SPATIAL DEPENDENCE IN SELF-EMPLOYMENT IN SPAIN

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Resumen

Según la EPA, la tasa de autoempleo español ronda el 15%. No se distribuye de manera homogénea en todo el país y las diferencias son bastante estables en el tiempo. Nuestro objetivo en este artículo es analizar la distribución espacial del autoempleo, estudiando la existencia de clústeres entre provincias y teniendo en cuenta las diferencias entre autónomos y empleadores. Utilizando la estadística de Getis-Ord, nuestros resultados revelan la existencia de dos clústeres de autoempleo elevado ubicados en el noroeste y el sureste. En cuanto a los clústeres de autoempleo bajo, estos dependen del ciclo económico y se sitúan entre el País Vasco, Navarra, La Rioja y, en varios años, Madrid. Para los empleadores, los conglomerados son pequeños y su composición cambia con el tiempo. Por el contrario, para los trabajadores autónomos individuales, hay dos grupos con altas tasas de autoempleo que se convierten en uno en 2013 cuando 15 provincias pasan a formar parte de este grupo.
Palabras clave: Heterogeneidad en el autoempleo, análisis espacial
Clasificación JEL: L26, J82, R12

Abstract

According to the LFS, Spanish self-employment rate is around 15%. It is not homogeneously distributed across the country and differences are quite stable over time. Our purpose in this article is to analyse the spatial distribution of self-employment, studying the existence of clusters among provinces and taking into account differences between solo self-employed workers and employers. Using the Getis-Ord statistic, our results reveal the existence of two clear high self-employment clusters located in the North-West and the South-East. Regarding low self-employment clusters, they depend on the economic cycle and they are situated including the Basque Country, Navarra, La Rioja and, in several years, Madrid. For employers, clusters are small and their composition change over time. On the contrary, for solo self-employed workers, there are two high self-employment rate clusters that become one in 2013 when 15 provinces form this cluster.
Keywords: Self-employment heterogeneity, spatial analysis
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1.   Introduction

Self-employment has become a phenomenon of great interest in recent years. Analysis of self-employment has increased while numerous programs were also launched to promote this form of employment, which can be related to at least two reasons: on the one hand, the link to entrepreneurship and, on the other, its consideration as an alternative to unemployment (Cueto et al., 2017; Mayor et al., 2015; Sánchez-Cañizares et al., 2020). Both causes reveal one of the characteristics of self-employment, which is its heterogeneity. This concept includes independent workers and employers, people who want to be their own bosses and others who cannot find employment for others, traditional and innovative businesses. This diversity increases the complexity of the analysis, and makes it difficult to draw conclusions that are valid for the entire group.

Bögenhold and Klinglmair (2017) highlight the heterogeneity of self-employment. Both authors point out that the boundaries between salaried employment and self-employment are blurred and that, within the latter, there are several forms. Thus, both self-employed workers without employees ("only self-employment" or "one-person enterprises) and employers are self-employed.

This heterogeneity in self-employment also is reflected in spatial terms. The differences in self-employment rates across countries are well documented (Acs, Audretsch and Evans, 1994; Parker and Robson, 2004). Economic development and institutional variables (such as tax rates or unemployment benefits features) can explain these differences.

However, we can also observe differences in self-employment rates within countries. For United Kingdom, Robson (1998) identified the factors explaining those differences. GDP and sectoral distribution of employment are among them. However, the author found that regional effects are important: the socio-economic characteristics of the regions or their cultural feature made some of them more prone to self-employment than other. In the same line, (Georgellis & Wall, 2000) found labour market characteristics can explain regional variation in self-employment but region-specific factors still are important. An implication of these results is that "regional differences in self-employment rates will persist over time" (Saridakis et al., 2020). In the same way, Fotopoulos (2014) found that differences among regions in new firm formation are time persistent as well as its determinants.

For Germany, Fritsch & Wyrwich (2014) show that there are persistent regional differences in terms of self-employment and new

business formation. The authors consider that regional entrepreneurship culture contributes to the stability of self-employment rates in the long-term.

In the case of Spain, several research has shown the relevance of space. Cueto et al. (2015) analyse the relationship between self-employment and unemployment taking into account its spatial dimension. Results show that entrepreneurial activity in each region depends not only on its own endowments. Thus, the entrepreneurship environment may be exerted some influence.

Our purpose in this article is to analyse the spatial distribution of self-employment rates in Spain, studying the existence of clusters among provinces. The paper is organized as follow: in the following section, we explain the main issues related to the spatial dimension of entrepreneurship. After that, data are presented and results are explained. Finally, there is a section of discussion and conclusions.

2.   The spatial dimension of entrepreneurship

The promotion of entrepreneurship is generally recommended as a means of fostering economic and employment growth and innovation. However, it is difficult to identify entrepreneurs. First, there is no commonly accepted definition of an 'entrepreneur'. Schumpeter's definition links entrepreneurship to innovation and change in a variety of forms (new goods, new methods of production, new markets, and a new organisation of industries). Other authors have identified entrepreneurship with new opportunities, risk-taking or the creation of value (Ahmad and Seymour, 2008).

However, a second issue is how entrepreneurship can be measured to ensure the availability of data and information that can be considered, especially in the process of contributing to policy proposals designed to boost entrepreneurship rates. The problems associated with the definition means that analysts are forced to rely on proxies for entrepreneurship (Ahmad & Hoffman, 2008). Thus, the number of entrepreneurs is generally associated with the number of self-employed workers (Parker, 2009; Parker et al., 2012).

Although entrepreneurship is a phenomenon of time and space, its spatial dimension has not always been considered. Plummer (2010) shows that spatial dependence is 'especially problematic for entrepreneurship research', as certain variables such as survival or start-up rates are especially prone to spatial dependence. Previous behaviour

and the experiences of other entrepreneurs in the same location can explain entrepreneurs' behaviour. Spatial dependence becomes more relevant when entrepreneurial activity tends to be clustered geographically.

The relevance of clustering to the spatial dimension of entrepreneurship has been explained in several contributions. Delgado, Porter and Stern (2010) state that a strong cluster environment surrounding a particular region-industry enhances the incentives and potential for entrepreneurship. More specifically, clusters facilitate new business formation and the growth of successful start-ups by lowering the entry costs (e.g., by providing ready access to suppliers or low-cost access to specialised inputs, offering an environment in which the costs of failure may be lower), enhancing opportunities for innovation-based entry (as a stronger cluster environment will allow local entrepreneurs to develop and commercialise new technologies more rapidly) and allowing start-up firms to leverage local resources to expand new businesses more rapidly. In this sense, the geographic extension of the clusters is important because some of them may not be limited to a single region (Porter, 1998).

The regional performance of the Spanish labour market has been studied from different perspectives using alternative methodologies. One of the most important stylised facts is the existence of fundamental differences in regional unemployment rates and their temporal persistence. The existence of these geographical differences may require that spatial issues are included in whichever model is selected. Existing studies find evidence on the presence of a spatial autocorrelation process among the unemployment rates, and hence, for any model to be capable of explaining or analysing the performance of the (regional) labour markets, it must include these processes. This evidence was reinforced by theoretical contributions.

All in all, the process of self-employment generation in a regional context exhibits a spatial configuration. Therefore, this spatial component should be considered in any attempt to model the situation. The decision to become an entrepreneur in a given region depends not only on the endowment in this region but also on the endowments in neighbouring regions.

## 3.   Self-employment in Spain

The Spanish labour market is an interesting case study because it has a high self-employment rate relative to other European countries. According to the figures from the Spanish labour force survey, there were 3.1 million self-employed workers in Spain in 2020. If agricultural sectors are excluded, the self-employed workers total 2.8 million out of total of 19 million employed workers, accounting for approximately 15.2%.

The analysis in this paper refers exclusively to 2005-2020. We have to take into account that a methodological change modifies the definition of self-employment in 2008[2]. That issue explains the drop in 2009 compared to 2008. However, given that our analysis is cross-sectional, we think that it does not affect our results.

In figure 1, we can observe the evolution of the number of self-employed workers in Spain and the rate of self-employment. Excluding the methodological change, in general, there is stability in both indicators. The number of self-employed workers is around 2.7 million people in the majority of the years and variations rates are smaller. Only in 2011, the drop is 3.1%, meaning that self-employment reduced by 346 thousand people. In terms of self-employment rate, it is 15.2% in 2020. Its maximum was 16.7% in 2013. From that year on, a decreasing tendency reached a minimum of 14.7% in 2019.

In 2020, self-employment rate increased compared to the previous year. However, we have to take into account that the pandemic situation affected employment in a very particular way. The implementation of various measures mitigated possible job losses resulting from confinement. In the case of paid employment, short-time work schemes facilitate adjustment while the companies are not active. In the case of the self-employed, the benefit for cessation of activity has helped to avoid the closure of many businesses.

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[2] In 2009 there is a methodological change in the definition of self-employment in the Labor Force Survey. New questions allow differentiating self-employed workers from those legally self-employment but wage-workers "de facto".

Figure 1: Evolution of non-agricultural self-employment in Spain
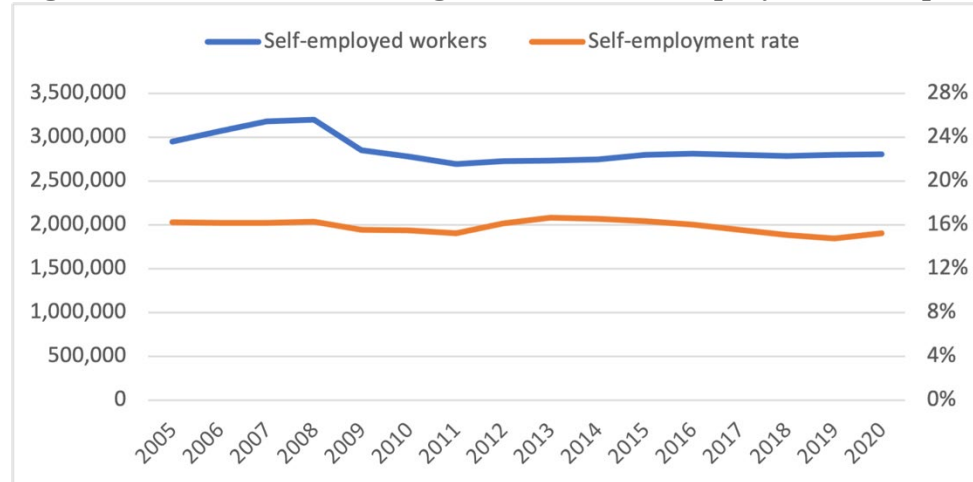
Source: own elaboration from LFS.

Types of self-employment

Labour Force Survey allows the characterisation of self-employed workers in four categories: employers, solo self-employed workers, member of cooperatives and family workers. The last two categories are residual, meaning less than 5% of total self-employment. In the following figure, we can observe that solo self-employed workers are the majority, meaning more than 60% with an increasing tendency during the considered period. Employers are a smaller proportion of self-employment, meaning less than 35%. A countercyclical pattern appears in this case. Thus, the proportion of employers reached a maximum of 35.9% in 2009. Since that year, a decreasing tendency is observed, with a minimum around 30% in 2013-2015. The economic recovery seems to favour the increase of employers in 2016-2019.

These results are also derived from Figure 3, where employers and solo self-employed workers are estimated over total employment. The percentage of employers is very stable in the period considered, standing at around 5%. Until 2008, a slight upward trend is observed, which becomes a downward trend during the great recession and continues until 2020, when it accounts for 4.6% of total employment.

The variations in the case of the solo self-employed workers are greater. Until 2011, this proportion was around 9%, with significant growth between 2011 and 2013, reaching 11% of total employment in the latter year. We must bear in mind that said increase may be due both to

the entry into self-employment from salaried employment, unemployment or inactivity, as well as to the transition from employer (if, for example, the crisis leads to the dismissal of the workers). On the other hand, since 2013, there has been a slight downward trend that is broken in 2020. We must take into account that this year is highly determined by the pandemic situation. As we have seen, the reduction in the number of self-employed has been small, as a consequence of the implementation of programs that have favoured their maintenance in employment while receiving aid to cushion the lack of income as a result of confinement and the lack of a normal activity in certain sectors (hospitality, for example). In any case, it does appear that many employers have dispensed with their employees in this situation.

Regional analysis

In the following maps (Figures 4, 5, 6 and 7), we display the self-employment rate at a regional level using Spanish provinces as unit of analysis. These provinces correspond to NUTS-3 in the European territorial unit classification. We analyse the spatial distribution and the temporal evolution of four variables: non-agricultural self-employment rate (Figure 4), services self-employment rate (Figure 5), employers (proportion of total employment, Figure 6) and solo self-employed workers (as proportion of total employment, Figure 7). In these maps, three years are presented: 2009 is our first year of analysis, 2013 corresponds to the last year of crisis and 2019 is the last year considered, without taking into account 2020, to avoid possible distortions derived from the COVID-19 pandemic. For the self-employment rate, we have included year 2005.

Notwithstanding the chosen variable, we can observe that self-employment is not homogeneously distributed across the country. While the self-employment rate is below 15% in several provinces, it is twice the national rate in others. Madrid has the lowest self-employment rate in the majority of the considered years; Barcelona also has a low self-employment rate. These two regions are identified as being among the most dynamic in the country in terms of employment and income. Valencia and the Basque Country also have low self-employment rates. In several cases, high entrepreneurship rates can be observed in provinces around centres of development; for instance, the provinces around Madrid (except Guadalajara) have high self-employment rates.

Figure 2: Distribution of self-employed worker by type
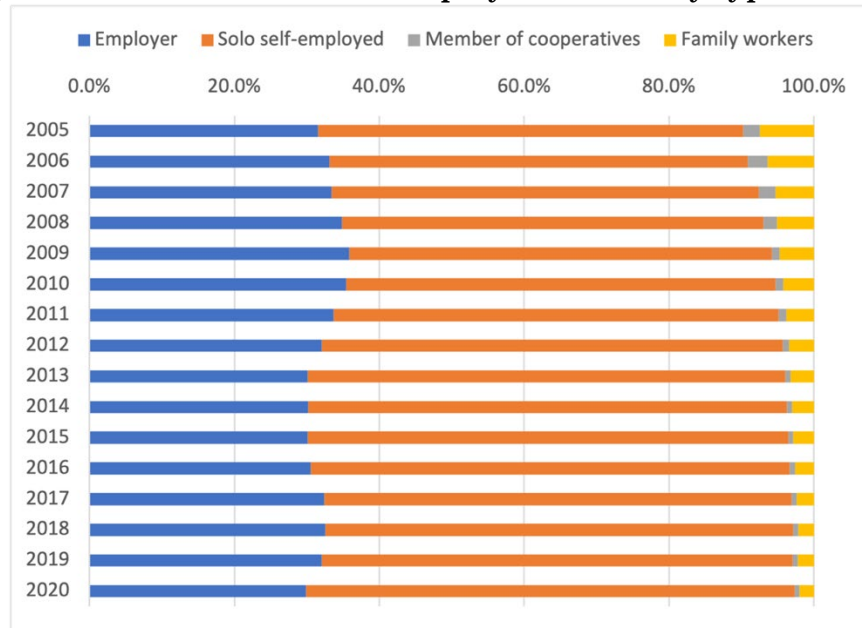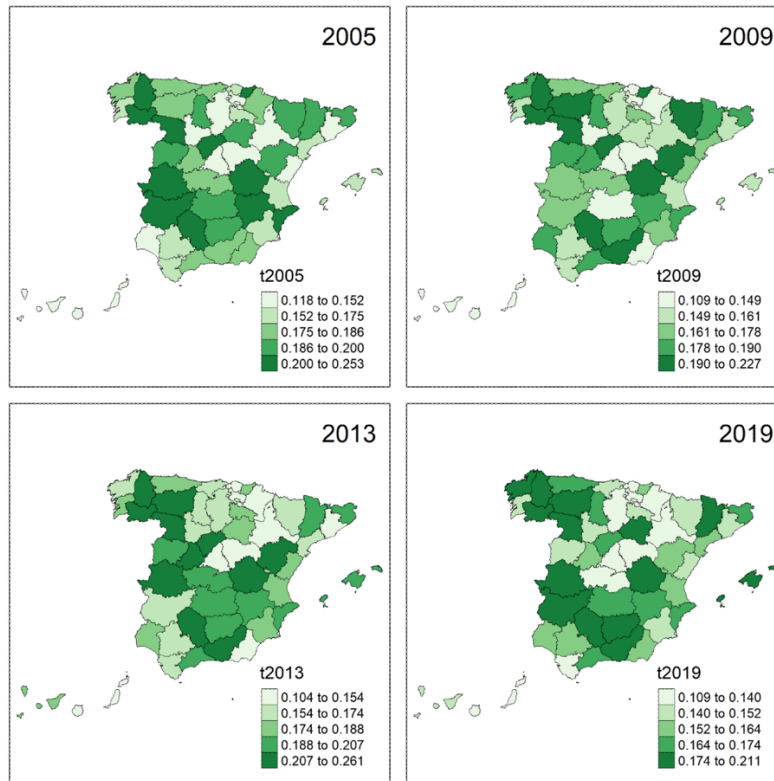

Source: own elaboration from LFS.

Figure 3: Evolution of employers and solo self-employed

Source: own elaboration from LFS.

Although changes are presented over time, we can observe several patterns that are maintained in the years considered. Thus, the lowest self-employment rates are found in the center and northeast of the territory, including Madrid, Guadalajara, Navarra and, in general, the provinces of the Basque Country. At the opposite extreme, we would find the provinces that are located in the northwest, but also Extremadura and several provinces of Andalusia.

Figure 4: Non-agricultural self-employment rate.
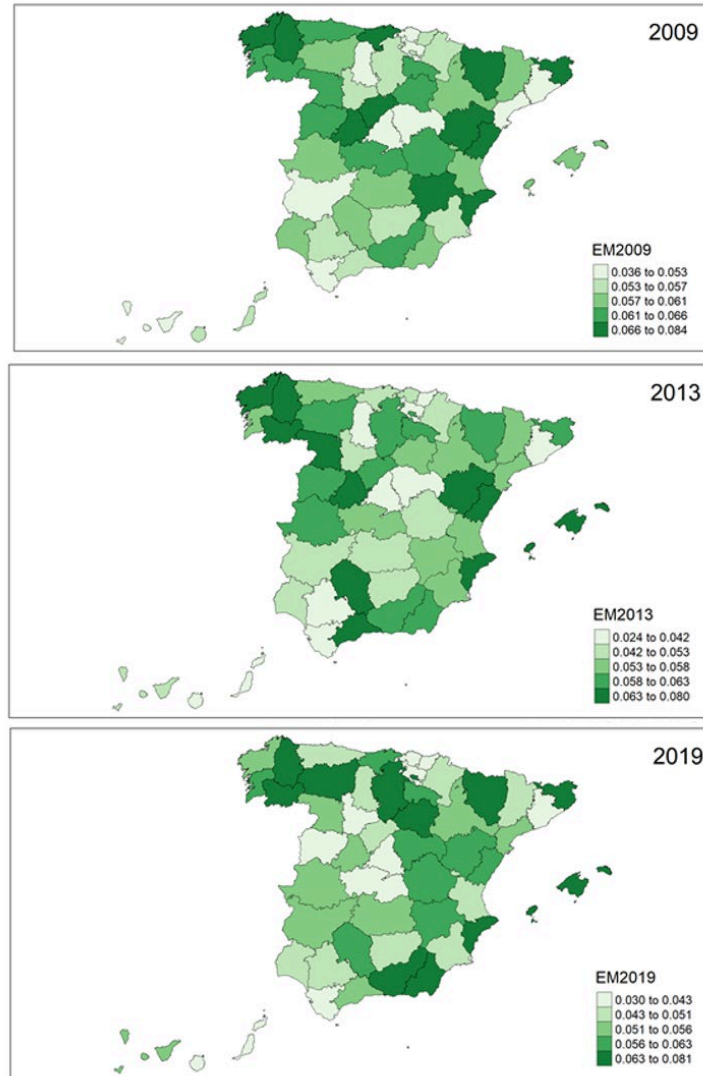

Source: own elaboration from LFS.

Given that self-employment represents a higher proportion of employment in services than in the industry sector, we present self-employment rate in this sector in Figure 5. The conclusions that emerged from these maps are similar to those presented previously. Thus, Madrid and provinces around have the smallest rates of self-employment. On the opposite side, provinces in Galicia, Castilla y León and Andalusia have the highest rates.

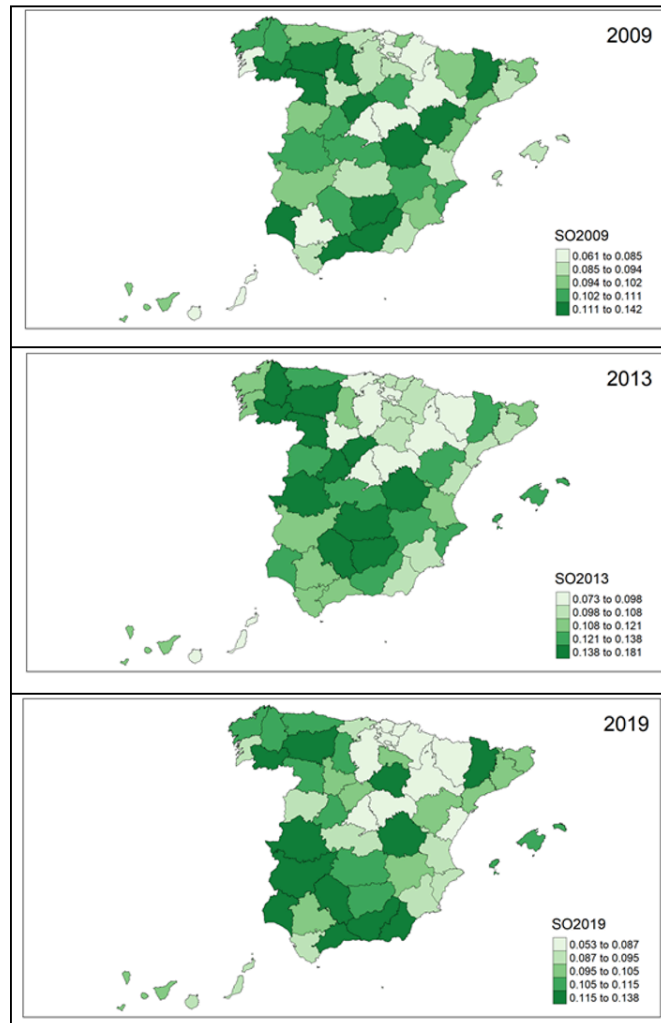**Figure 5: Services self-employment rate**
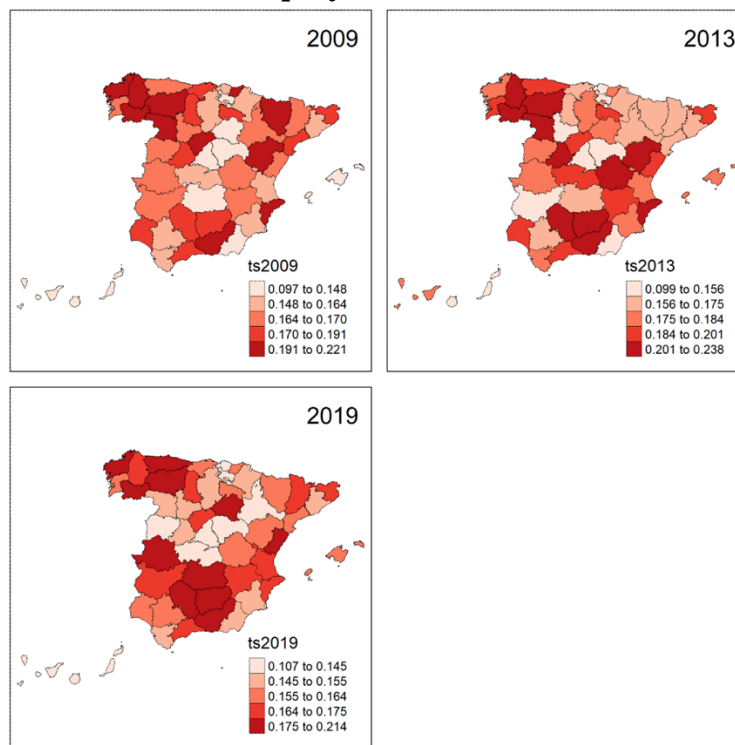
Source: own elaboration from LFS.

Figure 6: Employers workers (proportion of total employment)
Source: own elaboration from LFS.

Source: own elaboration from LFS.

Figure 7: Solo self-employed workers (proportion of total employment)

Source: own elaboration from LFS.

4.   Methodology and results

Methodology

We analyse the existence of a spatial pattern in the distribution of the self-employment rates using global and local spatial autocorrelation test. As it is expected the results for the global autocorrelation tests are not statistically significant because there is not a clear spatial pattern. However, the local spatial autocorrelation tests point out more interesting results. To do this, we compute the local statistics proposed by Getis and Ord (1992) and extended in Ord and Getis (1995) allowing, among other issues, the consideration of non-binary spatial weight matrix (i.e. row standardize weights). This statistic is specially indicated when global statistics do not identify the existence of clusters (Ord and Getis, 1995). The Getis-Ord statistic can be obtained as:

$$G_i^* = \frac{\sum_j w_{ij}(d)x_j - \bar{x}\sum_j w_{ij}}{s\sqrt{\dfrac{\left[n\sum_j w_{ij}^2 - \left(\sum_j w_{ij}\right)^2\right]}{n-1}}}$$

where w_{ij} is the spatial weight, x_j is the value of the variable of interest in each region and $(\bar{x}, s^2)$ are the sample mean and variance. If $G_i^* > E(G_i^*)$, there is a concentration of high values $x_j s$ in the catchment area of region i which is determined by the neighbourhood criteria. On other hand, we conclude that there is a clustering of low values if $G_i^* < E(G_i^*)$.

Results

We analize the existence of these self-employment hot spots on four different variables: non-agriculture self-employment rates, services self-employment rates, employers and solo self-employed workers.

In the following maps, we have plotted the results of Getis-Ord statistic. In red colour, we have those provinces that form a cluster with high self-employment rates. On the contrary, in blue colour, we have the clusters with low regional self-employment rates.

We observe that clusters of high self-employment rates prevail over cluster with low self-employment rates. Thus, there is a cluster of high self-employment rates in the North-West including Lugo, Pontevedra, Orense, León and Zamora. Another one is located in the

South-East formed by Ciudad Real, Albacete, Jaén and other bordering provinces, depending on the year. In fact, in 2013, these two cluster became one by including Salamanca, Cáceres y Toledo.

In the case of low self-employment rates, the more interesting results corresponds to 2013 and 2019. In both years, a cluster is detected in the North, including provinces from the Basque Country, Navarra, La Rioja and Soria.

We can conclude the stability of the detected clusters, especially in the case of provinces with high self-employment rates.

Figure 8. Getis-Ord's Test for Local Spatial Autocorrelation (non-agricultural)
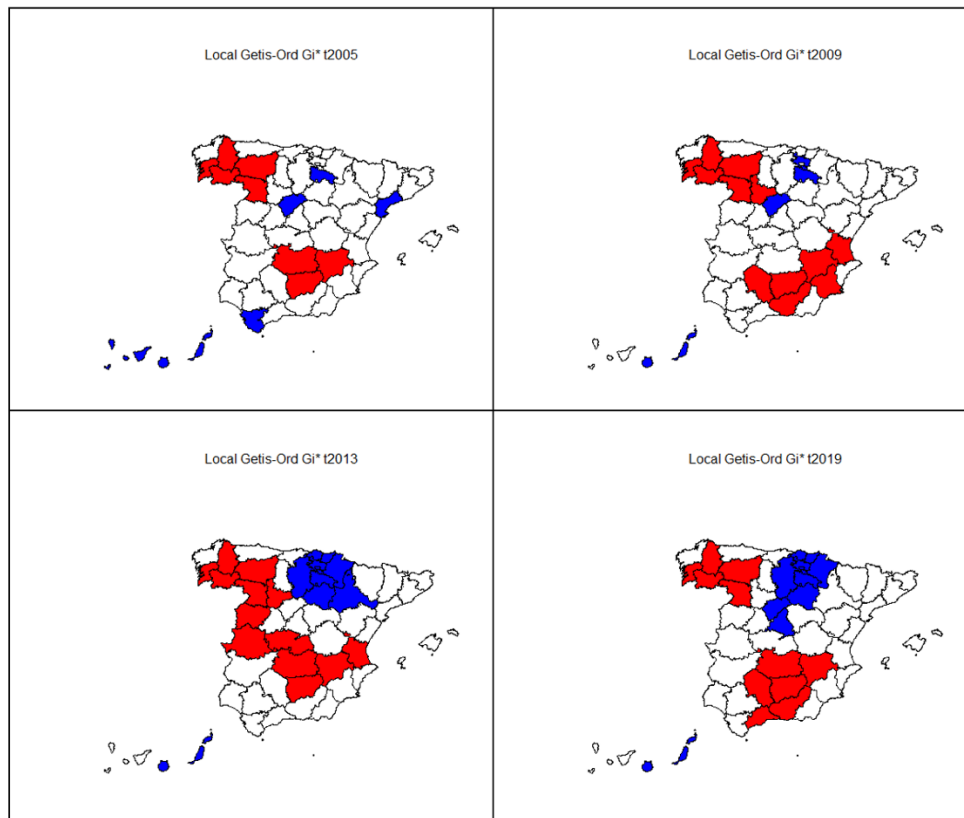
If we consider self-employment rates in services, the pattern is quite similar to the one previously explained, especially in the case of high self-employment rates. Thus, we have detected the same clusters in the North-West and the South-East, almost with the same composition.

A difference appears for low self-employment rates. The cluster is located in the centre of the country, including Madrid and bordering provinces. This cluster disappear in 2013 and emerges again in 2019. We can link this result with the economic situation. We can assume that they are provinces that, in an environment of economic growth, generate enough opportunities for salaried employment so that self-employment is not necessary.

Employers vs. solo self-employed workers

Finally, in the following maps, we have plotted the results of the Getis-Ord's Test for the proportion of employers and solo self-employed workers. First, we have to note that the number of high self-employment rates clusters are greater than the number of low self-employment rates clusters. And, second, the number of clusters is higher in the case of solo self-employment than in the case of employers.

Regarding employers, two high self-employment rates stand out. The first one in the North-West, including provinces in Galicia and bordering regions. The second one in the South-East, although its composition varies across years. With respect to low self-employment cluster, as it can be observed in the maps, provinces in the Basque country form a group although it is not stable over time.

If we focus on solo self-employment, the picture is very clear. There are two high self-employment rate clusters that become one in the worst year of the great recession. In fact, in 2013, the majority of the provinces of the province become a cluster.

Regarding low self-employment rates clusters, we have one including provinces in the Basque Country, Navarra and La Rioja. During the crisis, this cluster grows with bordering provinces, reducing again with the economic recovery.

Figure 9. Getis-Ord's Test for Local Spatial Autocorrelation (services)
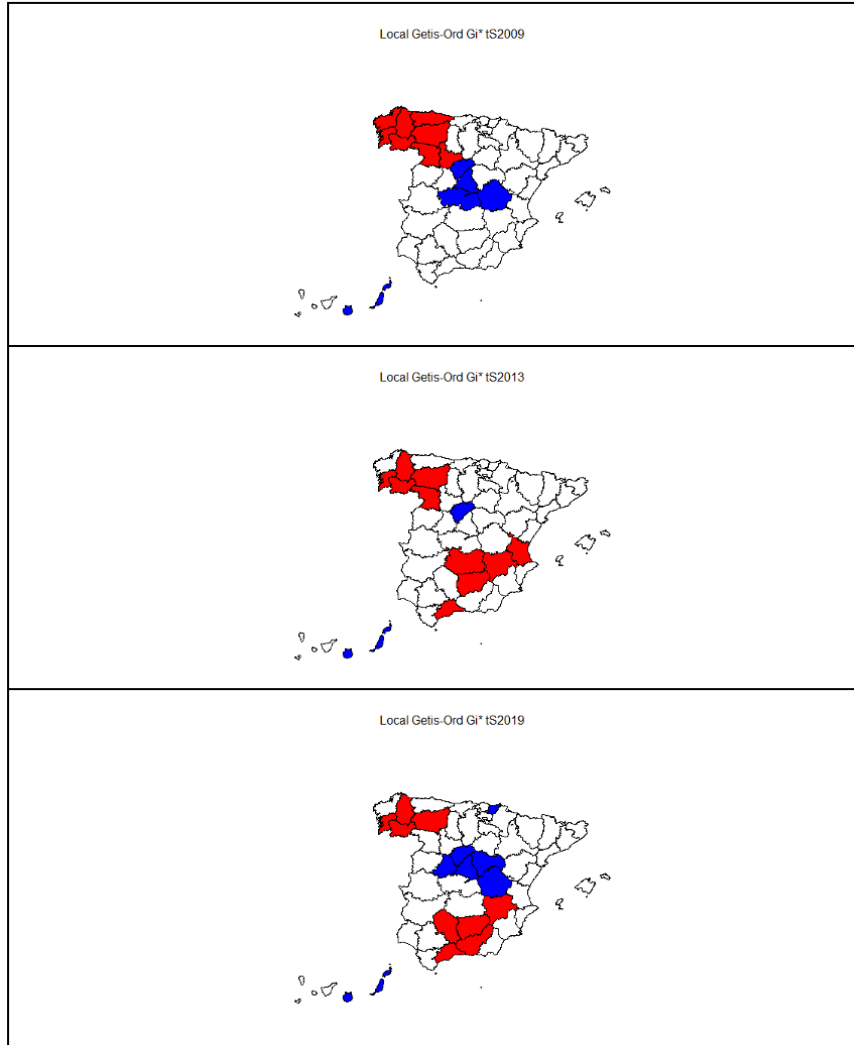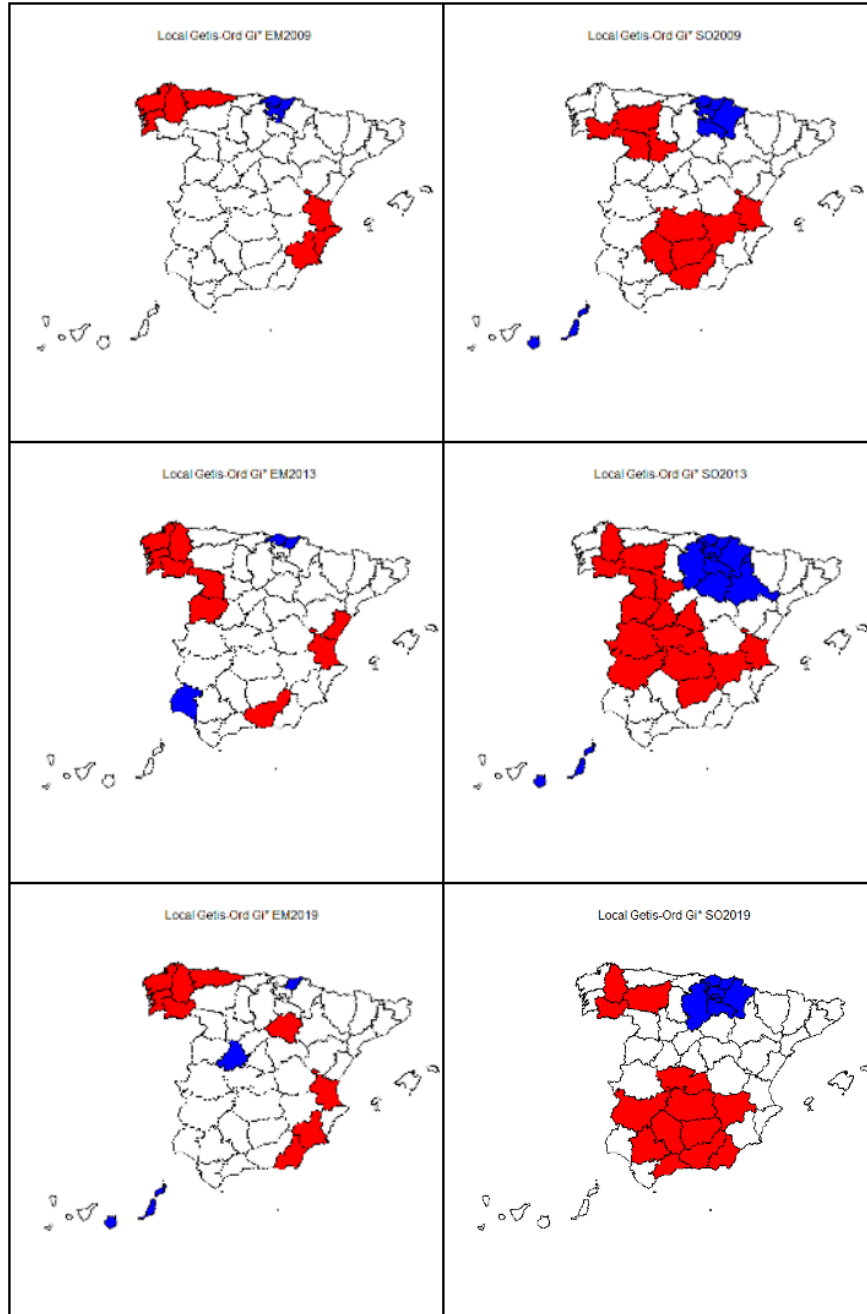
Figure 10. Getis-Ord's Test for Local Spatial Autocorrelation: employers and solo self-employed workers

5.   Discussion and conclusions

The results of this article show the existence of relevant regional differences in terms of self-employment in Spain. Throughout the period analyzed, 2005-2019, it is observed that certain provinces present substantially higher entrepreneurship rates than others, maintaining the gap over the years.

We have used the Getis-Ord statistic to analyse the existence of a spatial pattern in the distribution of the self-employment rates. Our results reveal the existence of two clear high self-employment clusters located in the North-West and the South-East. The first one places the provinces of Galicia as the center and the second one some of Castilla La Mancha and other border areas. These clusters are observed both in the analysis of non-agricultural self-employment and in the service sector. We need more information to find out to what extent the sectoral structure, the characteristics of the provinces or the entrepreneurial culture contribute to these high levels of self-employment.

The existence of low self-employment clusters seems to depend on the economic cycle. Thus, its existence is clearer during the recovery than during the crisis. It is situated including the Basque Country, Navarra, La Rioja and, in several years, Madrid. The cluster around Madrid emerges stronger when we consider services instead of non-agricultural activities.

The distinction between employers and solo self-employed workers has provided interesting results. For employers, clusters are small and their composition change over time. However, Galicia forms a cluster with their provinces and other bordering regions. On the contrary, for solo self-employed workers, there are two high self-employment rate clusters that become one in 2013 when 15 provinces form this cluster. In the case of low self-employment rates clusters, there are one that includes provinces in the Basque Country, Navarra and La Rioja, and some bordering provinces during the crisis.

We need further analysis about the reasons for differences in self-employment rates in order to understand what factors can affect entrepreneurship in the long-term. Furthermore, our results show the relevance of qualifying self-employment. Distinguishing between employers and own-account workers or differentiating among activities can be a way to understand the dynamics of self-employment and its relationship with unemployment or economic growth. This is especially

important to understand the role of entrepreneurship policies. Several articles have shown that effectiveness of this kind of policies is uncertain (Román et al., 2013). This can be especially important in the case of Spain where the proportion of solo self-employed workers is high in comparison with employers. This group have more difficulties to succeed (Congregado et al., 2010) and it is quite relevant in the Spanish context.

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