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Cooperative employment in the regions of Spain (1999–2019): The convergence clubs

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Abstract

In times of crisis, the study of employment is of vital importance, especially that generated by cooperatives, which show great resilience. This paper analyzes the evolution of employment created by cooperatives in the different Spanish regions in relation to total employment between 1999 and 2019 with a pioneering approach. We analyze the existence of convergence clubs among the Spanish regions using the methodology developed by Phillips and Sul (2007, 2009). The results show the existence of four clubs that include the regions that converge in relative terms of cooperative employment over the 20 years analyzed. The lack of homogeneity in the behavior of employment in cooperatives in the different Spanish regions is demonstrated, with certain divergences among regions. These divergences make it difficult to establish a model of cooperative employment for the whole of Spain.

KEYWORDS
cooperative, club convergence, employment

1 | INTRODUCTION

According to the Statement on Cooperative Identity (International Cooperative Alliance, 1995), a cooperative is "an autonomous association of persons voluntarily united to meet their common economic, social and cultural needs and aspirations through a jointly owned and democratically controlled enterprise". Particularly complex in nature (Puusa et al., 2016), they are organizations that, in addition to achieving the objectives of their members, play a relevant role in today's economies due to their social focus. Cooperatives stand as drivers of sustainability and growth in the context of globalization and social cohesion (Monzón, 2013). They also contribute to regional prosperity more through the employment they offer than for their value add (Costa et al., 2022).

Thus, studies of cooperatives' contribution to creating and maintaining employment, especially in periods of crisis, are a valuable source of information for decision making. Some studies conclude that these organisations have shown greater resilience than capitalist enterprises (Borzaga et al., 2021; Díaz-Foncea & Marcuello, 2010; Roelants et al., 2012). Further, cooperatives show a defensive character (Grávalos & Pomares, 2001).

It should be pointed out that the initial situation of each region and the response capacity of its cooperatives, with their characteristics, principles, and values, are not homogeneous across territories. Each region has its own institutional framework, production system, business population, level of employment and training, and its own entrepreneurial and association culture. Despite the idiosyncrasies of each region or territory, globalization, supranational economic and social policies, and the passing of time can bring regions or territories closer together or make them increasingly different. In addition, territories exert a greater influence on cooperatives than on other businesses (Pérez & Valiente, 2020).

In this framework, the aim of this paper is to analyze the evolution of employment generated by cooperatives in Spanish regions in relation to total employment as a source of value or wealth over the last 20 years (1999–2019). In addition, the differentiated behavior among Spanish regions over time will be studied. The existence of convergence clubs among the Spanish regions will be analyzed on the basis of the methodology developed by Phillips and Sul (2007, 2009). This methodology allows us to test this question by considering the possibility of multiple equilibria for a group of regions and, therefore, several paths of convergence.

This work presents an analysis of employment generated by cooperatives in the different Spanish regions over the last 20 years. The richness of this longitudinal analysis of cooperative employment helps overcome the scarcity of this type of research, given the difficulty of access to information. A study is also made of the development and convergence among regions on the basis of the employment generated by their cooperatives, which could reveal the greater or lesser success of their economic and even social policies. Finally, the paper's most important contribution is made in terms of the methodology used to define the convergence among regions. This study is a pioneer in applying the convergence club technique based on the proposal by Phillips and Sul (2007, 2009) to cooperatives and to business management in general.

Therefore, the contributions of this work are twofold. On the one hand, this paper provides evidence regarding the existence of regional convergence of cooperative employment in the regions of Spain. On the other hand, even though there are various estimation methods that can be applied to test club convergence hypotheses, this paper focuses on the implementation of a methodology that, to the best of our knowledge, has not been applied to the Spanish cooperative employment case. This work uses the panel convergence methodology developed by Phillips and Sul (2007). Phillips and Sul's methodology introduces a cross-sectional study, by means of an

analysis of heterogeneous time series in the parameters of a neoclassical growth model, in order to take into account, the heterogeneity of the transitional temporary variable analyzed. This approach has clear advantages over alternative methods. Firstly, it can be used to endogenously identify groups of regions converging toward the same growth path, and not by applying a predetermined criterion. Secondly, although a full convergence hypothesis can be rejected, this approach makes it possible to identify convergence clubs among regions as well as divergent regions. In addition, the speed of the convergence parameter can also be estimated with this methodology, which allows distinguishing relative convergence empirically. Thus, this technique has multiple advantages over other analyses, making this article a contribution to the field.

This paper is structured as follows. Following this Introduction, the second section sets out the theoretical bases underpinning the importance of cooperatives as a source of employment creation, wealth, and regional development and the application of the approach of convergence among territories. The third section discusses the methodology and data used. The results are then presented and, in the fifth and final section, the conclusions, implications, and future lines of research are explained.

2 | THEORETICAL BACKGROUND

2.1 | Cooperatives and employment

The survival, competitiveness and successes of cooperatives depend on the application of the principles and values that differentiate them from capitalist enterprises (Novkovic, 2008). These principles are set out in the International Cooperative Alliance 1995) and include, among others, the importance of social aspects, democratic governance, commitment to education, sustainable development, and concern for the community. These principles translate into democratic decision-making, the leading role of people as opposed to capital, and the objective of service to an organisation's members and to the community (Chaves, 2015). They give cooperatives a special operating philosophy and advantages over other enterprises,[1] even exerting a positive influence on performance in terms of both sales and employment (Guzmán et al., 2020).

Thus, based on their emphasis on people and their community, cooperatives have a great capacity for generating employment (Juste Carrión et al., 2011). Besides creating employment, they protect it better than other types of enterprises in times of recession. The role of cooperatives as generators and maintainers of employment has been observed in some longitudinal studies, although sometimes with different methodological approaches, periods of time, and units of analysis, which make comparisons difficult. These studies pay particular attention to the behavior of employment generated by cooperatives in the face of changes in economic cycles or in the presence of a crisis or recession, which is when cooperative values are especially needed. On that point, a debate is opened in the literature about the relation between cooperative employment and the economic cycle.

Díaz-Foncea and Marcuello (2010) observe the strength and stability of employment generated by cooperatives in Spain in times of GDP reductions between 1994 and 2008. Sala-Ríos et al. (2015) observed a certain counter-cyclical behavior of cooperative employment during the

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[1] Some of the advantages from the cooperative principles include, according to Spear (2000), their effectiveness in responding to market failures and crises, avoiding opportunistic behavior and consumer exploitation, facilitating high-trust relationships within the organization, and being attractive to staff because they value education and training.

period 1995–2014, although it is not large enough to be considered a significant refuge effect. However, according to those authors, growth phases have a negative impact on employment in cooperatives. On the other hand, there are also studies that exhibit results in a different way. For example, Sala-Ríos et al. (2020) conclude that, although cooperative employment shows some degree of resilience, it is not counter-cyclical. Cantarero et al. (2017) also contradict the idea that the creation of social economy enterprises (considering cooperatives and worked-owned firms) is counter-cyclical and that the sector is a refuge in crisis situations.

Although the exceptional nature of the Covid-19 pandemic compared to previous events that have been studied should be emphasized, some recent studies have included its impact in the analysis of cooperatives and employment. Examples are Sala-Ríos (2022) and Cancelo et al. (2022). Sala-Ríos (2022) could not observe either the refuge effect or the greater resilience of cooperatives and their employment. However, Cancelo et al. (2022) conclude that although it is not possible to observe a counter-cyclical evolution of cooperative employment in this crisis, cooperatives can be considered as instruments of economic stabilization since employment in these enterprises has fallen less in this crisis than in the rest of the economy. This greater relative resilience of cooperative employment compared to the rest of the economy has an even more positive effect: the authors note that cooperatives have been able to generate employment, especially in certain activities such as health care and social services. However, in the Spanish economy as a whole, employment declined in all economic activities during the pandemic.

One explanation for those results, according to Sala-Ríos et al. (2015), can be found in the transformation of troubled capitalist enterprises into cooperatives. Another set of reasons for the greater resilience cooperative employment has to economic cycles stems from the very defining characteristics of cooperatives. These include the leading role they give to their user-members (Billet et al., 2021), the workers' greater commitment to the cooperative (Lampel et al., 2012; Mcquaid et al., 2013; Tarazona & Albors, 2005), participation in decision-making bodies by matching the interests of enterprise and workers (Ben-Ner, 1988; Park et al., 2004), the social capital of cooperatives (Wulandhari et al., 2022), and that cooperatives are more selective when hiring and more reluctant to dismiss (Lampel et al., 2012), prioritising people over capital. Of all these reasons, the primary objective of all cooperatives stands out: to meet the needs of their members and increase their wellbeing, which involves stabilizing employment (Borzaga et al., 2021).

In short, cooperatives make an important contribution to employment. The greater stability of the employment levels they generate makes cooperatives an important tool for tackling unemployment in times of crisis (García-Louzao, 2021). Through their contribution to employment, cooperatives can stabilize the economy of their community, especially in times of crisis (Vieta & Lionais, 2015). Cooperatives can therefore be a good tool for creating and expanding employment opportunities. This is coherent with the nature of cooperatives as problem-solvers rather than profit maximizers (Borzaga et al., 2021)

2.2 | Cooperatives and territory

The development of societies linked to a territory and its resources has received some attention in the literature. In this context, the territory is not just the geographical support in which socioeconomic relations take place (Alburquerque-Llorens, 1998). The territory is a more complex reality defined by multiple factors, like its productive structure, entrepreneurial capacity and technological know-how, natural resources and infrastructure, social and political system (Vázquez, 2000), and the local culture and other local features (Garófoli, 1995), among others.

In this context, cooperatives are closely linked to territory-focused development (Pérez & Valiente, 2020) as they are key contributors to social integration and cohesion (Bel Durán & Ausín, 2007).[2] In fact, from the cooperative principles that define their nature, cooperatives are firmly embedded in local communities (Billiet et al., 2021). Their projects are thus linked to the territory (Díaz-Foncea & Marcuello, 2010; Pérez & Valiente, 2020). Cooperatives, because of their involvement in local economic and social development, are linked to their regions.

This idea, combined with the fact that each region has its own historical, cultural, socio economic, institutional, environmental, and political processes, has led researchers to make comparisons of the creation of cooperatives, the number of cooperatives, or the employment generated by them in different regions, as they could not be homogeneous among them.

This is the case of Cantarero et al. (2017). At the Spanish regional level and in the period 2002 to 2013, they made an analysis of the creation of social economy enterprises. Contrary to what might have been expected, they conclude that the creation of social economy enterprises is randomly distributed in time and space. It follows a regionally heterogeneous pattern, although with a rather limited influence of the cultural tradition or the relational framework existing in the region.

The results obtained by Díaz-Foncea and Marcuello (2015), also considering the 17 Spanish regions (NUT-2 regions) but over a period of 15 years (1995–2009) and with worker cooperatives, are similar. With the aim of identifying the regional determinants that condition the creation of worker cooperatives, they conclude that the main determinant of their creation is the level of unemployment in a region. In regions with a high level of unemployment, the rate of creation of these organisations is higher, and territorial differences can be observed. Along with unemployment, other factors that positively condition the creation of cooperatives, and thus cooperative employment, are the level of wages, population growth, and the establishment of cooperatives in the region or the density of cooperatives. However, in the case of Arando et al. (2009), with a sample of worker cooperatives in the Basque Country only, they find that unemployment is not a factor in the creation of more cooperatives. In any case, apart from the different geographical characteristics of their samples, it should be noted that both studies consider only one type of cooperative (worker cooperatives) or all the social economy entities. Further, they do not take into account the size of the cooperatives created or the employment they generate. Creating 5 cooperatives with 10 workers each is different from creating 5 cooperatives with 50 workers each.

Grávalos and Pomares (2001) conclude in a quite different way. Using a regional panel of the number of cooperatives created in the Spanish regions during the period 1986–95, they conclude that there is a differentiated behavior in the regions and that some differentiating elements can also be observed among them, such as the rootedness of cooperatives in the region and their public promotion. These authors highlight the unemployment rate in the region as a good predictor of the evolution of cooperatives: there is an anti-cyclic relation between regional employment and cooperatives. They confirm the *refuge effect* of cooperatives during the crisis.

Focusing on cooperative employment, and in order to make territorial comparisons, several studies have been carried out to analyze the behavior of employment generated by cooperatives in different regions. For example, in Italy, studies have been published by Borzaga et al. (2021) and Di Maggio et al. (2020). In the latter, the authors found that there are differences in the employment development patterns of cooperatives between different Italian provinces (NUT-3 regions), obtaining eight clusters that depend on the effect of the sector, neighbourhood, or proximity, and the effect of the region itself.

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[2] Bel Durán and Ausín (2007) present the contribution of cooperatives to territorial development in the framework of the European Community.

In Spain, several works stand out, such as Sala-Ríos et al. (2020), Clemente et al. (2009), and Pérez and Valiente (2017). The work by Sala-Ríos et al. (2020) addresses employment generated by cooperatives and their link with the territory, specifically with the regions (17 NUT-2 regions in Spain), between 2003 and 2019. By means of a cluster analysis, these authors obtain groups of regions with similar behavior based on how cooperatives in the different regions face the crises that occur during the study period. The results show that, although location matters, the existence of a cooperative culture in the region does not guarantee greater resilience in employment generated by cooperatives during a recession. Pérez and Valiente (2017), with data from 2013, show the heterogeneity among the existing cooperative models in the Spanish regions depending on their potentiality and territorial reality.

Although the positions of the researchers about the relation between cooperatives and territories over time are not clear, by using different methodological tools (for example, cluster), different unit of analysis, different data, and different time periods (for example, one year compared to another, a specific moment in time, or a 10-year period), the question to be debated is whether the cooperatives and the different territories they are established in become dynamic or employment-reducing mechanisms over time; that is, whether they go through periods of economic boom or economic crisis (for example, the one that began in 2007 or the one generated after the COVID-19 pandemic). In this way, it would be possible to discover whether there are territories that converge in cooperative employment or whether they diverge over time. The approach of this paper contributes to this approach, establishing an important relationship between cooperative employment in relation to total employment and territory from a longitudinal convergence perspective over the last 20 years.

2.3 | Growth and convergence

Differential behavior in the growth of a variable, in this case cooperative employment, is a recurrent theme in economics, especially in the case of panel data that reflects the evolution of a variable over time and for different regions. From this point of view, convergence analyses have been a basic pillar for the study of the behavior of economic and social variables. The concept of convergence in economics has evolved from both a theoretical and an empirical viewpoint. The neoclassical growth model argues that relatively poorer economies will grow faster than relatively richer ones, which in the long run will lead to countries reaching the same level of per capita income and employment (Solow, 1956; Swan, 1956). More recently, modern growth theories (Lucas, 1988; Romer, 1986) have suggested that the distribution of per capita income across regions points to a tendency to cluster around poles of attraction rather than "global convergence". Moreover, modifications to the original neoclassical model have been proposed by replacing homogeneous technological progress across countries in the neoclassical production function with the assumption of country-specific technological growth rates (Barro & Sala-i-Martin 1992; Howitt & Mayer-Foulkes 2005). Similarly, Galor (1996) shows that the neoclassical growth model can generate multiple equilibria so that countries with identical economic structures need not converge to the same growth path, giving rise to the club convergence hypothesis, allowing for the possibility of multiple steady states (Durlauf & Johnson, 1995).

At the same time, empirical evidence corroborates the existence of convergence clubs between countries for different variables (Apergis & Garzón, 2020; Barrios et al., 2018; Borsi & Metiu, 2015; Monfort et al., 2013; Phillips & Sul, 2007), as well as between regions (Barrios et al., 2019; Bartkowska & Riedl, 2012; Gonzalez et al., 2017; López-Mendóza et al., 2021;

Postiglione et al., 2010; Rodríguez et al., 2016; Tian et al., 2016; Von Lyncker & Thoennessen, 2016), with differences observed in terms of the variables used, the sample considered, the methodology employed, and the number and composition of clubs (Castellacci & Archibugi, 2008). However, empirical evidence on the existence of convergence clubs in Spain is still scarce.

One of the few studies that analyze cooperatives using a convergence approach is that of Clemente et al. (2009), for the period 1999–2007 and following the methodology proposed by Barro and Sala-i-Martin (1992).[3] They carry out a descriptive analysis of cooperatives by Spanish region based on employees, sales figures, and the value added created. They conclude that, while the regions converge in the general economy in terms of both per capita income and employment, this is not the case when analyzing the social economy. Disparities are observed between regions, especially in terms of employment. One of the causes of the opposing trends between the general economy and the social economy in the regions, according to the authors, could lie in the existence of different drivers of development for the two. In any case, they conclude that the social economy contributes more to job creation in the Spanish economy as a whole than to value creation.

In the context of convergence analysis, one objective of this paper is to study whether there has been a process of total convergence among Spanish regions in the employment generated by cooperatives, or whether, on the contrary, there is a pattern of convergence in clubs. To this end, we apply a methodology based on the log t test developed by Phillips and Sul (2007, 2009) which, although the absolute convergence hypothesis is rejected, makes it possible to determine convergence in clubs in regions converging toward the same steady state.

This methodology has relevant advantages over alternative methods. First, while other methodologies cluster economies a priori without using any specific methodology, which limits the results, the log t test does so endogenously; i.e., it clusters by unspecified factors that determine the formation of convergence clubs. Second, this methodology is based on a cross-sectional distribution, sigma convergence rather than beta convergence, modeling the structure of the panel data as a nonlinear relationship in which the coefficients can vary over time, showing that the asymptotic properties are well defined. The test is a regression as well as a clustering process that does not depend on any assumptions about the stationary trend of the variables examined (Monfort et al., 2013). Moreover, this methodology can also be used to estimate the speed of convergence, which allows relative convergence to be empirically distinguished.

3 | DATA AND METHODOLOGY

3.1 | Data

The object of study of this research is cooperatives and the employment they generate in the different Spanish regions (NUT-2 Regions of Spain).

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[3] From the methodological point of view, their convergence is a traditional approach. The most commonly used concepts have been those of sigma convergence and beta convergence (Barro and Sala-i-Martin, 1992). Sigma convergence analyses the dispersion of per capita income between economies, with convergence occurring if this dispersion is reduced over time. In beta convergence there is a negative correlation between the initial level of per capita income and the growth rate in subsequent years.

According to the latest data available from the Ministry of Labour and Social Economy (MITES), there were 11,673 cooperatives in Spain as of 30 June 2020, employing a total of 215,022 workers. According to their size, 77.9% of cooperatives have up to 10 workers and 0.8% of cooperatives are large enterprises employing more than 250 workers. If we look at their age, 43.5% of Spanish cooperatives were created since 2010, which means that they have been active for at least 12 years. Of these, 19% have been active for at least 22 years; the oldest, those created prior to 1960, represent 2.1% of the cooperatives currently registered. From the point of view of the sectors of activity, cooperativism is present in all aspects of the Spanish economy. The service sector stands out in particular, accounting for almost 70% of the jobs generated by cooperatives. The service sector is followed in terms of percentage of employment generated by the industrial and agricultural sectors, with construction being the sector of activity with the smallest presence of cooperatives. With regard to the territorial distribution of cooperatives, Andalusia stands out with 22.18% of Spain's cooperatives, followed by Catalonia (13.60%), the Valencian Community (9.98%), and the Basque Country (8.7%). These four regions, together with Castilla La Mancha (6.9%) and Castilla León (7.67%), account for 69.03% of the cooperatives in Spain.

One of the difficulties in obtaining the data necessary to carry out this research is the scarcity of sources of information on cooperatives that agree in terms of units of analysis, methodologies, and, above all, with continuity over time to allow an analysis from the time perspective. An example of the disparity of existing data is that the data in the Central Business Directory of the National Statistics Institute on the number of cooperatives and their descriptive characteristics (size and main activity) do not consider the agriculture, livestock, forestry and fishery sector. However, in some regions such as Murcia, the employment generated by cooperatives in the primary sector is particularly important. The Ministry of Agriculture, Fisheries, and Food does not have statistics regarding number of enterprises, including cooperatives, that could overcome this limitation of the Central Business Directory and serve as a complement to the economic indicators (physical and territorial environment, markets, marketing, or policies) that the Ministry does provide as a way of measuring the situation of the sector. In contrast, the Ministry of Labour and Social Economy (MITES) has data on employment generated by cooperatives, but it has stopped updating the annual series that used to provide it.

Bearing in mind these initial difficulties, the study of the convergence clubs of the Spanish regions in terms of employment generated by the cooperatives existing in each of them is carried out in the geographical scope of the 17 regions of the Spanish state (NUTS-2 level of Eurostat) during the 20-year time period between 1999 and 2019.

The technique of convergence clubs based on the proposal of Phillips and Sul (2007, 2009) is applied to a variable created ad hoc by the research team to consider in relative terms the employment generated by cooperatives in the Spanish regions under the General Social Security regime (excluding the self-employed regime) in relation to the employment (ECET) created by all companies regardless of their legal form (excluding self-employment) between 1999 and 2019. The variable used is:

$$ECET = \frac{Employment\ generated\ by\ the\ cooperatives\ in\ each\ region}{Total\ employment\ generated\ in\ each\ region}$$

The data on employment generated by cooperatives were obtained from the Social Economy Database of the Ministry of Labour and Social Economy (MITES) and the data on total employment generated in each autonomous community from the general statistics available at the Ministry of Labour and Social Economy.

3.2 | Methodology: Identification of convergence clubs

In this section we present the methodology used to analyze the convergence of cooperative employment relative to total employment (ECET) in Spanish regions between 1999 and 2019. The methodology developed by Phillips and Sul (2007) is a sigma convergence test applied to a panel of data. The variable under study $ECET_{it}$, the share of cooperative employment in total employment in our case, is often explained by two components:

$$logECET_{it} \approx \beta_i \, \mu_t \qquad (1)$$

where β_i is the component containing the systematic characteristics of each region, while μ_t represents the common trend in growth.

The contribution of Phillips and Sul (2007) is to add variation over time to the structural component so that the logarithm of the variable will be explained with a new decomposition:

$$logECET_{it} \approx \beta_{it}\mu_t \qquad (2)$$

where β_{it} attempts to explain the evolution of the share of cooperative employment in total employment (employed population) by measuring the share of the common growth path (μ_t) experienced by region i.

In this way, Phillips and Sul (2007, 2009) introduce a cross-sectional analysis as well as an analysis of heterogeneous time series in the parameters in order to take into account the heterogeneity of the time transition of the variable analyzed.

Starting from this idea and the panel data $ECET_{it}$ the variable under study, where $t = 1, 2,\ldots, T$ are the time values and $i = 1, 2,\ldots, N$ the regions. Then, the following steps are performed:

First, for each time t, the mean of the $ECET_{it}$, values is calculated, and each individual value is compared with this mean to obtain the values:

$$h_{it} = \frac{ECET_{it}}{\frac{\sum_{i=1}^{N} ECET_{it}}{N}} \qquad (3)$$

From here on, the panel of the h_{it} (3), will be used, and not with the initial data $ECET_{it}$.

Second, for each time t, the variance of the corresponding h_{it}, values is calculated using the formula:

$$H_t = \frac{\sum_{i=1}^{N} (h_{it} - 1)^2}{N} \qquad (4)$$

The reason for comparing each value with 1 is that, if there were convergence, all these values should converge to 1.

Finally, the absolute convergence hypothesis is based on the assumption that H_t tends to zero. This is done by fitting the data to a model of the type:

$$loglog \left(\frac{H_1}{H_t} \right) - 2log \, (loglog \, t) = a + \beta loglog \, t + u_t, \quad t = [rT], \, [rT] + 1, \ldots, T \qquad (5)$$

If $\beta < 0$, the absolute convergence hypothesis is rejected. Phillips and Sul (2007), based on Monte Carlo simulations, suggest using $r = 0.3$ for samples where $T < 50$.

Once β has been estimated, it is necessary to measure the reliability of the value obtained for this parameter with an appropriate statistic.

If the absolute convergence hypothesis is rejected, possible convergence clubs are identified by applying an iterative algorithm developed by Phillips and Sul (2007) at a 5% significance level. The iterative procedure for identifying convergence clubs is summarised in four steps:

First step (sort the panel data by cross-section): Convergence, even between clubs, is most evident in the final observations of the series. For this reason, the first step will be to sort the panel data from largest to smallest based on the observations of the latest period, in our case the year 2019.

Second step (formation of the convergence clubs of k^* regions): This involves selecting the k^* regions in the panel that will form each club. To do this, we start by forming groups of regions from the highest value of each variable in year 2019 so that the groups will be formed by a number of regions between $2 \leq k < N$. The log test regression is applied and the value of the log t test statistic is calculated for the first group, choosing the value of k^* that maximizes t_k according to the criterion (significance level 5%).

$$k^* = argarg\ max_k \{t_k\}\ conditional\ upon\ min\{t_k\} > -1,65 \qquad (6)$$

This is done for the first two regions; if it does not meet the criterion, it is done for the second and third, and continues until a couple of regions meet the criterion. If this does not happen, we can conclude that there are no convergence clubs in the panel data.

Third step (sieving the data to form the clubs): If in the previous step two regions meet the established criterion, we continue adding regions in the order in which they appear in the panel data as long as the criterion continues to be met. When the criterion is no longer met, we stop the process and have obtained the first club.

Fourth step (repeat and stop the rule): For the second club, start with the region that broke the rule in the first club, adding region after region as long as the criterion is met; again, when the criterion is broken, stop and start again. If there is no k in step 2 whose $t_k > -1,65$, these regions will be divergent.

The analysis of convergence in a panel of data has several relevant advantages. This model plots an individual trajectory for each region i relative to the mean value of the panel data so that degrees of convergence can be differentiated. The regression coefficient provides an estimator of the speed of convergence of ECET in each group or club of regions; specifically,[4] $\beta = 2\alpha$. In addition, we can estimate and plot the transition curves:

$$h_{it} = \frac{ECET_{it}}{\frac{\sum_{i=1}^{N} ECET_{it}}{N}} = \frac{\beta_{it}}{\frac{\sum_{i=1}^{N} \beta_{it}}{N}} \qquad (7)$$

so that the variable h_{it} is called the relative transition path, and plots both the individual path for each region i relative to the mean of the panel data and the path for each of the estimated clubs.

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[4] See Appendix B of Phillips and Sul (2007).

TABLE 1 Statistical analysis of the data on employment in cooperatives in relation to total employment by region (1999–2019).

Region	Average	Standard deviation	Maximum value	Minimum value	Average annual growth rate
Murcia	2.47%	0.31%	2.93%	1.81%	2.7%
Basque Country	2.20%	0.26%	2.67%	1.91%	1.8%
Valencia	2.19%	0.19%	2.67%	1.90%	0.1%
Andalusia	1.76%	0.14%	2.29%	1.57%	0.0%
Navarre	1.69%	0.37%	2.41%	1.28%	3.1%
Extremadura	1.59%	0.25%	2.09%	1.30%	−1.6%
Castilla-La Mancha	1.43%	0.13%	1.70%	1.25%	−0.9%
Aragón	0.97%	0.14%	1.24%	0.83%	−1.5%
La Rioja	0.96%	0.18%	1.30%	0.68%	−2.4%
Catalonia	0.90%	0.09%	1.12%	0.79%	−0.8%
Castilla-León	0.89%	0.09%	1.10%	0.78%	−1.1%
Canary Islands	0.75%	0.17%	1.07%	0.57%	−2.4%
Asturias	0.68%	0.10%	0.87%	0.54%	−1.3%
Galicia	0.67%	0.07%	0.83%	0.57%	−1.0%
Cantabria	0.47%	0.04%	0.53%	0.38%	−0.7%
Balearic Islands	0.39%	0.08%	0.48%	0.28%	−1.6%
Madrid	0.39%	0.02%	0.42%	0.35%	0.3%

Source: the authors.

4 | RESULTS

4.1 | Descriptive analysis

Our data show that employment in cooperatives as a proportion of total employment varies significantly among the different regions, reaching 2.93% in the region of Murcia as the maximum value and 0.28% in the Balearic Islands as the minimum value, as can be seen in Table 1. This table provides a brief descriptive analysis of the variable employment of cooperatives in relation to total employment (ECET) by region.

The results confirm the heterogeneity of ECET behavior among Spanish regions. Figure 1 shows the evolution of the variable by region, showing that Murcia, the Basque Country, Navarre, and Valencia occupy the first places in the share of employment in cooperatives for the period observed. However, while Murcia and the Basque Country have increased their participation rate, Navarre and Valencia have not, although this evolution has been irregular, as shown in Figure 1. On the other hand, regions such as Asturias, Galicia, Cantabria, the Balearic Islands, and Madrid have an employment participation in cooperatives of less than 1% in the period analyzed (Table 1).

If we look at Figure 2, we can see how the degree of dispersion of the ECET between regions measured by the Pearson coefficient of variation has increased over the period analyzed. We can therefore affirm that the behavior of the ECET among regions is increasingly divergent. The question we ask ourselves is whether this divergent behavior as a whole has some similar patterns of
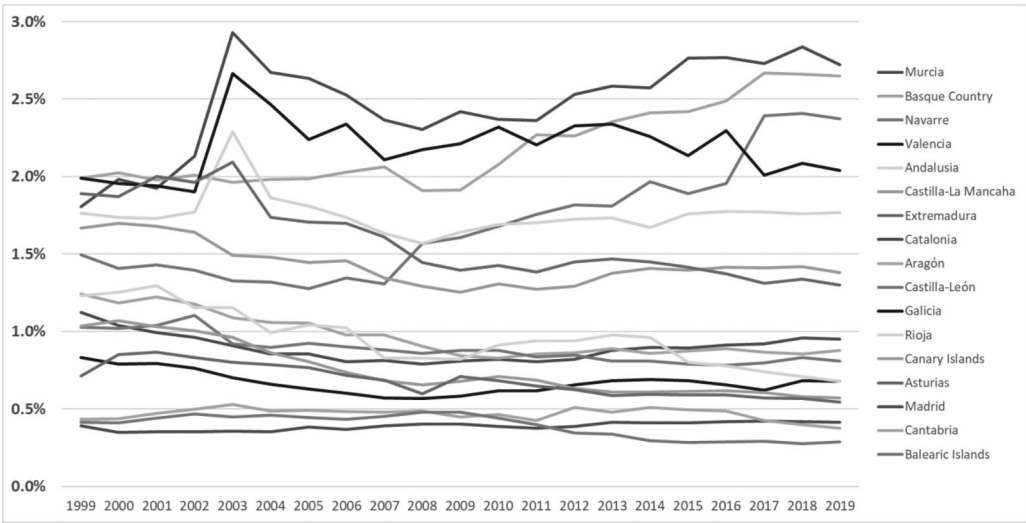
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FIGURE 1   Evolution of the share of employment in cooperatives in total employment by region.
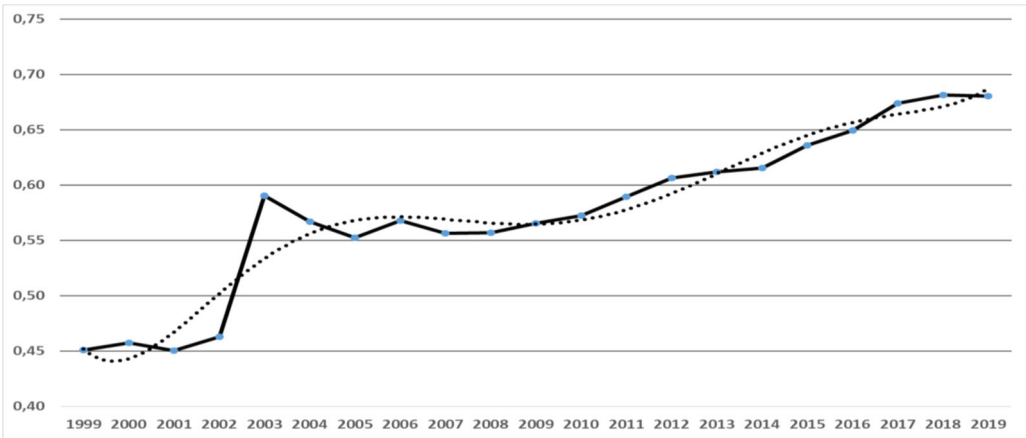
Source: the authors.

FIGURE 2   Degree of dispersion of the share of employment in cooperatives in total employment by autonomous region.

[Colour figure can be viewed at wileyonlinelibrary.com]

Source: the authors. * Pearson's coefficient of variation.

behavior across groups of regions, which is why we will apply the log t test (Phillips & Sul, 2007) to this panel of data.

4.2 | Differentiated behavior in the growth performance of cooperatives: Convergence clubs

In this section we present the results of applying the log t test (Phillips and Sul, 2007) to the panel data described in Section 3.1 (17 regions and 20 observations per region). Since we aim to analyze

TABLE 2 Classification of convergence clubs.

	Regions	*t* statistic	β	
	Total sample	−23.5465	−1.022	Cooperative employment participation in 2019
Club 1	Murcia, Basque Country, Navarre, Valencia, Andalusia	1.7948	0.2350	2.31%
Club 2	Castilla-La Mancha, Extremadura	4.5647	1.3293	1.34%
Club 3	Catalonia, Aragón, Castilla-León, Galicia, La Rioja	−1.0221	−0.1969	0.80%
Club 4	Canary Islands, Asturias, Madrid, Cantabria, Balearic Islands	−0.3351	−0.0556	0.44%

Source: the authors.

the evolution of the ECET of Spanish regions using the Phillips and Sul methodology, we apply the log t test to the ECET for the 17 regions over the period 1999–2019. The results of the application can be seen in Table 2. The hypothesis of total or absolute convergence is rejected at 5% since for the whole panel data the value of the t-statistic is well above the critical value of −1.65 (−23.5465). Thus, we reject the existence of convergent behavior in the evolution of the ECET variable across Spanish regions. However, we observe the existence of several convergence clubs (Table 2). The application of the Phillips and Sul algorithm identifies 4 statistically differentiated convergence clubs.

Both Table 2 and Figure 3 provide us with information for understanding how the ECET does not present homogeneous behavior between regions, but rather behavior in clubs, as we would expect. Club 1 shows the highest ECET, 2.31% in 2019, and is made up of Murcia, the Basque Country, Navarre, Valencia, and Andalusia. The transition curve for this club in Figure 3 shows how in the late 1990s and 2000 it coincided with club 2, but since 2001, they have had different and increasingly divergent transitions. This first club is the one with the second-highest speed of convergence ($\alpha = 0.1175$). Club 2 is formed by Castilla-La Mancha and Extremadura, showing an ECET of 1.34% in 2019, and has the highest speed of convergence ($\alpha = 0.6646$), which shows a similar behavior between the ECET of both regions in the period analyzed.

Club 3 is made up of the regions of Catalonia, Aragon, Castilla-León, Galicia, and La Rioja, with an ECET of 0.80%, the second-lowest among the clubs. Finally, club 4, with the lowest ECET (0.44%), is made up of the two archipelagos (Balearic and Canary Islands) together with Madrid, Asturias, and Cantabria. Figure 3 shows how, especially from 2008 onwards, the behavior of this last club diverges from the rest. Clubs 3 and 4 show the lowest degree of convergence (weak convergence). The value of the t-statistic, although negative, exceeds the critical value of -1.65, so that they converge at 5% significance.

4.3 | Transition curves

Phillips and Sul (2007) propose modeling the transition elements by constructing relative measures of these coefficients which, when plotted graphically, are called transition (club or region)

curves:

$$h_{it} = \frac{ECET_{it}}{\frac{\sum_{i=1}^{N} ECET_{it}}{N}} = \frac{\beta_{it}}{\frac{\sum_{i=1}^{N} \beta_{it}}{N}}$$
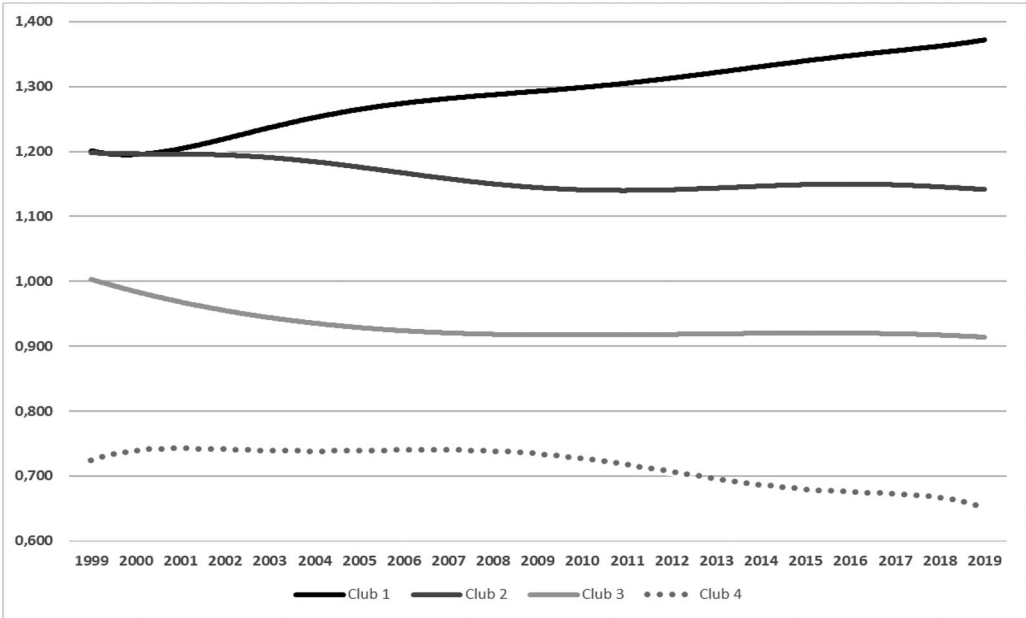

FIGURE 3 Transition curves of the clubs.
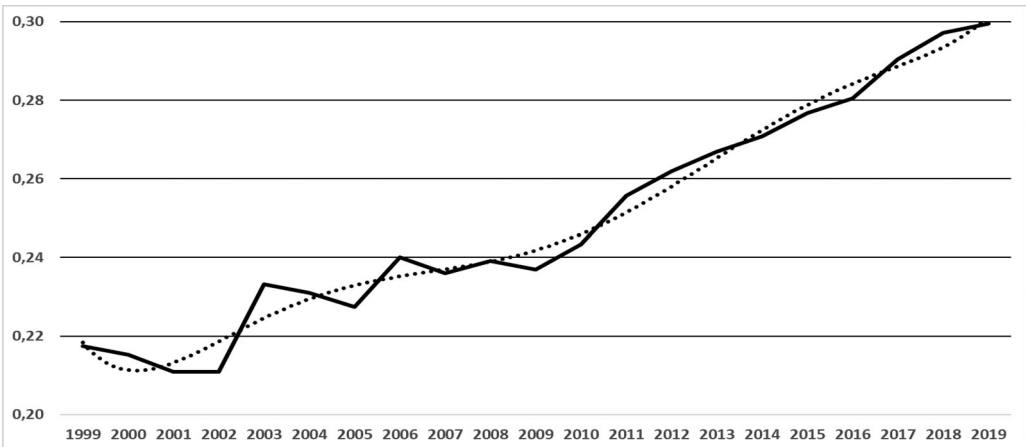*Source*: the authors.

FIGURE 4 Standard deviation among the hit clubs. The clubs of convergence.
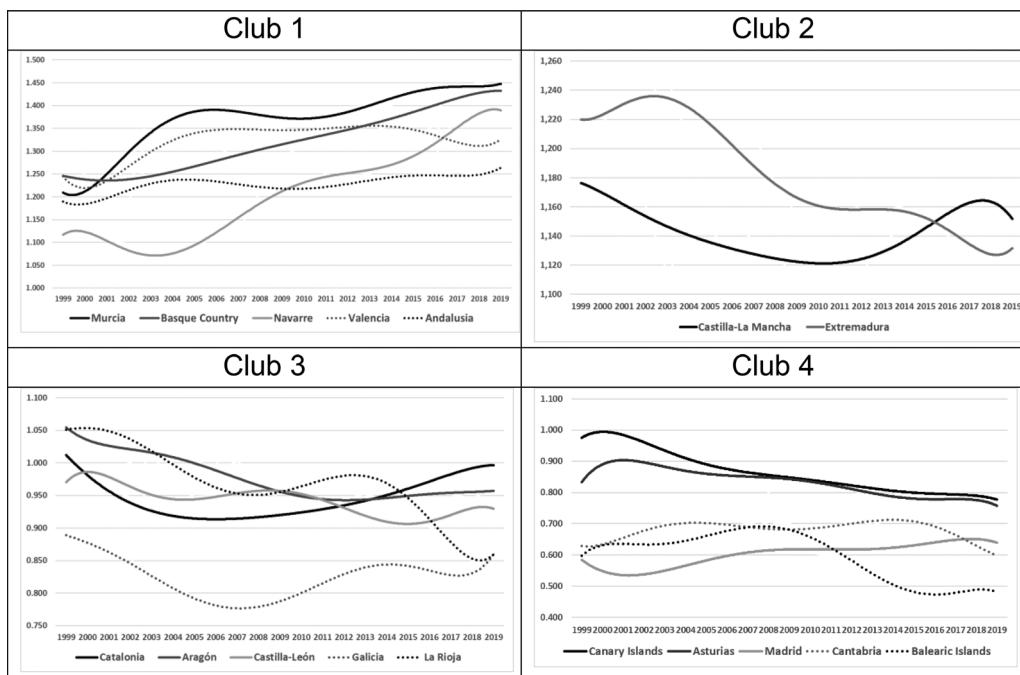*Source*: the authors.

FIGURE 5   Transition curves of the regions by club.
Source: the authors.

This measures the weighted coefficients relative to the panel data so that the variable is called the relative transition path, and plots an individual path for each region *i* relative to the average of the panel data. It thus measures the trajectory of each region or country *i* from the relative exit position toward the common growth path. When there is a common behavior in the growth path across regions a convergence club could exist within that group, and in the same way we could plot the common growth path of the club relative to the panel data. In our case this is seen in Figure 3. Under the assumption of absolute convergence for all regions, the transition curves should tend to unity, as all ECETs in each region converge to the same level. However, under the assumption of convergence clubs each club tends to different constants, some above and some below unity, as shown in Figure 3.

The growth paths of the individual clubs (Figure 3) show the trend of the clubs. Clubs 1 and 4 occupy opposite positions; while club 1 is clearly above average with an increasing trend. Club 4 is in the opposite situation, below average, and has a decreasing trend. Club 1 and club 2 in the first years (1999-2001) were the same club. From that moment, there is a divergent behavior between the regions that formed it and two new clubs appear; the first one, club 1, has had an increasing trend in ECET, while club 2 has shown a decrease, which has resulted in two clearly differentiated clubs. However, club 3 has been around the average and has maintained a relatively stable behavior.

The relative transition trajectories of the four clubs in Figure 3 show a slight trend away from unity, suggesting a smooth trend toward divergence among all clubs. This can be verified by looking at the values of the standard deviation of the hit between the four clubs at each point in time (Apergis et al., 2014). Figure 4 shows the standard deviation for each year of the hit values; this curve captures the dispersion of hit values among the clubs from 1999 to 2019. Therefore, the convergence of the hit values for each club leads to a higher standard deviation.

If we look at Figure 5, we can see the individual trajectory of each of the regions within the club to which they belong, confirming that there is a process of approximation between the ECETs in each club. This implies absolute convergence among the regions of each club, although with different convergence processes as the transition curves in each of the clubs present heterogeneous convergence patterns. Club 1 has a clear upward trajectory, while clubs 2 and 4 have a downward trajectory. The trajectory of club 3 seems to be more stable.

5 | CONCLUSIONS AND SUGGESTIONS FOR FUTURE RESEARCH

Cooperatives can become an economic policy tool (Díaz-Foncea & Marcuello, 2015) and an instrument of economic stabilization (Cancelo et al., 2022) and employment stabilization, especially in crisis times (García-Louzao, 2021; Vieta & Lionais, 2015). Hence, all the contributions linked to the employment they generate are of particular importance in any socioeconomic circumstance. It is with this in mind that this paper sets out to analyze the heterogeneity and convergence of employment in the cooperative sector compared to total employment in the different Spanish regions over the last 20 years.

5.1 | Cooperative employment in relation to total employment

The first conclusion that can be drawn from the results obtained in this study is that cooperative employment in relation to total employment in Spain has a maximum value in regions such as Murcia, the Basque Country, Valencia, Andalusia, and Navarre, with minimum value in regions such as the Balearic Islands and Madrid. Thus, the important role of cooperative employment is evident in regions such as Murcia and the Basque Country, especially in the primary and industrial sectors, respectively. On the contrary, in regions like Madrid and the Balearic Islands, with a great contribution of the service sector to their economies, the role of cooperative employment is much less important. Related to that, it should be noted that even though Madrid or the Balearic Islands are well positioned in the country's economy as a whole, cooperative employment in these regions is insignificant, as concluded by Pérez and Valiente (2017). These authors identified the same regions at the head of cooperative employment with respect to total employment in the country in 2013: Basque Country, Murcia, Navarra, Valencian Community and Andalusia. Furthermore, descriptive analysis confirms that the behavior of cooperative employment among the different regions, and over the period analyzed, is increasingly divergent as a whole.

These results confirm the heterogeneity of ECET behavior among Spanish regions and coincide to some extent with those of a study on the territorial impact of self-employment in the social economy in Spain by Pérez and Valiente (2015). These authors, applying cluster analysis, conclude that Murcia, as well as the Basque Country, Navarre, and Valencia, among other regions, stand out in the importance of collective self-employment above the Spanish average, both in 2007 and in 2013. The same authors detect a low level of self-employment generated in those two years in the Balearic Islands, together with the Canary Islands and Madrid. Díaz-Foncea and Marcuello (2014), in a study of the weight of cooperative employment in the total, also conclude that the Basque Country, Valencia, and Murcia are at the forefront in terms of cooperative employment, while Madrid, Cantabria, Galicia, and the Canary Islands are at the bottom of the Spanish regions in this respect.

5.2 | Convergence of cooperative employment related to total employment in the Spanish regions

In this context, this paper analyzed the degree of convergence of cooperative employment with respect to the total employment generated in the different Spanish regions applying the Phillips and Sul (2007) technique. The results suggest the existence of four clubs with different speeds of convergence. We obtained four clubs integrated by regions that present common behavioral features and trajectories in each, but differ among the clubs. The relative transition curves of the four clubs show a slight tendency to move away from unity, suggesting a smooth trend toward divergence among all the clubs. Club 1 shows a clear upward trajectory and a higher speed of convergence with the regions that contribute most to the development of cooperative employment: Murcia, the Basque Country, Navarre, Valencia, and Andalusia. At the other extreme, club 4, made up of the Canary Islands, Asturias, Madrid, Cantabria, and the Balearic Islands, shows a decreasing trend.

The causes of this divergence among groups of regions may be multiple and diverse, including their different economic and industrial development, their historical and cultural characteristics, and their regional policies (Díaz-Foncea & Marcuello, 2015). With regard to the legal and political framework, Murcia is one of the regions that has been most dynamic in terms of policy in promoting the social economy, according to Perard (2016). This may be part of the explanation for its integration in club 1 and its leading position in the data on employment in cooperatives in relation to total employment. It should be also noted that each region has its own legislation on cooperatives in addition to the state Law 27/1999 of 16 July 1999 on Cooperatives (BOE No. 170 of 17 July 1999), and its own policies to promote employment.

On the other hand, in relation to the economic development of each region and the importance of one sector over another, it can be concluded that club 1, with an increasing trajectory and greater convergence, is made up of eminently agricultural and industrial regions: Murcia, Valencia, Andalusia, and the Basque Country, with the Mondragon Cooperative Corporation (Arando et al., 2009) as an important employment catalyst. In contrast, club 4, with a decreasing trajectory, is made up of regions whose predominant sector of activity is the service sector: Madrid, the Balearic Islands or the Canary Islands, joined with Cantabria and Asturias. These results coincide, although using a different methodology, with those of Pérez and Valiente (2017). Sala-Ríos et al. (2020) also explain that Madrid has a significant presence of administration and services and that the Balearic Islands is one of the largest tourist destinations in Spain, which requires a large number of service companies. This same argument can be used to explain the inclusion of the Canary Islands in this same club, where the service sector seems to predominate. Díaz-Foncea and Marcuello (2015) find a positive and significant effect of a region's service sector on the creation of capitalist enterprises, but it is not observable in the creation of cooperatives. This leads us to think of a relationship between the greater weight of cooperative employment in those regions with a more dynamic economy. Conversely, there is a lower weight of cooperative employment in those with a less dynamic economy, with the exception of Madrid.

Taking into consideration cultural traits, Sala-Ríos et al. (2020) attribute to these two clubs (1 and 4), which seem to be opposite in terms of the employment behavior of their cooperatives with respect to total employment, a high and a low cooperative culture, respectively, which could also partly explain these results. Thus, regions with important cooperative cultures such as Murcia, Valencia, or Andalusia have a higher development of cooperative employment compared to regions with less cooperative culture such as Madrid.

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In addition to the possible exogenous reasons put forward, it may be that in these two clubs (1 and 4), with such contrasting cooperative employment behavior in relation to total employment, cooperatives (and capitalist enterprises) of very different size and age predominate. Perhaps club 1 is dominated by older and larger cooperatives than club 4, capable of overcoming crises such as that of 2008 with a greater capacity for innovation, a greater international presence, or greater financial solvency, such as the Mondragon cooperative in the Basque Country.

It should also be noted that club 4 includes the two archipelagos (the Canary Islands and the Balearic Islands) with low or very low rates of employment in cooperatives as a proportion of the total and with negative average annual employment growth rates, which may indicate that insularity (historical communication problems and transport difficulties) also has its effects on the development of employment in these fields, as recognized by Díaz-Foncea and Marcuello (2015).

In short, cooperative employment does not show a homogeneous pattern of behavior among the different regions considered, but rather within the different clubs, which in turn tend to diverge slightly. Club 1 shows a clear upward trend, Clubs 2 and 4 a downward trend, and Club 3 seems to have a more stable trend. This territorial heterogeneity makes it difficult to establish an explanatory model of the behavior of cooperative employment for the whole of Spain over the 20 years analyzed. It is necessary to carry out a diagnosis by territory in order to identify the drivers of development and the characteristics and potential of each of them, with the aim of designing and applying measures to enable the development of employment in general and cooperative employment in particular.

5.3 | Future research

In addition to the above contributions, this work fills an important gap from a methodological point of view, not only by applying the Phillips and Sul (2007, 2009) technique to cooperatives, but also by considering a regional context for its application and a time horizon of 20 years. An added value lies in the lines of work that are opened up by these results. Firstly, future development of this work should be aimed at completing the time series analyzed and observing the future behavior of the clubs defined in the study and their convergence in the regions. Particularly interesting and important to analyze will be the years directly linked to the COVID-19 pandemic, 2020 and 2021, as well as subsequent years. We believe that both the contribution of cooperatives to regional development and the exceptional nature of the current situation suggest that competent bodies make the effort to continue the publication of the time series on cooperatives that was interrupted at the beginning of 2020.

Once the convergence clubs of the Spanish regions have been obtained in terms of the employment generated by their cooperatives, another line of research to be developed will undoubtedly be to identify the circumstances, contexts, and features that characterise each club and differentiate them from one another. In this way, it should be possible to obtain the explanatory variables of a region relative to one club or another. Economic policies for regional development could thus be identified or strengthened in order to improve convergence in terms of employment in certain territories. In this sense, instrumental variables such as the active population of the regions could be included or the sectoral effect could be introduced in the analysis of the convergence of cooperative employment. The employment considering the type of cooperative could also be studied in greater depth. For example, the employment of worker or agricultural cooperatives, could be studied because they greatly contribute to cooperative employment.

Given the importance of knowledge and innovation in the processes of economic convergence and employment, another line of inquiry could focus on the role of cooperatives in innovative development compared to the total number of companies in the different Spanish regions and on the type of innovation developed by them compared to the total. Thus, it would be possible to determine in which regions the cooperatives contribute most to innovation and in which cooperatives they contribute the least; what type of innovation predominates in each of the regions; and what characterises each of these regions. Perhaps in this case there is greater homogeneity among regions and a greater degree of convergence than in the case of employment or, on the contrary, there may have been many more divergent trajectories than those detected in the case of cooperative employment over the last 20 years.

Finally, given the heterogeneity and territorial divergence detected in cooperative employment compared to global employment in this work, it is necessary to delve more deeply into the cooperative model of each region considered, as well as their characteristics and territorial specificities, in order to establish and develop strategic lines of action.

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REFERENCES

Alburquerque-Llorens, F. (1998). Espacio, territorio e instituciones de desarrollo económico local. *Quivera Revista de Estudios Territoriales*, *1*, 77–95.

Apergis, N., Christou, C., & Miller, S. (2014). Country and industry convergence of equity markets: International evidence from club convergence and clustering. *North American Journal of Economics and Finance*, *29*, 36–58.

Apergis, N., & Garzón, A. J. (2020). Greenhouse gas emissions convergence in Spain: Evidence from the club clustering approach. *Environmental Science and Pollution Research*, *27*(31), 38602–38606.

Arando, S., Peña, I., & Verheul, I. (2009). Market entry of firms with different legal forms: An empirical test of the influence of institutional factors. *International Entrepreneurship and Management Journal*, *5*(1), 77–95.

Barrios, C., Flores, E., & Martínez, M. Á. (2018). Technological capabilities and patterns of income convergence in Europe: A cluster analysis. *Revista de Economía Mundial*, *50*, 129–152.

Barrios, C., Flores, E., & Martínez, M. Á. (2019). Club convergence in innovation activity across European regions. *Papers in Regional Science*, *98*(4), 1545–1565.

Barro, R. J., & Sala-i-Martin, X. (1992). Convergence. *Journal of Political Economy*, *100*(2), 223–251.

Bartkowska, M., & Riedl, A. (2012). Regional convergence clubs in Europe: Identification and conditioning factors. *Economic Modelling*, *29*(1), 22–31.

Bel Durán, P. B., & Ausín, J. M. (2007). Contribución de las sociedades cooperativas al desarrollo territorial. *REVESCO. Revista de Estudios Cooperativos*, *92*, 41–71.

Ben-Ner, A. (1988). The life-cycle of worker-owned firms in market economies. A theoretical analysis. *Journal of Economic Behavior and Organization*, *10*(3), 287–313.

Billiet, A., Dufays, F., Friedel, S., & Staessens, M. (2021). The resilience of the cooperative model: How do cooperatives deal with the COVID-19 crisis? *Strategic Change*, *30*(2), 99–108.

Borsi, M. T., & Metiu, N. (2015). The evolution of economic convergence in the European Union. *Empirical Economics*, *48*(2), 657–681.

Borzaga, C., Carini, C., & Tortia, E. C. (2021). Co-operative enterprise anti-cyclicality and the economic crisis: A comparative analysis of employment dynamics in Italy. *Annals of Public and Cooperative Economics*, *93*(3), 551–577.

Cancelo, M., Vázquez, E., & Díaz-Vázquez, M. R. (2022). Impacto de la crisis de la Covid-19 en el empleo de las cooperativas y sociedades laborales en España en el año 2020: Un análisis shift-share sectorial. *CIRIEC-España, Revista de Economía Pública, Social y Cooperativa*, *104*, 35–64.

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Cantarero, S., González-Loureiro, M., & Puig, F. (2017). Efectos de la crisis económica sobre el emprendimiento en empresas de economía social en España: Un análisis espacial. *REVESCO. Revista de Estudios Cooperativos*, *125*, 24–48.

Castellacci, F., & Archibugi, D. (2008). The technology clubs: The distribution of knowledge across nations. *Research Policy*, *37*(10), 1659–1673.

Chaves, R. (2015). La economía social en España: Concepto, agentes y políticas públicas. In J. M. Pérez de Uralde (Ed.), *La economia social en Iberoamérica. Un acercamiento a su realidad*. Fundación Iberoamericana de Economía Social. Madrid.

Clemente López, J. C., Día Foncea, M., & Marcuello Servos, C. (2009). Sociedades cooperativas y sociedades laborales en España: Estudio de su contribución a la creación de empleo y al crecimiento económico. *REVESCO. Revista de Estudios Cooperativos*, *98*, 35–69.

Costa, M., Delbono, F., & Linguiti, F. (2022). Cooperative movement and widespread prosperity across Italian regions. *Annals of Public and Cooperative Economics*, accepted for publication, 1–20.

Díaz-Foncea, M., & Marcuello, C. (2010). The relation between total employment and cooperative employment: A convergence and causality analysis. *Spatial Economic Analysis*, *9*(1), 71–92.

Díaz-Foncea, M., & Marcuello, C. (2015). Spatial patterns in new firm formation: Are cooperatives different? *Small Business Economics*, *44*, 171–187.

Di Maggio, U., Notarstefano, G., & Terzo, G. (2020). The spatial determinants of employment growth in the cooperative sector: An analysis of Italian provinces. *Rivista Italiana di Economia Demografia e Statistica*, 74(3/4).

Díaz-Foncea, M., & Marcuello, C. (2014). The relation between total employment and cooperative employment: a convergence and causality analysis. *Spatial Economics Analysis*, *9*(1), 71–92.

Durlauf, S. N., & Johnson, P. A. (1995). Multiple regimes and cross-country growth behavior. *Journal of Applied Econometrics*, *10*(4), 365–384.

Galor, O. (1996). Convergence? Inferences from theoretical models. *The Economic Journal*, *106*(437), 1056–1069.

García-Louzao, J. (2021). Employment and wages over the business cycle in worker-owned firms: Evidence from Spain. *British Journal of Industrial Relations*, *59*(2), 418–443.

Garofoli, G. (1995) Desarrollo económico, organización de la producción y territorio. In A. Vázquez & G. Garófoli (Eds.), *Desarrollo económico local en Europa*, 113–123. Madrid: Colegio de Economistas.

González, M. C. B., Varo, E. F., & Navarro, M. Á. M. (2017). Patrones de convergencia en las regiones españolas: Una aplicación de la metodología de Phillips-Sul. *Revista de Estudios Regionales*, *109*, 165–190.

Grávalos, M. A., & Pomares, I. (2001). Cooperativas, desempleo y efecto refugio. *REVESCO, Revista de Estudios Cooperativos*, *74*, 69–84.

Guzmán, C., Santos, F. J., & Barroso, M. D. L. O. (2020). Analysing the links between cooperative principles, entrepreneurial orientation and performance. *Small Business Economics*, *55*, 1075–1089.

Howitt, P., & Mayer-Foulkes, D. (2005). R&D, implementation and stagnation: A Schumpeterian theory of convergence clubs. *Journal of Money Credit and Banking*, *37*(1), 147–177.

International Cooperative Alliance (1995). Statement on the Cooperative Identity. Retrieved from https://www.ica.coop/en/cooperatives/cooperative-identity. Accessed April 18, 2023.

Juste Carrión, J. J., Gómez García, J. M., & Fernández Arufe, J. E. (2011). Economía social y desarrollo local/rural. Un análisis de sus sinergias. *Estudios de Economía Aplicada*, *29*, 189–222.

Lampel, J., Bhalla, A., & Jha, P. (2012). The employee owned business model during growth and adversity: How well does it hold up? *European Business Review*, July-August, 20–23.

López-Mendoza, H., Montañés, A., & Moliner-Lahoz, F. J. (2021). Disparities in the evolution of the COVID-19 pandemic between Spanish provinces. *International Journal of Environmental Research and Public Health*, *18*(10), 5085.

Lucas, R. (1988). On the mechanics of economic development. *Journal of Monetary Economics*, *22*, 3–42.

Mcquaid, R., Canduela, J., Edgell, V., & Dutton, M. (2013). The growth of employee owned business in Scotland. Report by the Employment Research Institute, Edinburgh Napier University.

Monfort, M., Cuestas, J. C., & Ordóñez, J. (2013). Real convergence in Europe: A cluster analysis. *Economic Modelling*, *33*, 689–694.

Monzón, J. L. (2013). Empresas sociales y economía social: Perímetro y propuestas metodológicas para la medición de su impacto socioeconómico en la UE. *Revista de Economía Mundial*, *35*, 151–163.

Novkovic, S. (2008). Defining the co-operative difference. *The Journal of Socio-Economics*, *37*(6), 2168–2177.

Park, R., Kruse, D., & Sesil, J. (2004). Does employee ownership enhance firm survival? *Advances in the Economic Analysis of Participatory and Labor-Managed Firms*, *8*, Employee Participation, Firm Performance and Survival, 3–33.

Perard, P. (2016). La crisis ¿una oportunidad para la Economía Social? *Estudios de la Fundación. Serie Economía y Sociedad*. FUNCAS.

Pérez, M. C., & Valiente, L. (2015). Impacto territorial del autoempleo en la economía social en España. *CIRIEC-España, Revista de Economía Pública, Social y Cooperativa*, *83*, 83–114.

Pérez, M. C., & Valiente, L. (2017). La localización sectorial del cooperativismo: una aproximación a nivel territorial español. *REVESCO. Revista de Estudios Cooperativos*, *123*, 198–224.

Pérez, M. C., & Valiente, L. (2020). The "business–territory" relationship of cooperative societies as compared to the conventional business sector in the region of Andalusia. *Annals of Public and Cooperative Economics*, *91*(4), 565–583.

Phillips, P. C., & Sul, D. (2007). Economic transition and growth. *Journal of Applied Econometrics*, *24*(7), 1153–1185.

Phillips, P. C., & Sul, D. (2009). Transition modeling and econometric convergence test. *Econometrica*, *75*(6), 1771–1855.

Postiglione, P., Benedetti, R., & Lafratta, G. (2010). A regression tree algorithm for the identification of convergence clubs. *Computational Statistics and Data Analysis*, *54*, 2776–2785.

Puusa, A., Hokkila, K., & Varis, A. (2016). Individuality vs. communality. A new dual role of co-operatives? *Journal of Co-operative Organization and Management*, *4*(1), 22–30.

Rodríguez, D., López, F., & Mendoza, M. A. (2016). Clubs de convergencia regional en México: Un análisis a través de un modelo no lineal de un solo factor. *Investigaciones Regionales*, *34*, 7–22.

Roelants, B., Dovgan, D., Eum, H., & Terrasi, E. (2012). The Resilience of The Cooperative Model. CECOP-CICOPA. Brussels, Belgium.

Romer, P. (1986). Increasing returns and long run growth. *Journal of Political Economy*, *94*, 1002–1036.

Sala-Ríos, M. (2022). Análisis del comportamiento de las cooperativas: De la Gran Recesión a la crisis del COVID-19. *Revesco*, *142*, 1–18.

Sala-Ríos, M., Torres, T., & Farre, M. (2015). El empleo de las cooperativas. Un análisis comparativo de sus fases cíclicas y de su grado de sincronización. *CIRIEC-España, Revista de Economía Pública, Social y Cooperativa*, *83*, 115–141.

Sala-Ríos, M., Farré-Perdiguer, M., & Torres-Solé, T. (2020). Los ciclos del empleo de las cooperativas en España. ¿Importa la localización regional? *REVESCO. Revista de Estudios Cooperativos*, *136*, 1–25.

Solow, R. M. (1956). A contribution to the theory of economic growth. *Quarterly Journal of Economics*, *70*(1), 65–94.

Spear, R. (2000). The co-operative advantage. *Annals of Public and Cooperative Economics*, *71*(4), 507–523.

Swan, T. W. (1956). Economic growth and capital accumulation. *Economic Record*, *32*, 334–361.

Tarazona, P., & Albors, J. (2005). La economía social y el desarrollo local. *Revista Noticias del CIDEC*, *45*, 70–75.

Tian, X., Zhang, X., Zhou, Y., & Yu, X. (2016). Regional income inequality in China revisited: A perspective from club convergence. *Economic Modelling*, *56*, 50–58.

Vázquez Barquero, A. (2000). Desarrollo económico local y descentralización: Aproximación a un marco conceptual. Proyecto CEPAL/GTZ "Desarrollo económico local y descentralización". Santiago de Chile.

Vieta, M., & Lionais, D. (2015). The cooperative advantage for community development. *Journal of Entrepreneurial and Organizational Diversity*, *4*(1), 1–10.

Von Lyncker, K., & Thoennessen, R. (2016). Regional club convergence in the EU: Evidence from a panel data analysis. *Empirical Economics*, *52*(2), 525–553.

Wulandhari, N. B. I., Gölgeci, I., Mishra, N., Sivarajah, U., & Gupta, S. (2022). Exploring the role of social capital mechanisms in cooperative resilience. *Journal of Business Research*, *143*, 375–386.

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