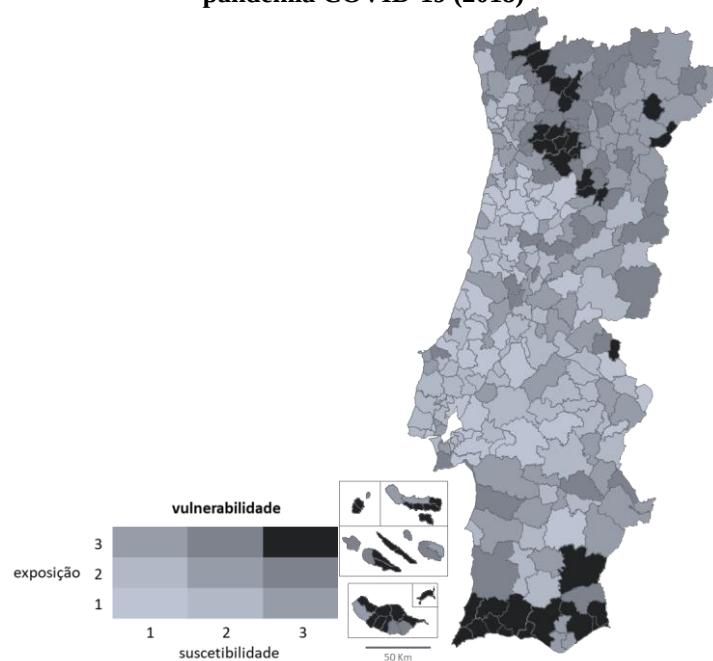


Fonte: Elaboração Própria

² Apenas os dados relativos ao desemprego se referem a 2019/20.

A Figura 2, onde se definem 5 graus de vulnerabilidade em função da relação entre os três escalões de suscetibilidade e de exposição antes analisados, permite confirmar as quatro áreas geográficas mais críticas do país, isto é, as manchas de municípios com, simultaneamente, estruturas socioeconómicas frágeis (suscetibilidade) e permeabilidade acentuada a fatores exógenos (exposição): são as mencionadas no parágrafo anterior, mas com maior relevo para o arco externo de municípios da região Noroeste repartidos pelas NUTS III Alto Minho, Ave, Cávado e, sobretudo, Tâmega e Sousa.

Figura 2: Estrutura socioeconómica e emprego: grau de vulnerabilidade por município no período pré-pandemia COVID-19 (2018)



Fonte: Elaboração Própria

A construção de uma tipologia de situações a partir dos resultados dos vários indicadores de suscetibilidade (cinco) e de exposição (três) por município permite identificar conjuntos de relações privilegiadas entre esses vários indicadores, introduzindo um maior potencial explicativo por comparação com as descrições anteriormente expostas. Com esse objetivo, recorreu-se a uma classificação dos municípios envolvendo os oito indicadores e os 308 municípios do país.

3.2. Tipologias de Territórios Vulneráveis

A abordagem estatística adotada para a classificação dos municípios em grupos foi uma análise de *clusters*. A análise realizada é essencialmente exploratória. Foram efetuadas várias análises de *clusters* utilizando diferentes pontos de partida: (a) as oito variáveis consideradas, (b) os fatores extraídos de uma análise exploratória de componentes principais e (c) as variáveis específicas de suscetibilidade e de exposição, tomadas separadamente. Os três processos mencionados são satisfatoriamente consistentes entre si. Reteve-se a abordagem (a) para a apresentação seguinte.

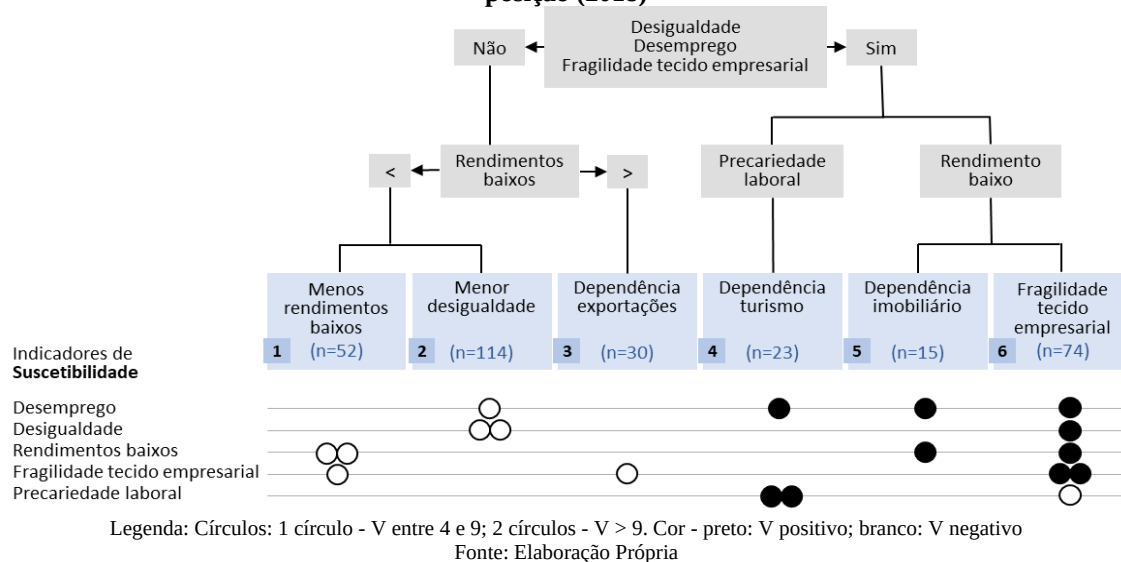
As análises realizadas seguiram a lógica proposta por Marôco (2021). Primeiramente, foi realizada uma análise hierárquica, seguindo o método de *Wards* e a distância euclidiana quadrada. Como critério para decisão do número de *clusters* a reter foi utilizada a visualização do dendrograma. A pertença a cada *cluster* foi posteriormente comparada e confirmada por agrupamento automático (K-Means). A análise da ANOVA sugere diferenças estatisticamente significativas para todos os *clusters* definidos em todas as variáveis incluídas. Os resultados estatísticos foram obtidos usando IBM SPSS (ver. 25) e SPAD.

Através deste procedimento, os municípios são sucessivamente agrupados de acordo com o grau de semelhança que apresentam entre si em função dos resultados que apresentam em cada um dos indicadores considerados.

O grau de sobre ou sub-representação dos vários indicadores que se verifica nas diferentes situações-tipo permite identificar os aspetos que conferem unidade a cada grupo e, ao mesmo tempo, o distinguem dos restantes. Por exemplo (ver Anexo 4), no Grupo 3 o valor médio relativo à dependência das exportações é 22, enquanto para o conjunto dos 308 municípios do país é apenas 2,9. O valor-teste (V) é, por isso, elevado e positivo (14,7), indiciando uma situação de clara sobre-representação. Já no Grupo 1, a importância relativa do peso dos rendimentos baixos é de 66,6, um valor bastante inferior ao da média dos municípios portugueses: 98,6. Como no exemplo anterior, também neste caso o valor-teste é elevado, ainda que agora negativo (-12,7), refletindo uma posição significativa de sub-representação. Em ambos os exemplos, contudo, o elevado grau de sobre ou sub-representação indica que estamos perante traços distintivos dos grupos em questão.

O dendrograma da Figura 3 sintetiza graficamente os resultados obtidos. Uma leitura descendente do dendrograma indica que os 308 municípios do país se agregam em dois grandes conjuntos, que se diferenciam entre si sobretudo pela incidência contrastante de três dos indicadores de suscetibilidade: desigualdade, desemprego e fragilidade do tecido empresarial. O conjunto com estruturas socioeconómicas mais robustas envolve 197 municípios, sendo, portanto, significativamente mais numeroso do que o segundo (111). Cada um desses conjuntos, por sua vez, subdivide-se em grupos que se distinguem entre si principalmente pelos resultados relativos aos dois restantes indicadores de suscetibilidade: rendimentos baixos e precariedade laboral. Autonomizam-se, assim, seis grupos de municípios, relativos a outras tantas situações-tipo, cuja incidência geográfica pode ser vista na Figura 4. Para ajudar à leitura do dendrograma, foram assinalados na parte inferior da Figura 3 os indicadores de suscetibilidade que mais contribuem para caracterizar cada um dos grupos dado o grau de sub/sobre-representação elevado (valor-teste – V – entre 4,0 e 9,0) ou muito elevado ($V > 9,0$) que evidenciam.

Figura 3: Dendrograma das situações-tipo (grupos de municípios) em termos de suscetibilidade e exposição (2018)



O Grupo 1, com 52 municípios, inclui basicamente a área metropolitana de Lisboa (alargada para norte em direção a Alenquer e Azambuja), o núcleo central da área metropolitana do Porto e diversas cidades de média dimensão (p.e. Funchal, Ponta Delgada, várias sedes de distrito, Figueira da Foz, Caldas da Rainha, Sines). Estes municípios distinguem-se dos restantes por terem características estruturais socioeconómicas mais favoráveis, sobretudo no que diz respeito ao peso relativo de rendimentos baixos e, secundariamente, à fragilidade do tecido empresarial, que são bastante inferiores à média nacional.

O Grupo 2 é o mais numeroso (114 municípios) e encontra-se bem representado na Região Centro, Oeste, Ribatejo e Alentejo Norte e Central. Em relação ao anterior, tem uma incidência relativa mais baixa de desemprego e um perfil de desigualdades menos acentuado.

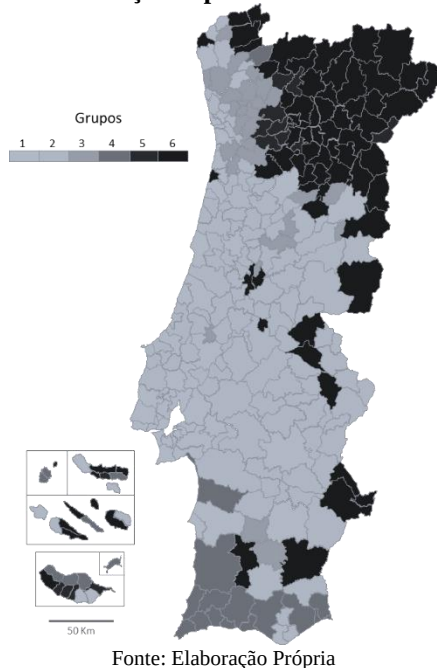
O Grupo 3 caracteriza-se por uma grande dependência das exportações. Engloba 30 municípios geograficamente concentrados na área de industrialização difusa do Noroeste do país e ainda diversos municípios isolados com uma significativa base de indústria transformadora (Alcanena, Castanheira de Pera, Mangualde, Oliveira do Hospital, etc.) ou mineira (Aljustrel, Castro Verde). Por comparação com os restantes grupos, os municípios deste grupo possuem um tecido empresarial globalmente menos frágil.

O Grupo 4 associa uma forte dependência do turismo com precariedade laboral e, secundariamente, desemprego. Mais de metade dos 23 municípios deste grupo localiza-se no Algarve e no litoral alentejano, distribuindo-se os restantes pelas regiões autónomas dos Açores e da Madeira.

O Grupo 5 inclui municípios fortemente dependentes da fileira da construção civil e do imobiliário. Caracterizam-se por uma presença significativamente superior à média nacional de baixos rendimentos e de desemprego. Envolve 15 municípios, merecendo serem salientados os nove localizados na NUTS III do Tâmega e Sousa ou geograficamente contíguos (Cabeceiras de Basto / Ave; Ribeira de Pena / Alto Tâmega; Mesão Frio e Tarouca / Douro) e os quatro na ilha da Madeira. Correspondem a bolsas geográficas com uma forte presença de mão-de-obra da construção civil, que é recrutada para trabalhar em municípios com maior dinamismo económico.

Finalmente, o Grupo 6, o segundo mais numeroso (74 municípios), apresenta uma situação estrutural frágil visível na maioria dos indicadores de suscetibilidade. Corresponde a uma vasta mancha contínua no Nordeste do país, incluindo o interior da Região Norte e de parte da Região Centro, e tem uma presença igualmente relevante na Região Autónoma dos Açores e em algumas áreas do Alentejo (p.e. Nisa/Crato/Monforte; Mourão/Barrancos/Moura).

Figura 4: Geografia das situações-tipo de vulnerabilidade territorial (2018)



As situações-tipo identificadas, ao estabelecer relações de conexão (associação estatística) entre diferentes dimensões de suscetibilidade e de exposição, podem ser úteis para analisar preventivamente os impactos de determinados choques externos em territórios com estruturas socioeconómicas distintas, não tanto no sentido de estimar a intensidade desses impactos, que será sempre contingente, mas sobretudo no que diz respeito às suas principais manifestações, provável durabilidade e potencial de recuperação.

Tabela 3: Suscetibilidade, Exposição e Vulnerabilidade – Desempenhos por situação-tipo

	Situações-tipo					
	Grupo 1 Menos rendi- mentos bai- xos	Grupo 2 Menos desi- gualdade	Grupo 3 Dependência das exporta- ções	Grupo 4 Dependência do turismo	Grupo 5 Dependência do imobiliário e da constru- ção	Grupo 6 Fragilidade do tecido empre- sarial
Suscetibilidade	30,3	38,0	30,3	72,6	72,4	64,9
Exposição	18,5	16,7	49,9	66,3	57,8	21,7
Vulnerabilidade	24,4	27,4	40,1	69,5	65,1	43,3

Sombreado claro: valores entre 40 e 50 (próximos da média); sombreado escuro: valores >50 (superiores à média)

Fonte: Elaboração Própria

A Tabela 3 permite uma visão de conjunto em relação ao grau de suscetibilidade, exposição e vulnerabilidade de cada um dos grupos definidos, tendo por base a média normalizada dos Municípios de cada grupo numa escala de 0 a 100. Para facilitar a leitura da informação da Tabela, destacaram-se os valores próximos (sombreado claro) e superiores (sombreado escuro) à média dos municípios de cada grupo para cada uma das dimensões em causa.

O Grupo 6 é dos menos expostos, estando por isso tendencialmente protegido (Tabela 3). Mas, dada a sua fragilidade estrutural, os impactos, caso sejam intensos, confrontar-se-ão com uma significativa dificuldade de reação e recuperação.

Os grupos 3, 4 e 5 são os que têm uma margem de resposta mais estreita, dada a especificidade do tipo de dependências que os caracteriza (Tabela 3). Os impactos imediatos serão mais devastadores, mas a recuperação poderá ser mais rápida, mantendo, contudo, a mesma vulnerabilidade em face de riscos sistémicos de origem externa caso não ocorram, entretanto, alterações significativas no perfil das estruturas socioeconómicas locais.

Finalmente, os grupos 2 e, sobretudo, 1 são, potencialmente, os menos vulneráveis (Tabela 3), mas neste último caso há uma maior probabilidade de o amortecimento e a recuperação da crise serem feitos à custa do agravamento da polarização social (aumento do desemprego e em particular das desigualdades). Essa situação é sobretudo previsível nos núcleos centrais das áreas metropolitanas, não só pelo facto de os valores médios esconderem, nesses casos, disparidades intramunicipais muito significativas, mas também porque pode ser mais crítico o impacto da conjugação de múltiplas dependências externas (maior diversidade de frentes de exposição), por um lado, e de polarizações sociais preexistentes, pelo outro.

4. OS IMPACTOS DA CRISE PANDÉMICA

4.1. Os impactos da pandemia no contexto nacional

Em janeiro de 2021, com Portugal a experimentar uma violenta ressurgência da pandemia e com o sistema de saúde em estado de emergência, os poderes públicos decretaram um novo confinamento. Para trás tinha ficado uma primeira vaga entre março e maio de 2020, e uma acalmia entre maio e setembro simultânea a uma recuperação económica rápida.

A partir de setembro de 2020, porém, foi-se tornando claro que o regresso a um estado de relativa normalidade ao longo do verão mais não havia sido do que o prelúdio de um novo agravamento, acompanhado de travagem da recuperação económica. Esse agravamento, em vagas sucessivas, haveria de culminar em janeiro de 2021 num pico infeccioso de grandes proporções e num novo confinamento.

O impacto socioeconómico da primeira vaga foi violento e, dado que a recuperação verificada ao longo do verão foi interrompida a partir de setembro e revertida em janeiro, revelou-se mais duradouro do que o esperado. A informação estatística disponível permite documentá-lo apenas num

número restrito, mas significativo, de dimensões – Produto Interno Bruto (PIB), emprego, desemprego e rendimento – ainda que com um desfasamento temporal considerável³

A pandemia e o confinamento resultaram em Portugal numa contração do PIB de cerca de 2,3% no primeiro trimestre de 2020 e de 16,2% no segundo trimestre, relativamente aos trimestres homólogos de 2019. Já a recuperação no terceiro trimestre reduziu para 5,7% o hiato relativamente ao nível do produto do mesmo trimestre do ano anterior (cf. Anexo 5). A quebra do 1º para o 2º trimestre foi mais acentuada em Portugal do que na UE (11,6% e 9,6%, respetivamente) e, embora a recuperação do 2º para o 3º trimestre tenha sido mais vincada em Portugal (14,1% vs. 11,6% na UE), na comparação com o ano anterior Portugal encontrava-se em posição mais desfavorável em finais de 2020 do que a UE no seu conjunto.

A consulta de uma série relativamente longa dos dados trimestrais do PIB documenta bem a desproporção da contração económica ocorrida no 2º trimestre de 2020. A quebra do produto verificada – 16,2% – é quatro vezes superior à do pior precedente no último quarto de século (4,4% no primeiro trimestre de 2009; Figura 5). Já a quebra estimada para 2020 (7,6%) não só quase duplica a ocorrida no pior dos anos da intervenção da Troika (4,1% em 2012⁴), como apenas encontra precedente histórico em Portugal em 1928 (ano em que o PIB terá regredido 9,7%) e em 1936 (queda de 7,6%), de acordo com as estimativas publicadas pelo Banco de Portugal (Batista et al., 1997 e Séries Longas).

Os dados trimestrais do emprego mostram que a contração no 1º e 2º trimestres (-0,2% e -3,7%, respetivamente, em relação ao mesmo período do ano anterior), assim como a recuperação no 3º trimestre para um nível inferior em 3,1% ao do mesmo trimestre de 2013, são sensivelmente menos pronunciadas do que as do PIB. Essa diferença resulta, pelo menos em parte, das medidas de política adotadas para mitigar o efeito da recessão no emprego. Como no caso do produto, a quebra do nível de emprego foi mais acentuada em Portugal do que na média da UE. Embora a recuperação no 3º trimestre tenha sido ligeiramente mais intensa em Portugal, o hiato negativo relativamente ao mesmo período do ano anterior era menor na média da UE (cf. Anexo 5).

Os dados mensais relativos ao emprego permitem constatar que após uma contração súbita do nível de emprego entre fevereiro e maio de 2020 – 183 mil postos de trabalho destruídos em termos líquidos em apenas três meses – a recuperação iniciada em maio, mais lenta, se prolongou até novembro, reduzindo consideravelmente o hiato do emprego relativamente ao nível pré-pandemia, mas foi interrompida no mês de dezembro (Anexo 5).

Os dados do desemprego divergem consideravelmente segundo a fonte. Os do Inquérito ao Emprego do INE exibem uma descida paradoxal até maio de 2020 e uma subida subsequente até agosto, só explicável pela contabilização, por força dos critérios estatísticos adotados, de numerosos desempregados como inativos nos meses de confinamento e o subsequente regresso destes inativos à categoria de desempregados (Anexo 5).⁵ A partir de agosto os dados do INE apontam para um queda acentuada quer do desemprego, quer da população inativa, que contrasta com a informação de outras fontes.

Em contrapartida, os dados divulgados mensalmente pelo IEFP relativos ao “desemprego registado” dão conta de um incremento do seu número entre fevereiro e maio de 2020, seguido de uma estabilização num patamar elevado. Essa estabilização, no entanto, resulta em parte do aumento do número crescente de “ocupados” a partir de setembro de 2020, já que estes “ocupados” deixam de ser contabilizados como desempregados (Anexo 5).⁶

³ Os dados relativos ao Produto Interno Bruto mais recentes reportam-se ao 4º trimestre de 2020, os do emprego ao 3º Trimestre (Eurostat) e a dezembro (dados mensais INE), os do desemprego a dezembro no mesmo ano (tendo como fonte o INE, o Instituto do Emprego e Formação, IEFP e Instituto do Emprego da Madeira) e os do rendimento a setembro (tendo como fontes o INE e o Eurostat).

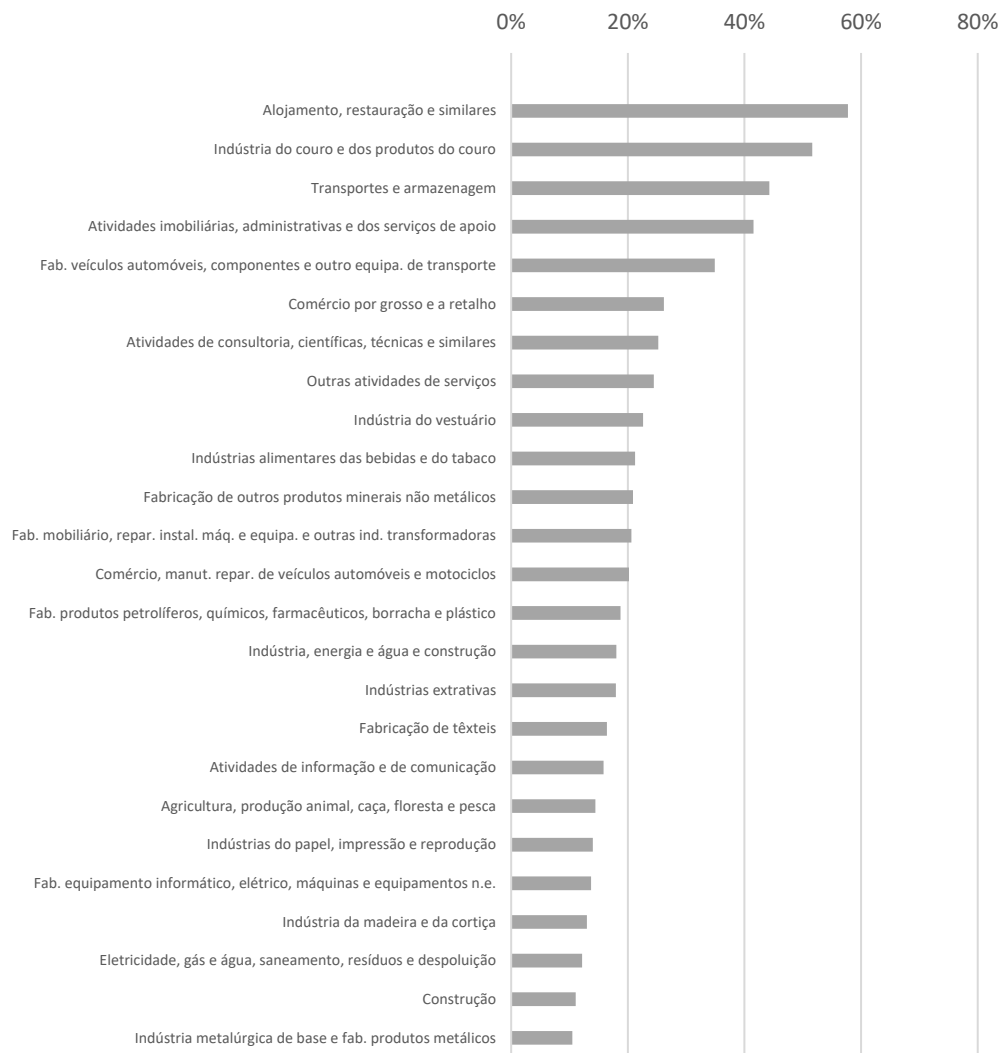
⁴ INE, Contas Nacionais, Quadro A.1.1.8 - Produto interno bruto a preços de mercado (taxa de variação em volume; anual).

⁵ Segundo o INE, é toda a pessoa acima de uma determinada idade que, durante o período de referência, estava: a) “sem trabalho”, isto é, não estavam num emprego remunerado ou num emprego por conta própria; b) “atualmente disponível para trabalhar”, isto é, estava disponível para um emprego remunerado ou por conta própria durante o período de referência; c) “à procura de trabalho”, isto é tinham dado passos específicos num período recente especificado no sentido de procurarem emprego remunerado ou por conta própria. Toda a pessoa que esteja sem emprego e não cumpra os requisitos b) e c) é considerado inativo.

⁶ Segundo o critério adotado pelo IEFP - Considera-se desempregado o candidato [a emprego] inscrito num Centro de Emprego, que não tem trabalho, procura um emprego como trabalhador por conta de outrem, está imediatamente disponível e tem capacidade para o trabalho. Como imediatamente disponível entende-se o compromisso do candidato aceitar um posto de trabalho no prazo máximo de 15 dias a contar do momento da inscrição. Como capacidade para ocupar um posto de trabalho. Considera-se o candidato que demonstre possuir aptidões para o exercício de uma atividade profissional, nomeadamente a inexistência de incapacidade por doença. O IEFP considera “ocupado” o candidato inscrito num Centro de Emprego a desenvolver trabalho socialmente necessário, a frequentar formação profissional ou integrado em medidas ativas de emprego com exceção das medidas que visem a criação do próprio emprego ou de postos de trabalho, ou seja, que visem a integração direta no mercado de trabalho.

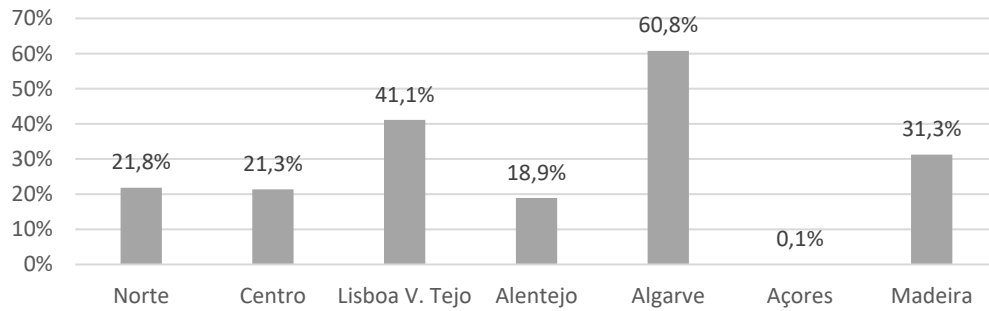
Da mesma fonte é possível obter uma imagem da desigual distribuição setorial do desemprego, onde quatro ramos de atividade, ainda que com dimensões muito diferentes, se destacam pela violência do impacto da pandemia e do confinamento – *alojamento e restauração, indústria do couro e dos produtos de couro (calçado), transportes e armazenagem e atividades imobiliárias administrativas e dos serviços de apoio* (onde se incluem, entre outras, atividades imobiliárias e também atividades de aluguer de viaturas, agências de viagens e empresas de trabalho temporário) (Figura 5).

Figura 5: Desemprego registado por ramo de atividade (taxa de variação homóloga dezembro 2020), Portugal



Fonte: IEFP, Informação Mensal do Mercado de Emprego

Já no plano regional (Figura 6), Algarve, Lisboa e Vale do Tejo e Madeira, regiões particularmente dependentes de atividades turísticas, são os territórios mais afetados pelo desemprego.

Figura 6: Desemprego registado por região (taxa de variação homóloga dezembro 2020), Portugal

Fonte: IEFP, Informação Mensal do Mercado de Emprego

Vários estudos entretanto publicados sobre o impacto da pandemia no desemprego têm alertado para a relação entre a evolução do desemprego, que cresceu repentinamente nos meses iniciais correspondentes ao primeiro confinamento, e a precariedade laboral. A este respeito, como refere um trabalho editado pelo Observatório das Desigualdades, o primeiro choque inicial “produziu o que já se classificou como vaga de “desempregados imediatos”, composta pelos trabalhadores mais precários, informais, trabalhadores independentes, falsos recibos verdes, em suma, pelos trabalhadores vulneráveis, com vínculos contratuais frágeis ou simplesmente inexistentes” (Tavares, Cândido, Caleiras e Carmo, 2021: ii). Num outro relatório sobre as dinâmicas recentes do desemprego jovem conclui-se que “em 2020, na Europa e em Portugal, verificou-se um aumento do desemprego jovem relativamente ao ano anterior (mais 1,7 p.p. e 4,3 p.p., respetivamente). Em Portugal, a taxa de desemprego no ano de 2020 era de 22,6% entre os jovens com menos de 25 anos – mais 5,8 p.p. que a média da UE27. Comparativamente com a taxa de desemprego geral, a taxa de desemprego jovem em Portugal em 2020 situava-se 15,7 p.p. acima” (Tavares, Cândido e Carmo, 2021: 1).

Em suma, o quadro que emerge dos dados disponíveis respeitantes aos impactos da pandemia e do confinamento no produto, no emprego, no desemprego e no rendimento apontam para: (a) uma compressão instantânea no nível de atividade no 2º trimestre de 2020 que só encontra precedente em 1928, seguida de uma inversão rápida no 3º trimestre, interrompida a partir de outubro com o desencadear de novas vagas da pandemia e um novo confinamento; (b) um impacto relativamente mitigado no emprego; (c) uma desigual distribuição de danos, que afetam mais duramente os mais jovens, os trabalhadores com vínculos precários, assim como os setores e regiões dependentes da procura externa em forte retração, nomeadamente a associada ao turismo e a produtos manufaturados como o calçado, o automóvel e o vestuário.

4.2. Impactos territorializados no emprego

Nesta secção iremos tentar perceber até que ponto se pode estabelecer uma relação entre a identificação das 6 situações-tipo resultantes da análise efetuada sobre os níveis de suscetibilidade e de exposição das estruturas socioeconómicas municipais e as dinâmicas do desemprego ocorridas entre fevereiro e dezembro de 2020, correspondente ao período marcado pelo impacto da pandemia da COVID-19.

Para tal utilizam-se os dados do desemprego registado referentes a meses em cadeia em três fases temporais: fevereiro-abril; fevereiro-junho; e fevereiro-dezembro. Esta lógica permite acompanhar a evolução do desemprego ao longo de 2020 para os diferentes grupos em análise; contudo, esta opção pode ser insuficientemente sensível para captar as dinâmicas e os efeitos da sazonalidade ao considerar o desemprego em meses homólogos, designadamente nos territórios mais dependentes das atividades relacionadas com o turismo.

Como foi referido na secção anterior, a evolução conjugada da pandemia e das medidas de contenção e de controlo do vírus, nomeadamente as que se alicerçaram na proclamação dos consecutivos estados de emergência, provocaram em 2020 impactos diferenciados no aumento do desemprego que afetaram desigualmente os territórios. Por sua vez, é importante distinguir os impactos imediatos, que aconteceram principalmente durante o primeiro confinamento, e os impactos mais mediados no tempo, que ocorreram até ao final desse ano.

Tabela 4: Cruzamentos dos tipos de territórios vulneráveis (situações-tipo) com as médias de variação do desemprego (%)

Situações-tipo	Fevereiro - Abril 2020	Fevereiro - Junho 2020	Fevereiro - Dezembro 2020
Grupo 1. Menos rendimentos baixos	23,6	31,9	29,8
Grupo 2. Menos desigualdade	22,4	23,5	17,9
Grupo 3. Dependência das exportações	25,3	27,1	20,6
Grupo 4. Dependência do turismo	14,5	12,6	27,9
Grupo 5. Dependência do imobiliário e da construção	10,0	8,3	11,4
Grupo 6. Fragilidade do tecido empresarial	1,8	1,5	0,9

Fonte: Elaboração Própria

Assim, como se pode observar na Tabela 4, o Grupo 1 apresenta os valores médios de variação do desemprego mais elevados nos primeiros meses, com uma ligeira desaceleração no final do período considerado. Tratando-se dos territórios menos vulneráveis segundo a análise efetuada, podemos avançar com algumas hipóteses que deverão ser melhor testadas em trabalhos futuros. É possível que tenha ocorrido um efeito conjugado entre o maior grau de internacionalização direta e indireta da economia e uma exposição *mais imediata* aos efeitos da pandemia no emprego mais frágil e precário em atividades ligadas ao setor do turismo, como é o caso do alojamento e da restauração, mas também em empresas do comércio e dos serviços, que devido à quebra das atividades acabaram por dispensar e despedir os trabalhadores em situação contratual não permanente. Na verdade, na caracterização deste grupo identifica-se uma incidência da precariedade laboral cuja expressão só é amplamente ultrapassada pelo Grupo 4.

O Grupo 2 apresenta, à semelhança do anterior, um aumento imediato do desemprego, mas de forma menos marcada. Contudo, denota-se uma evolução de decréscimo até ao final do ano de 2020. Este dado pode significar alguma capacidade de recuperação destes territórios que, ao contrário dos do grupo anterior, são menos dependentes das exportações e do turismo. São também os territórios menos desiguais, o que representa um fator estrutural que pode ter contribuído para essa atenuação do desemprego.

O Grupo 3 é o mais dependente das exportações. Se este dado contribuiu, num primeiro momento, para um aumento acentuado do desemprego devido ao confinamento interno e ao fechamento da ligação com as economias internacionais, num momento posterior, com a gradual abertura e retoma da economia que acontece no segundo semestre de 2020, verificou-se uma boa recuperação, sendo o grupo onde, em média, mais se reduz o nível do desemprego até ao final desse ano.

O Grupo 4 é o mais afetado pelo desemprego, sendo aquele que inclui os territórios mais dependentes do turismo, com particular destaque para os municípios do Algarve e do litoral alentejano. Ao mesmo tempo, são municípios muito marcados pela precariedade laboral, fator que contribuiu decisivamente para o aumento do desemprego.

O Grupo 5, mais dependente do imobiliário e da construção civil, não foi muito afetado, na medida em que estes setores não suspenderam grande parte das suas atividades, mesmo durante o confinamento.

O Grupo 6 inclui um conjunto de territórios pouco afetados pelo desemprego no período em causa. Embora se trate de municípios relativamente vulneráveis devido, sobretudo, à fragilidade do tecido empresarial, acabaram por estar mais protegidos na medida em que são territórios pouco expostos à procura turística (e até residencial).

Em suma, podemos dizer que o aumento imediato do desemprego afetou mais os territórios situados nas áreas metropolitanas e certas áreas do litoral, onde se manteve relativamente alto nos meses seguintes. Por sua vez, nos territórios correspondentes à Região Centro, Oeste, Ribatejo e Alentejo Norte e Central identifica-se alguma recuperação em termos da atenuação do desemprego no último semestre de 2020. O mesmo sucede, mas em menor grau, nas áreas de industrialização difusa (particularmente no Noroeste e em alguns municípios situados no Centro-Norte interior). A maior parte dos municípios algarvios e parte do litoral alentejano são as áreas mais afetadas pelo aumento do desemprego. São os que mais perdem com o impacto da crise pandémica. Finalmente, nas áreas contíguas entre Tâmega e Sousa e nos municípios que compõem a mancha contínua no Nordeste do

país, que inclui o interior da Região Norte e de parte da Região Centro, o desemprego não alcançou a mesma expressão assinalada nas restantes áreas do país. Embora sejam territórios com vulnerabilidades distintas, apresentaram uma maior proteção aos impactos da pandemia e à consequente crise económica e social. Uma das questões que se levanta para próximos estudos é saber se esta situação se manteve ou se, ao invés, estes municípios sofreram maiores impactos durante o segundo confinamento e a terceira vaga de incidência do vírus.

5. CONCLUSÃO

O presente artigo desenvolveu de forma exploratória uma análise que procurou relacionar as vulnerabilidades territoriais pré-crise com os impactos da pandemia no caso português.

As vulnerabilidades foram compreendidas como uma combinação de aspetos ligados à suscetibilidade, entendida como um conjunto de características estruturais que enfraquecem o sistema socioeconómico diante de eventos adversos, e à exposição, características que carecem de proteção contra riscos de proveniência exógena.

A noção de resiliência foi mobilizada na análise para ajudar a refletir sobre a razão de certos territórios serem fortemente atingidos de imediato, outros demorarem mais tempo a sentir os impactos nos números do desemprego, outros recuperarem e outros ainda manterem-se relativamente protegidos. A análise sugere alguns aspetos a ter em atenção sobre a importância da redução destas vulnerabilidades cruciais para a resiliência dos territórios. Um dos elementos é o efeito do turismo, que parece criar nos territórios muito dependentes desta atividade (Grupo 4) uma menor resiliência, em particular tendo em conta o prazo de variação de desemprego analisado mais alargado. Também os territórios com rendimentos menos baixos, associados a municípios de áreas metropolitanas (Grupo 1), são confrontados com vários estrangulamentos que revelam falta de resiliência.

No entanto, valerá a pena sublinhar a necessidade de refletir atentamente sobre os múltiplos sentidos da resiliência, termo que assume uma centralidade acrescida no contexto dos vários planos elaborados para responder à *Recovery and Resilience Facility*, no qual se integra o Plano de Recuperação e Resiliência português. A recuperação da economia, em termos do produto e emprego, até pode vir a ser acelerada (caso se encontre uma solução definitiva para a própria pandemia – o que ainda está por fazer), mas não vai resolver os problemas sistémicos da sociedade contemporânea nem as fraquezas estruturais da economia portuguesa no longo prazo, refletidas num conjunto alargado de vulnerabilidades como as analisadas neste artigo. A este respeito é importante continuar a acompanhar e a monitorizar devidamente os impactos diferenciados da pandemia nos diversos territórios, de modo a perceber até que ponto a ação das políticas públicas, decorrente dos respetivos planos e programas, poderá atenuar e contribuir para resolver as debilidades estruturais da sociedade e da economia portuguesas.

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ANEXOS

Anexo 1 – Emprego em atividades características do turismo

	Total economia - Equivalente a tempo completo (ETC), N°	Componente turística das atividades características do turismo - Equivalente a tempo completo (ETC), N°	Componente turística do emprego
1. Hotéis e similares	98 689	98 689	100%
2. Residências secundárias por conta própria (por imputação)	//	//	
3. Restaurantes e similares	224 274	103 680	46%
4. Transportes ferroviários	2 597	1 709	66%
5. Transportes rodoviários	35 433	14 312	40%
4+5 Transportes terrestres	38 030	16 021	40%
6. Transportes marítimos	2 548	1 905	75%
7. Transportes aéreos	12 673	8 970	71%
8. Aluguer de equipamento de transporte	6 775	4 109	61%
9. Agências de viagens, operadores turísticos e guias turísticos	11 812	8 934	76%
10. Serviços culturais	20 183	6 476	32%
11. Desporto, recreação e lazer	29 133	8 098	28%
Total das atividades características	444 117	256 883	58%

Fonte: INE, Contas Nacionais, Conta Satélite do Turismo, Quadro E.2.1.8 - Emprego e remunerações das atividades características do turismo e da economia nacional – 2018.

Anexo 2 – Emprego em atividades expostas à quebra das exportações

Produtos expostos	Grau de dependência das exportações (Exportações/Total de empregos)
Minérios metálicos	98,00%
Serviços de transporte aéreo	71,00%
Serviços de transporte por água	62,50%
Artigos de borracha e de matérias plásticas	41,30%
Outros serviços de consultoria, científicos, técnicos e similares	39,00%
Papel e cartão e seus artigos	38,30%
Couro e produtos afins	36,70%
Madeira e cortiça e suas obras, exceto mobiliário, obras de espartaria e cestaria	36,70%
Veículos automóveis, reboques e semirreboques	36,60%
Equipamento elétrico	34,60%
Outros produtos minerais não metálicos	33,20%
Mobiliário	32,60%
Produtos metálicos transformados, exceto máquinas e equipamento	32,40%
Produtos informáticos, eletrónicos e óticos	31,20%
Produtos têxteis	30,20%
Artigos de vestuário	30,10%
Máquinas e equipamentos, n.e.	30,00%
Outro material de transporte	29,30%
Metais de base	26,60%
Consultoria e programação informática e serviços relacionados	22,10%
Coque, produtos petrolíferos refinados e aglomerados de combustíveis	22,00%
Produtos químicos e fibras sintéticas ou artificiais	21,50%

Fonte: INE, Contas Nacionais, Matrizes Input-Output, Quadro C.6.7.1 - Matriz de produção nacional a preços de base, 2017 (P82-P82)

Vulnerabilidades Territoriais, Pandemia e Emprego

Produtos declinantes	TVh (Novembro 2019- Novembro 2020)
Hulha (incluindo antracite) e lenhite	-91,23%
Serviços de bibliotecas, arquivos e museus e outros serviços culturais	-77,00%
Trabalhos de impressão e gravação	-62,83%
Coque e produtos petrolíferos refinados	-50,88%
Petróleo bruto e gás natural	-45,02%
Serviços de produção de filmes, vídeos e programas de televisão, gravação de som e edição de música	-41,65%
Serviços de saneamento básico; lamas de depuração	-38,32%
Artigos de vestuário	-14,56%
Couro e produtos afins	-14,42%
Produtos da silvicultura, da exploração florestal e serviços relacionados	-13,65%
Minérios metálicos	-10,63%

Fonte: INE, Estatísticas do Comércio Internacional, Exportações (€) de Bens por Local de destino e Tipo de bem, produto por atividade (CPA 2008); Novembro 2019, Novembro de 2020.

Anexo 3 – Atividades expostas às dinâmicas do imobiliário

Construção - Promoção imobiliária (desenvolvimento de projetos de edifícios); construção de edifícios

411 PROMOÇÃO IMOBILIÁRIA (DESENVOLVIMENTO DE PROJETOS DE EDIFÍCIOS) 4110

41100 As atividades de promoção imobiliária consistem em desenvolver, com carácter permanente, programas imobiliários, assumindo os promotores quer o risco financeiro, quer a responsabilidade de condução das operações necessárias à sua execução. A promoção imobiliária consubstancia a reunião dos meios jurídicos, financeiros e técnicos a fim de construir os edifícios ou de implementar nos terrenos as infraestruturas com vista à venda. Os promotores podem intervir quer como donos das obras quer como prestadores de serviços. Não inclui: · Construção de edifícios (41200); · Promoção imobiliária por entidades construtoras (41200); · Compra e venda de edifícios (68100); · Actividades de arquitectura e engenharia (711).

412 CONSTRUÇÃO DE EDIFÍCIOS (RESIDENCIAIS E NÃO RESIDENCIAIS) 4120

41200 Compreende a construção de todos os tipos de edifícios residenciais (edifícios de habitação unifamiliar e multifamiliar) e não residenciais (edifícios cobertos para a produção industrial, hospitais, escolas, edifícios para escritórios, hotéis, armazéns, edifícios comerciais, restaurantes, edifícios dos aeroportos, edifícios para desportos em locais cobertos, piscinas cobertas, garagens, edifícios para fins religiosos e outros), executados por conta própria ou em regime de empreitada ou subempreitada, de parte ou de todo o processo de construção. Inclui também a ampliação, reparação, transformação e restauro de edifícios, assim como a montagem de edifícios pré-fabricados.

Atividades imobiliárias

Esta Secção compreende a compra, venda e arrendamento de bens imobiliários, a mediação e avaliação imobiliária e a administração de imóveis. Estas atividades podem ser desenvolvidas pelo próprio ou por conta de outrem. Não inclui: · Desenvolvimento de projetos de edifícios (41100); · Desenvolvimento de projetos de engenharia civil (42).

Anexo 4 – Emprego atividades expostas à quebra das exportações

Dimensões analíticas	Indicadores	Valor-teste (V): Média do Grupo vs. Média dos 308 Municípios					
		Grupo 1	Grupo 2	Grupo 3	Grupo 4	Grupo 5	Grupo 6
Exposição	Dependência das exportações	-	-3,3	14,7	-	-	-3,3
	Dependência do imobiliário	-4,1	-3,6	-	-	12,2	-
	Dependência do turismo	-	-3,9	-3,1	13,6	-	-
Suscetibilidade	Desemprego	-	-6,7	-	4,9	5,6	4,9
	Desigualdade	-	-9,2	-3,0	3,8	3,0	6,9
	Rendimentos baixos	-12,7	-	2,4	-	4,0	6,2
	Fragilidade do tecido empresarial	-6,8	-	-5,9	-	-	10,1
	Precariedade laboral	2,65	-	-3,6	9,2	2,7	-6,1

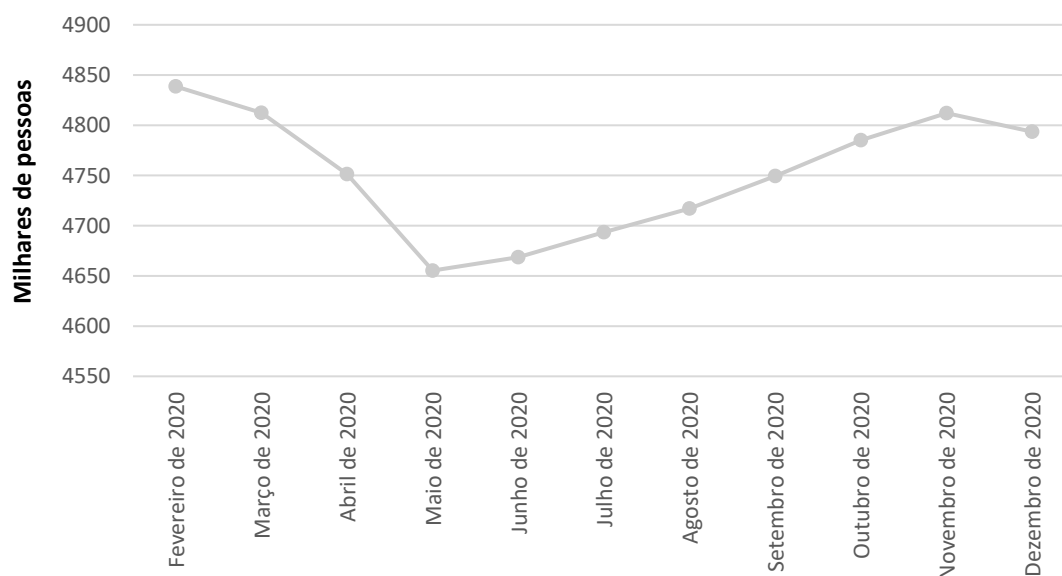
Nota: apenas se assinalam os valores-teste (V) superiores a |2|.

Valores-teste (V) entre |4,0| e |9,0| (elevados): a itálico.

Valores-teste (V) superiores a |9,0| (muito elevados): a negrito.

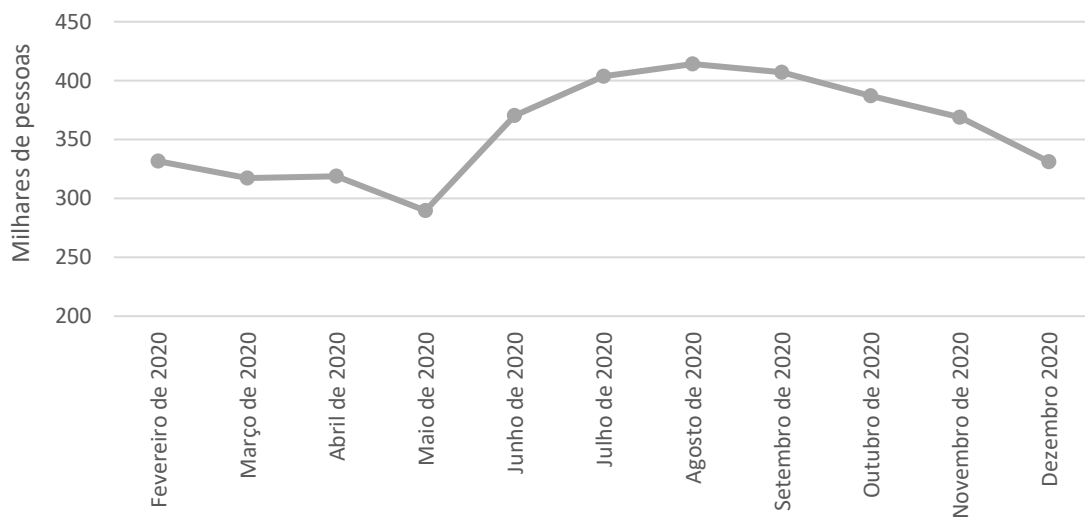
Anexo 5 – Evolução de Emprego / Desemprego em Portugal

Figura A5.1: População empregada com idade entre 15 e 74 anos (ajustada de sazonalidade – N.º de pessoas), Portugal



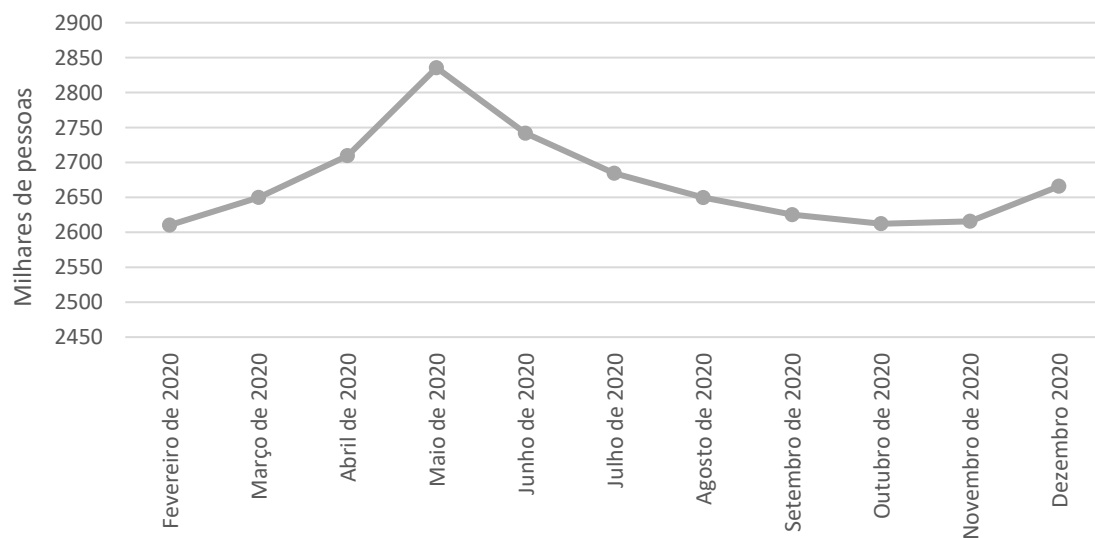
Fonte: INE, Inquérito ao emprego

Figura A5.2: População desempregada com idade entre 15 e 74 anos (ajustada de sazonalidade - N.º de pessoas), Portugal



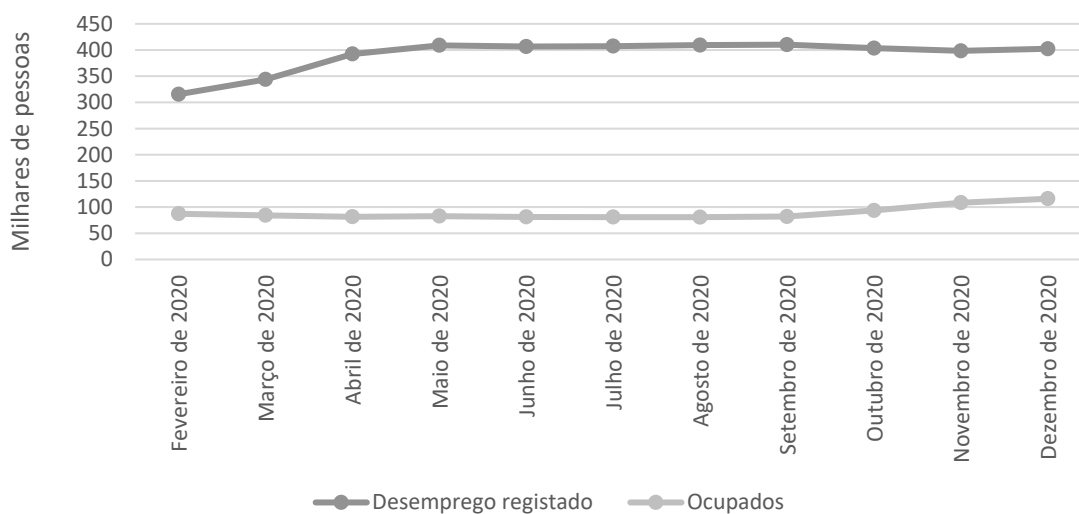
Fonte: INE, Inquérito ao emprego

Figura A5.3: População inativa com idade entre 15 e 74 anos (ajustada de sazonalidade - N.º de pessoas), Portugal



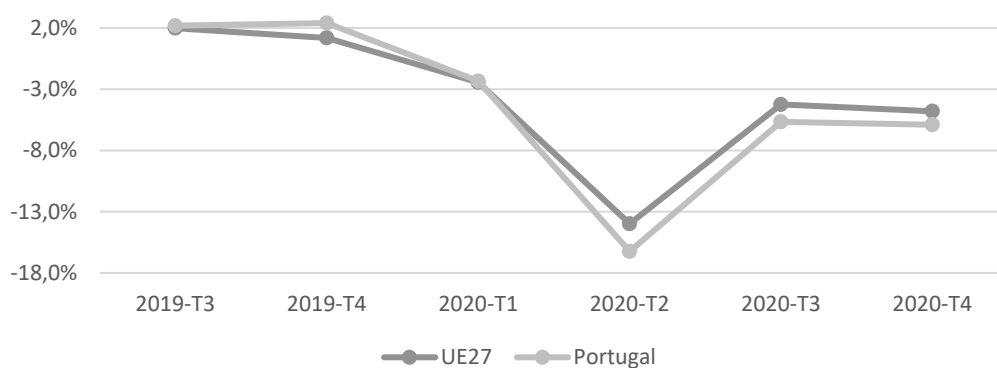
Fonte: INE, Inquérito ao emprego

Figura A5.4: Desemprego registado (Nº de pessoas), Portugal



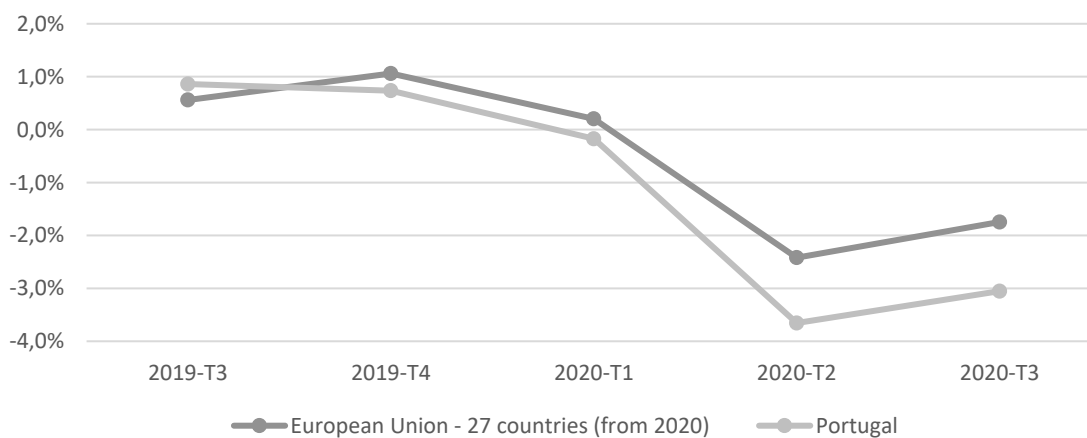
Fonte: IEFP, Informação Mensal do Mercado de Emprego

Figura A5.5: Taxa de variação homóloga do PIB (2019-T2/2020-T4), Portugal e UE 27



Fonte: Eurostat

Figura A5.6: Taxa de variação homóloga do emprego (2019-T2/2020-T3); Portugal e UE 27



Fonte: Eurostat

NORMAS PARA OS ARTIGOS A SUBMETER À REVISTA PORTUGUESA DE ESTUDOS REGIONAIS

A. Normas respeitantes à aceitação e avaliação dos artigos

1. Embora a Revista Portuguesa de Estudos Regionais (RPER) não seja membro do Com-mittee on Publication Ethics (COPE), a sua Direção Editorial decidiu declarar a sua adesão aos princípios do Código de Conduta do COPE, com efeitos a partir de 1 de Janeiro de 2012 (<http://publicationethics.org/files/Code%20of%20conduct%20for%20journal%20editors4.pdf>).

2. Só serão em princípio aceites para avaliação na RPER artigos que nunca tenham sido publicados em nenhum suporte (outra revista ou livro, incluindo livros de Atas). Excetua-se a divulgação anterior em séries do tipo “working papers” (eletrónicas ou em papel). Outras exceções pontuais podem ser aceites pela Direção Editorial, se os direitos de reprodução estiverem salvaguardados.

3. Ao enviar uma proposta de artigo para a Revista, os autores devem renunciar explicitamente a submetê-la para publicação a qualquer outra revista ou livro até à conclusão do processo de avaliação. Para o efeito deverão sempre enviar, juntamente com o artigo que submetem, uma declaração assinada neste sentido. No caso de recusa do artigo pela Direção Editorial, os autores ficarão livres para o publicar noutra parte.

4. Os artigos submetidos à Direção Editorial para publicação serão sempre avaliados (anonimamente) por dois especialistas na área, convidados para o efeito pela Direção Editorial. Os dois avaliadores farão os comentários que entenderem ao artigo e classificá-lo-ão de acordo com critérios definidos pela Direção Editorial. Os critérios de avaliação procurarão refletir a originalidade, a consistência, a legibilidade e a correção formal do artigo. No prazo máximo de 16 semanas após a submissão do artigo, os seus autores serão contactados pela Direção Editorial, sendo-lhes comunicado o resultado da avaliação feita.

O processo de avaliação tem três desenlaces possíveis:

(1) O artigo é admitido para publicação tal como está (ou com meras alterações de pormenor) e é inserido no plano editorial da revista. Neste caso, a data previsível de publicação será de imediato comunicada aos autores.

(2) O artigo é considerado aceitável mas sob condição de serem efetuadas alterações significativas na sua forma ou nos seus conteúdos. Neste caso, os autores disporão de um máximo de 6 semanas para, se quiserem, procederem aos ajustamentos propostos e para voltarem a submeter o artigo, iniciando-se, após a receção da versão corrigida, um novo processo de avaliação.

(3) O artigo é recusado.

5. A RPER poderá organizar números especiais de natureza temática, na sequência de conferências, *workshops* ou outros eventos relevantes na sua área de interesse. Embora nestes casos o processo de avaliação dos artigos possa ser simplificado, a RPER manterá ainda assim, escrupulosamente, o princípio de revisão pelos pares de todos os artigos.

6. Excecionalmente a RPER poderá contudo publicar artigos “por convite”, ou seja não sujeitos ao crivo de revisores. A singularidade destes artigos será sempre assinalada, de forma transparente, na sua primeira página.

7. A RPER reconhece o direito dos membros da sua Direção Editorial (incluindo o seu Diretor) a submeterem artigos para publicação. Sempre que um membro da Direção Editorial é autor ou coautor de um artigo, então é necessariamente excluído do processo de revisão, em todos os seus passos, incluindo a decisão final.

8. A RPER reconhece o direito de recurso de qualquer sua decisão relativa à aceitação de um artigo para publicação. Esse recurso é endereçado ao Diretor que deverá informar toda a Direção Editorial. Os termos do recurso serão enviados aos revisores, que terão um prazo máximo de 30 dias para se

pronunciarem em definitivo. No caso de não haver acordo entre os dois *referees*, a Direção Editorial tem obrigatoriamente de indicar um terceiro especialista. Não existe novo recurso, para uma segunda decisão que decorra deste processo.

9. A RPER encoraja a publicação de críticas relevantes, por outros autores, a artigos publicados nas suas páginas. Os autores criticados têm sempre a possibilidade de resposta.

10. Os *referees* estão sujeitos ao dever de confidencialidade, quer quanto ao conteúdo dos artigos que apreciam, quer quantos aos seus próprios comentários, devendo mais em geral garantir que todo o material que lhes é submetido é tratado em confiança. Será sempre enviada aos revisores a informação sobre os princípios do Código de Conduta referido em 1.

11. Uma vez o artigo aceite, e feito o trabalho de formatação gráfica prévio à sua publicação na revista, serão enviadas ao autor as respetivas provas tipográficas para revisão. As eventuais correções que este quiser fazer terão de ser devolvidas à Direção Editorial no prazo máximo de 5 dias úteis a contar da data da sua receção. Só serão aceites correções de forma.

12. Ao autor e a cada um dos coautores de cada artigo aceite será oferecido um exemplar do número da Revista em que o artigo foi publicado.

13. Os originais, depois de formatados de acordo com as presentes normas, não poderão exceder as 30 páginas, incluindo a página de título, a página de resumo, as notas, os quadros, gráficos e mapas e as referências bibliográficas.

14. As propostas de artigo deverão ser enviadas por e-mail para rper.geral@gmail.com, ou pelo correio, para o Secretariado da RPER: APDR - Universidade dos Açores, Rua Capitão João d'Ávila 9700-042 Angra do Heroísmo – PORTUGAL. Para comunicação posterior o contacto com o Secretariado far-se-á pelo: e-mail: rper.geral@gmail.com.

B. Normas respeitantes à estrutura dos artigos

1. Os autores deverão enviar o artigo completo (conforme os pontos seguintes), por e-mail ou em CD-rom, para os contactos referidos no ponto 14 das Normas A.

2. Os textos deverão ser processados em Microsoft Word for Windows (versão 97 ou posterior). O texto deverá ser integralmente a preto e branco.

3. Na publicação os gráficos, mapas, diagramas, etc. serão designados por “figuras” e as tabelas por “quadros”.

4. As eventuais figuras e quadros deverão ser disponibilizados de duas formas distintas: por um lado devem ser colocados no texto, com o aspeto pretendido pelos autores. Para além disso, deverão ser disponibilizados em ficheiros separados: os quadros, tabelas e gráficos serão entregues em Microsoft Excel for Windows, versão 97 ou posterior (no caso dos gráficos deverá ser enviado tanto o gráfico final como toda a série de dados que lhe está na origem, de preferência no mesmo ficheiro e um por worksheet); para os mapas deverá usar-se um formato vetorial em Corel Draw (versão 9 ou posterior).

5. As expressões matemáticas deverão ser tão simples quanto possível. Serão apresentadas numa linha (entre duas marcas de parágrafo) e numeradas sequencialmente na margem direita com numeração entre parêntesis curvos. A aplicação para a construção das expressões deverá ser ou o Equation Editor (Microsoft) ou o MathType.

6. Salvo casos excecionais, que exigem justificação adequada a submeter à Direção Editorial, o número máximo de coautores das propostas de artigo é quatro. Só deverão ser considerados autores os que contribuíram direta e efetivamente para a pesquisa refletida no trabalho.

7. O texto deve ser processado em página A4, com utilização do tipo de letra Times New Roman 12, a um espaço e meio, com um espaço após parágrafo de 6 pt. As margens superior, inferior, esquerda e direita devem ter 2,5 cm.

8. A primeira página conterá exclusivamente o título do artigo, em português e em inglês, bem como o nome, morada, telefone, fax e e-mail do autor, com indicação das funções exercidas e da instituição a que pertence. No caso de vários autores deverá aí indicar-se qual o contacto para toda a correspondência da Revista. Deve ser também incluída na primeira página uma nota sobre as instituições financiadoras da investigação que conduziu ao artigo. Esta nota é obrigatória quando pertinente.

9. A segunda página conterá unicamente o título e dois resumos do artigo, um em português e outro inglês, com um máximo de 800 caracteres cada, seguidos de um parágrafo com indicação, em português e inglês, de palavras-chave até ao limite de 5, e ainda 2 a 5 códigos do Journal of Economic Literature (JEL) apropriados à temática do artigo, a 3 dígitos, como por exemplo R11. Os títulos, os resumos, as palavras-chave e os códigos JEL são obrigatórios.

10. Na terceira página começará o texto do artigo, sendo as suas eventuais secções ou capítulos numerados sequencialmente utilizando apenas algarismos (não deverão utilizar-se nem letras nem numeração romana).

11. Cada uma das figuras e quadros deverá conter uma indicação clara da fonte e ser, tanto quanto possível, compreensível sem ser necessário recorrer ao texto. Todos deverão ter um título e, se aplicável, uma legenda descritiva.

12. A forma final das figuras e quadros será da responsabilidade da Direção Editorial que procederá, sempre que necessário, aos ajustamentos necessários.

C. Normas respeitantes às referências bibliográficas

1. A “Bibliografia” a apresentar no final de cada artigo deverá conter exclusivamente as citações e referências bibliográficas efetivamente feitas no texto.

2. Para garantir o anonimato dos artigos, o número máximo de citações de obras do autor do artigo (ou de cada um dos seus coautores) é três e não são permitidas expressões que possam denunciar a autoria tais como, por exemplo, “conforme afirmámos em trabalhos anteriores (cfr. Silva (1998:3))”.

3. O estrito cumprimento das normas à frente só é obrigatório na versão final dos artigos, após aceitação. Ainda assim, recomenda-se fortemente a sua adoção em todas as versões submetidas.

4. Os autores citados ao longo do texto serão indicados pelo apelido seguido, entre parêntesis curvos, do ano da publicação, de “:” e da(s) página(s) em que se encontra a citação. Por exemplo: ao citar-se “Silva (2003: 390-93)”: está-se a referir a obra escrita em 2003 pelo autor “Silva”, nas páginas 390 a 393. Deverá usar-se “Silva (2003: 390-93)” e não “SILVA (2003: 390-93)”. No caso de uma mera referenciação do autor bastará indicar “Silva (2003)”.

5. No caso de o mesmo autor ter mais de um trabalho do mesmo ano citado no artigo, indicar-se-á a ordem da citação, por exemplo: Silva (2003a: 240) e Silva (2003b: 232).

6. As referências bibliográficas serão listadas por ordem alfabética dos apelidos dos respetivos autores no fim do manuscrito. O nome será seguido do ano da obra entre parêntesis, e da descrição conforme com a seguinte regra geral:

Monografias: Silva, Hermenegildo (2007a), *A Teoria dos Legumes*, Coimbra, Editora Agrícola

Coletâneas: Sousa, João (2002), “Herbicidas e estrumes” in Cunha, Maria (coord.), *Teoria e Prática Hortícola*, Lisboa, Quintal Editora, pp. 222-244

Artigos de Revista: Martins, Vicente (2009), “Leguminosas Gostosas”, *Revista Agrícola*, Vol. 32, nº 3, pp. 234-275

7. A forma final das referências bibliográficas será da responsabilidade da Direção Editorial que procederá, sempre que necessário, aos ajustamentos necessários.

NORMS FOR THE SUBMISSION OF PAPERS TO THE PORTUGUESE REVIEW OF REGIONAL STUDIES

A. Norms concerning papers submission and evaluation

1. Although the Portuguese Review of Regional Studies (RPER) is not a member of the Committee on Publication Ethics (COPE), its Editorial Board decided to adhere to the principles of the COPE Code of Conduct, from January 1st 2012 onwards:
(<http://publicationethics.org/files/Code%20of%20conduct%20for%20journal%20editors4.pdf>).

2. In principle, only papers that have never been published (in another journal or book, including conference Proceedings) can be considered for publication in RPER. The previous publication in a series of “working papers” (electronic or paper format) is an exception to this rule. The Editorial Board may agree with other sporadic exceptions, when copyrights are secured.

3. When a paper is submitted to RPER, authors must explicitly state that it will not be submitted for publication in any other journal or book until the reviewing process is completed. For this purpose, a signed declaration must be sent along with the paper. If the paper is rejected by the Editorial Board, the authors are free to publish it anywhere else.

4. Papers submitted for publication will always be reviewed (anonymously) by two experts in the area, invited by the Editorial Board. Both referees will offer their comments and classify it in accordance with the criteria defined by the Editorial Board. The reviewing criteria include originality, consistency, readability and the paper’s formal correction. The authors will be informed by the Editorial Board of the results of the evaluation within 16 weeks of its receipt. The assessment has three possible outcomes:

(1) The paper is accepted for publication just as it is (or with minor changes) and it is included in the editorial plan. In this case, the authors are immediately informed of the expected publication date.

(2) The paper is considered acceptable provided that major changes are made to its form or contents. In this case, authors will have a maximum of six weeks to make such changes and to submit the paper again. Once the revised version is received, a new assessment process starts.

(3) The paper is refused.

5. RPER may organize special issues on specific themes, following conferences, workshops, or other events relevant in its area of interest. Although, in these cases, a simplifying shorter reviewing process may be adopted, the principle of peer-review selection will always be preserved.

6. Exceptionally, RPER may publish articles “by invitation”, meaning that they are not subject to the reviewing process. These outstanding articles, however, are always clearly signaled as such in their front page.

7. RPER acknowledges the right of the members of its Editorial Board (including its Director) to submit papers to the journal. When an author or co-author is also a member of the Editorial Board, he/she is excluded from the reviewing process in all its stages, including the final decision.

8. RPER acknowledges the authors’ right of appeal on any publishing decision of the Editorial Board. That appeal is made to the Director of RPER that will inform the Editorial Board. The new arguments will be sent to the reviewers, asking for a final judgment within a 30-day term. In case of disagreement between the two referees, the Editorial Board is compelled to appoint a third reviewer. There is no further appeal for a second decision ensuing this process.

9. RPER positively welcomes cogent criticism on the works it publishes. Authors of criticized material will have the opportunity to respond.

10. Reviewers are required to preserve the confidentiality on the contents of the papers and on their comments, and requested, more generally, to handle all the submitted material in confidence. Proper information on the principles of the Code of Conduct referred in 1. will always be provided to the reviewers.

11. Once the paper has been accepted and formatted for publishing, it will be sent to the author for graphics checking and revision. Any corrections the author might want to make must be sent to RPER within five days. Only formal corrections will be accepted.

12. Each author and co-author of accepted papers will be offered a number of the published issue

13. Articles cannot exceed 30 pages after being formatted according to the present norms, including the title page, the summary page, notes, tables, graphics, maps and references.

14. Papers must be sent, by e-mail to rper.geral@gmail.com or by normal mail, to the Secretariat of RPER: APDR - Universidade dos Açores, Rua Capitão João d'Ávila, 9700-042 Angra do Heroísmo – PORTUGAL. For future contact please use the e-mail address: rper.geral@gmail.com.

B. Norms concerning papers structure

1. The authors must send a complete version of the paper by e-mail or on a CD-Rom by mail, in the original Microsoft Word file, to the contacts specified in point 14 of Norms (A).

2. Texts must be processed in Microsoft Word for Windows (97 or later version). All written text must be black.

3. Graphics, maps, diagrams, etc. shall be referred to as “Figures” and tables shall be referred to as “Tables”.

4. Figures and Tables must be delivered in two different forms: inserted in the text, according to the author's choice, and in a separate file. Tables and graphics must be delivered in Microsoft Excel for Windows 97 or later. Graphics must be sent in both the final form and accompanied by the original data, preferably in the same file (each graphic in a different worksheet). Maps must be sent in a vector format, like Corel Draw or Windows Metafile Applications.

5. Mathematical expressions must be as simple as possible. They will be presented on one line (between two paragraph marks) and numbered sequentially at the right margin, with numeration inside round brackets. Equation Editor (Microsoft) or Math Type are the accepted Applications for original format files.

6. The paper must have no more than four co-authors. Exceptions may be accepted when a reasonable explanation is presented to the Editorial Board. Authorship must be limited to actual and direct contributors to the conducted research.

7. Text must be processed in A4 format, Times New Roman font, size 12, line space 1.5 and 6 pt space between paragraphs. The upper, lower, left and right margins must be set to 2.5 cm.

8. The first page shall contain only the paper's title, the author's name, address, phone and fax numbers and e-mail, and the author's affiliation. In the case of several authors, please indicate the contact person for correspondence. A remark on funding institutions of the research or related work leading to the article – that is compulsory when it applies – must be placed as well in this first page.

9. Second page shall contain the title and the abstract of the paper, in English and, if possible, in Portuguese as well, with no more than 800 characters, followed by two lines, one with the keywords to a limit of 5, and the other with the proper Journal of Economic Literature (JEL) codes describing the paper. JEL codes must be from 2 up to 5, with three digits, as for example R11. The title, the abstract, the key-words and the JEL codes area all compulsory, at least in English.

10. Text starts on the third page. Sections or chapters are numbered sequentially using Arabic numbers only (letters or Roman numeration must not be used).

11. Figures and Tables must contain a clear source reference. These shall be as clear as possible. Each must have a title and, if applicable, a legend.

12. The final format of Figures and Tables will be of the responsibility of the Editorial Board, who will allow some adjustments, whenever necessary.

C. Norms concerning bibliographic references

1. The references listed at the end of each paper shall only contain citations and references actually mentioned in the text.

2. To ensure the anonymity of papers, each author's self references are limited to three and no expressions that might betray the authorship are allowed (for example, "as we affirmed in previous works (cfr. Silva (1998:3))").

3. Although their meeting in preliminary versions is recommendable, the bibliographic norms below are mandatory for the final (accepted) version only.

4. Authors cited in the text must be indicated by his/her surname followed, within round brackets, by year of publication, by ":" and by the relevant page number(s). For example, the citation "Silva (2003: 390-93)", refers to the work written in 2003 by the author Silva, on pages 390 to 393. If the author is merely mentioned, indication of "Silva (2003)" is sufficient.

5. In case an author has more than one work from the same year cited in the paper, citation must be ordered. For example: Silva (2003a: 240) and Silva (2003b: 232).

6. References must be listed alphabetically by authors' surnames, at the end of the manuscript. The name will be followed by year of publication inside round brackets and the description, thus:

Monographs: Silva, Hermenegildo (2007a), *The Vegetables Theory*, Cambridge, Agriculture Press

Collection: Sousa, João (2002), "Weed Killers and Manure" in Cunha, Maria (coord.), *Farming - Theories and Practices*, London, Grassland Publishing Company, pp. 222-244

Journal Papers: Martins, Vicente (2009), Tasty Broccoli, *Farmer Review*, Vol. 32, nº 3, pp. 234-275

7. The final format of the references will be the responsibility of the Editorial Board, who will allow adjustments whenever necessary.

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