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Convergence in social well-being: Are Spanish regions closing the gap?

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Abstract:

The literature on Quality of Life (QoL) and Subjective Well Being (SWB) highlights the idea that economic indicators, such as GDP, do not provide an accurate account of the real progress of societies. We study the evolution of social progress through several social indicators for the 17 Spanish regions during the period 2008-2020. In searching for patterns of convergence, we apply the club convergence approach. The data available point to the existence of three clubs for the indicators considered: material conditions and QoL. Therefore, there are no signs of global convergence. The analysis of the data also reveals that some of the richest regions in terms of GDP (Madrid and Cataluña), achieve only moderate results in terms of quality of life. Some policy recommendations arise from comparing the evolution of well-being and GDP per capita.

Keywords: Quality of life; subjective well-being; convergence; Spain.
JEL Classification: I30; D60; H50.

Convergencia en el bienestar social: ¿Están las regiones españolas cerrando la brecha?

Resumen:

La literatura sobre la calidad de vida (QoL, por sus siglas en inglés) y el bienestar subjetivo (SWB) resalta la idea de que los indicadores económicos, como el PIB, no ofrecen una representación precisa del progreso real de las sociedades. En este trabajo estudiamos la evolución del progreso social a través de varios indicadores sociales para las 17 regiones españolas durante el período 2008-2020. En la búsqueda de patrones de convergencia, aplicamos el enfoque de convergencia por clubes. Los datos disponibles apuntan a la existencia de tres clubes para los indicadores considerados: condiciones materiales y calidad de vida. Por lo tanto, no hay señales de convergencia global. El análisis de los datos también revela que algunas de las regiones más ricas en términos de PIB (Madrid y Cataluña) solo alcanzan resultados moderados en términos de calidad de vida. Algunas recomendaciones de política surgen al comparar la evolución del bienestar y del PIB per cápita.

Palabras clave: Calidad de vida; bienestar subjetivo; convergencia; España.
Clasificación JEL: I30; D60; H50.

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1. Introduction

The literature on Quality of Life (QoL) and Subjective Well Being (SWB) highlights the idea that traditional economic indicators, such as GDP, cannot provide an accurate account of the real progress of societies (Noll, 2004; Adler and Seligman, 2016). Mainstream economists may find surprising that even the creator of the GDP, Simon Kuznets, almost one century ago, challenged the interpretation of this construct as a measure of social progress: "the welfare of a nation can scarcely be inferred from a measurement of national income" (Kuznets, 1934: 7). In the 1970s, Easterlin (1974), Andrews and Withey (1976), Campbell (1976) and Campbell *et al.* (1976) showed that the evolution of subjective well-being did not reflect the evolution of economic growth, what is known as the "Easterlin paradox". More specifically, while there usually exists a positive correlation between income and perceptions of well-being at a given period, over time the correlation is not significant[1]. These findings came to question again the value of macro aggregates of production as meaningful indicators of social progress. Nobel laureate Amartya Sen describes this beautifully in his capabilities approach to welfare. For Sen (1985) the intrinsic value of the standard of living lies in *living*, and not in the resources that one can accumulate or control.

The limitations of income as an indicator of progress led the United Nations to develop the Human Development Index (HDI) in the 1990s. This composite indicator measured the degree of development of countries, by combining health status and education attainment with GDP figures. The academic interest in QoL composite indicators (such as the HDI) increased greatly after the publication of the well-known and influential report of the French Commission on the Measurement of Economic Performance and Social Progress (Stiglitz *et al.*, 2010). If the objective is to provide an accurate picture of the welfare reality of a population, then social and environmental dimensions should be added to material conditions variables (Costanza *et al.*, 2009; Fitoussi and Stiglitz, 2011). In 2013, the OECD started to publish the Better Life Index, which addresses social welfare for countries through a combination of 11 dimensions that include material conditions variables (housing, income and jobs), QoL variables (community, education, environment, civic engagement, health status, safety and work-life balance) and a measure of SWB (life satisfaction). Other leading institutions, such as the European Statistical System (ESS), recommended a similar framework comprising 8+1 dimensions, urging the national statistical systems of European countries to develop statistical sources for collecting this information. QoL was approached by material conditions, productive or main activity, health, education, leisure and social interaction, economic and physical safety, governance and basic rights and natural and living environment. The remaining indicator measures SWB with a variable assessing the *overall experience of life*. This framework has been adopted by the Spanish Statistical System (Instituto Nacional de Estadística-INE), which recently released a multidimensional index of QoL that covers the 8+1 dimensions proposed by the ESS. Disaggregated data for all the dimensions is now available for each of the 17 Spanish regions (Autonomous Communities), from 2008 to 2020. The INE also constructs a composite multidimensional index by applying an equal weighting aggregator to the 9 partial dimensions.

Academic attempts to address the measurement of QoL in Spain have been intense during the last 20 years. At the local level of analysis, initial disperse studies explored the issue in specific provinces or regions, such as Rayuela and Artís (2006) for Barcelona, Zarzosa (2005) for Valladolid or López and Sánchez (2009) for Galicia. The most comprehensive study at the local level considered all the Spanish territory and estimated composite indicators of QoL for the 393 largest municipalities along the period 2001-2011 (Cárcaba *et al.*, 2017). González *et al.* (2017) focused on the evolution of municipal social progress during the same decade. Navarro-Azorín and Artal-Tur (2015) followed a different approach, based on the analysis of migration patterns across municipalities. In turn, the regional level of analysis has received considerable attention. Somarriba and Pena (2008), Murias *et al.* (2010), Jurado and Pérez-Mayo (2012), Portela and Neira (2012), Zarzosa and Somarriba (2013) or, more recently, De Maya-Matallana

[1] The Easterlin paradox only points to the absence of correlation between income and happiness in the long run. The existence of positive correlation in the short run opens the debate about the direction of causality. The evidence in the literature is mixed. For instance, Graham *et al.* (2004) found support for reverse causality (i.e., happier people is able to make more income), while Powdthavee (2010) reports the opposite effect. Clark (2017) provides an excellent discussion of the complexities underlying this relationship.

et al. (2022) measured Spanish regional well-being with different composite indicators. The intermediate provincial level was also examined in detail by Peiró-Palomino *et al.* (2019).

The efforts done at measuring QoL in Spain contrast with the scant attention paid to the issue of convergence. The availability of the INE data set provides a good opportunity to explore territorial convergence in material conditions and QoL in the 21st century. Unfortunately, the limited data available for SWB does not allow to perform a reliable convergence analysis for that indicator. Our data covers the period 2008-2020, which is characterized by the negative effects of the 2008 world financial crisis, the fast economic recovery experienced from 2014, and the outbreak of the COVID-19 pandemic in early 2020.

Spain is an interesting country for studies on regional convergence due to its high degree of decentralization and the role of different levels of government. In addition, our study also contributes to the QoL literature, being the first paper (to our knowledge) that employs the club convergence approach developed by Phillips and Sul (2007; 2009). This method finds endogenously the clusters of regions sharing common patterns. Although our results do not show overall convergence among the Spanish regions, we were able to identify three convergence clubs for the Material conditions (MC) and Quality of Life (QoL) constructs.

The paper is structured as follows. Next section reviews past literature on regional convergence in Spain. The methodology and data are described in Section 3. Section 4 contains the results from the club convergence analysis. Finally, concluding remarks are presented in Section 5.

2. Regional convergence in Spain

A large proportion of the literature on regional convergence has focused on economic variables such as income or GDP. Our objective in this paper is to explore regional convergence using different well-being constructs, such as QoL. The literature shows important differences when convergence is measured exclusively with income variables or in terms of QoL. At a global scale, the traditional literature on economic convergence has found mixed evidence of convergence in real GDP per capita (Hobijn and Frances, 2001; Cole and Neumayer, 2003). However, when living standards are considered, instead of income variables, the literature points to convergence across nations. Focusing on the European Union countries, Giannias *et al*. (1999) report economic and social convergence between 1970 and 1990. In contrast, Hobijn and Frances (2001) find no evidence of convergence in living standards between low income and high income countries in the world between 1965 and 1990, although they focus exclusively on health-related variables, some of which are doubtful as indicators of standards of living (e.g., daily calorie intake). Those results were critically challenged by Neumayer (2003), who used a large data set of countries, variables and periods to assess convergence between 1960 and 1999. The results contain strong evidence of convergence on QoL variables, including health, education and access to technology. Giles and Feng (2005) conclude that convergence in output is not associated with convergence in well-being for OECD countries, and Welsch and Bonn (2008) find evidence of convergence in life satisfaction (SWB) across the European member states. Decancq *et al.* (2009) also find robust evidence of convergence on the Human Development Index across 97 nations for the period 1975-2000.

Regional studies of convergence have also examined QoL indicators. Royuela and García (2015) find evidence of regional convergence in Colombia during the period 1975-2005 on key social variables, such as education or health, but not regarding GDP per capita. Signs of convergence in QoL within the Colombian region of Medellin are also reported by Moncada and Hincapié (2013). In the same manner, Ginajar *et al*. (2020) find positive convergence of human development in the provinces of Indonesia between 2010 and 2019. More recently, Cardoso de Almeida *et al*. (2021) studied convergence across Brazilian states from 1990 and 2010. While they find no signs of convergence in income, convergence is strong in variables such as life expectancy or literacy rates. Finally, both economic and social convergence are documented in Carrington and Jiménez-Ayora (2021) for Ecuador.

As for the case of Spain, Marchante and Ortega (2006) analyzed regional convergence in QoL from 1980 to 2001. While there are no signs of convergence on material conditions, they provide evidence of convergence trends in many of the QoL variables employed. Therefore, they conclude that a strong process

of convergence occurred regarding the human development of regions, highlighting the achievements of the public sector as provider of education and health provision with a norm of equality across territories.

Below the regional level of analysis, Royuela and Artís (2006) found evidence of convergence in both income and QoL in a sample of urban areas within the Spanish province of Barcelona from 1991 to 2000. In a comprehensive study of the evolution of QoL in Spain during the period 2001-2011, González *et al.* (2017) measured an index of social progress for the largest municipalities. The index was then decomposed into a frontier shift effect (global progress) and a catching-up effect (convergence). The results show positive catching-up effects for the great majority of the municipalities analyzed, with an average of 2.5%. Furthermore, the worst municipalities in 2001 experienced the largest convergence effects in 2011. The frontier shift was also important, with an average improvement of 2.8%.

More recently, Peiró-Palomino and Picazo-Tadeo (2018) explored the effects of the Great Recession, comparing measures of material conditions and well-being in Spanish provinces, corresponding to periods 2000-2007 and 2008-2014 (i.e., before and after the financial crisis of 2008). Their results point to an overall general deterioration of material conditions after the crisis and a more uneven distribution of this variable across the territory. However, their index of well-being remained stable. Therefore, they provide evidence of divergence in material conditions and stability in well-being, during an intense episode of financial crisis, which led to a great recession.

To sum up, past evidence in Spain, suggests a faster path of convergence in well-being and QoL than in material conditions across territories. There are good reasons to expect stronger convergence patterns in QoL variables than in GDP per capita; the first reason is that many QoL variables are bounded by construction (Neumayer, 2003). For instance, infant mortality cannot improve below 0% and literacy rates cannot be larger than 100%. The second is that, even if those limits are not achieved, as a country gets closer to them it is increasingly difficult to improve further, which favors catching-up. In contrast, GDP is unbounded and rich countries can improve at a faster path than poor countries if mobility of resources and people is limited.

Based on the results reported in past research, we expect to find a trend towards convergence in well-being constructs. Our approach is innovative in several ways with respect to past literature. First, we use different constructs of social progress, such as material conditions and QoL, and compare the results to those obtained with GDP. Unfortunately, we cannot assess convergence on SWB since there are only two periods available for this variable in the dataset. Second, we apply a novel methodology, club convergence, which endogenously identifies clubs of convergence from the data without a priori assumptions.

3. Methodology and data

Phillips and Sul (2007, 2009) propose the *logt* test[2] in order to analyze convergence in a panel data set. The variable under consideration is y_{it}, $i = 1, 2, \ldots, N$ and $t = 1, \ldots, T$ (with N being the number of regions and T the sample size), and they focus on the dynamic factor formulation:

$$y_{it} = b_{it}\mu_t \tag{1}$$

being b_{it} the transition path of the economy i to the common steady-state growth component, represented by μ_t.

Transition coefficients b_{it} can be empirically analysed using the relative transition path, h_{it}, that traces out an individual trajectory over time for economy i relative to the panel average, removing the common growth path:

[2] Among the advantages of the method are the following: 1) it allows for endogenous determination of clustering groups; 2) it allows for heterogeneity of objects along different time paths, so that different transitions can occur; and 3) there is no need to depend on the specific assumptions involved.

$$h_{it} = \frac{y_{it}}{N^{-1}\sum_{i=1}^{N} y_{it}} = \frac{b_{it}}{N^{-1}\sum_{i=1}^{N} b_{it}} \quad (2)$$

In presence of convergence, that is, when all economies move toward the same transition path, $h_{it} \rightarrow 1$ for all i as $t \rightarrow \infty$, and the cross-sectional variance of h_{it} ($H_t = N^{-1}\sum_{i=1}^{N}(h_{it}-1)^2$) converges to zero asymptotically.

Based on the above result, Phillips and Sul (2007, 2009) propose the *logt* convergence test, which builds on estimating by OLS (with heteroskedasticity and autocorrelation consistent[3] -HAC- standard error estimates) the following equation:

$$\log\left(\frac{H_1}{H_t}\right) - 2\log(\log(t)) = c + \gamma \log(t) + u_t \quad (3)$$

for t=[rT], [rT]+1,…,T, being [rT] the integer part of rT (with r>0); concretely, r=0.3 is suggested for T≤50, so the initial 30% of observations are discarded.

Under convergence, the least squares estimator of γ converges in probability to the scaled speed of convergence parameter[4] (2α), and the null of convergence is tested by a one-sided t test of $\gamma \geq 0$, which is rejected at the 5% significance level if the t-statistic is below -1.65 ($t_{\hat{\gamma}} < -1.65$). Furthermore, given the relationship $\gamma = 2\alpha$, the case $0 \leq \gamma < 2$ ($0 \leq \alpha < 1$) implies *relative convergence* (convergence over time in growth rates), whereas $\gamma \geq 2$ ($\alpha \geq 1$) means *absolute convergence* (convergence in level).

When the null hypothesis of convergence is rejected for the whole panel, a four-step clustering algorithm[5] based on the *logt* test can be applied in order to identify endogenously convergence clubs (i.e. specific subgroups that converge). The details of the algorithm can be found in Phillips and Sul (2007).

The data employed in this paper comes from a database released by the Spanish Statistical Office (INE) in 2021. The data contains indicators covering the 8+1 dimensions of quality of life suggested by ESS in 2011 for the 17 Spanish Autonomous Communities from 2008 to 2020. The dimensions are the following[6]:

1. Material conditions of life: includes variables related to economic status (median income, population at risk of poverty, inequality, economic satisfaction), material conditions (material deprivation, problems and satisfaction with dwellings, difficulty making ends meet), and economic security (delay with payments, difficulty in facing unanticipated expenses).
2. Work: this dimension is constructed from variables regarding work quantity (unemployment, long-term unemployment, unwanted part-time employment) and work quality (low salaries, long hours, part-time, satisfaction at work).
3. Health: is measured as a combination of results (life expectancy at birth, own health perception, chronic morbidity and limitations for daily activity), access to health service (lack of medical attention) and health drivers (body mass index, daily smokers, regular physical exercise).
4. Education: aggregates variables regarding competence (education attainment, higher education, education level of young people, early school drop-out) and continuous training (of adult population).

[3] The HAC estimators provide robust standard errors for tests when the data exhibits heteroscedasticity and autocorrelation. They ensure that significance tests remain reliable when those issues are present in data.

[4] α is the speed of convergence parameter. For further details of the method, see Phillips and Sul (2007).

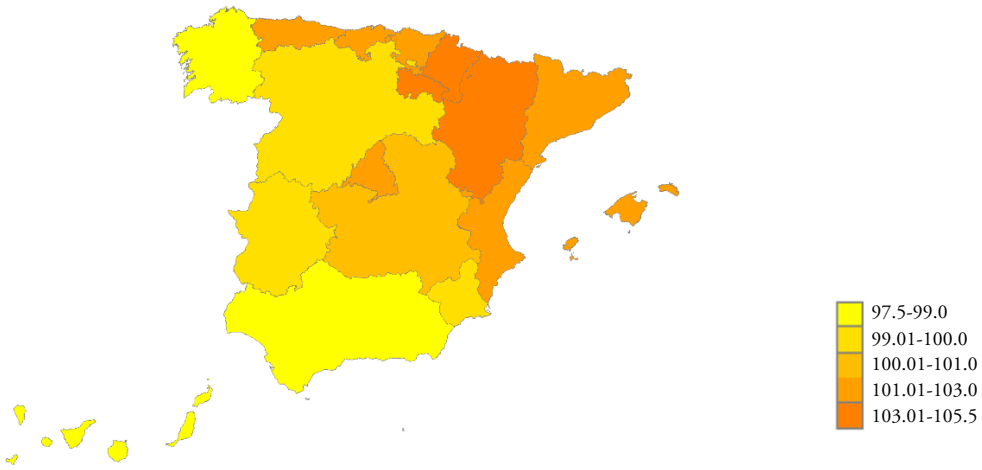
[5] Briefly, the steps are as follows: 1) sort the regions into descending order on the basis of the last observation; 2) form a core club; 3) filter the data for new club members and run the *logt* test to check if a convergence club is attained; 4) run the *logt* test on the regions which were no selected in step 3. If the t statistic is greater than the critical value, conclude that there are two convergence clubs; in another case, repeat step 1-3 to detect other convergence clubs; when no other clubs are estimated, conclude that the remaining regions diverge.

[6] Appendix -Tables A.1, A.2 and A.3- contains the ranking of regions across these dimensions in order to describe the situation of each region regarding the data employed.

5. Leisure and social relations: includes variables on leisure (satisfaction with leisure time, attendance to cultural or sports events) and social relations (social meetings, satisfaction with personal relations, existence of friends and relatives, someone to talk to, trust in others).
6. Physical and personal security: contains data on homicides, crime, vandalism and safety perception.
7. Governance and basic rights: combines data about institutions (trust in the political system, the judicial system and the police) with a variable of citizen participation.
8. Environment: based on pollution (contamination, noise, particles PM10), satisfaction with green areas and overall satisfaction with the environment.
9. General experience of life: summarizes the global satisfaction with life, positive emotions and the personal evaluation of meaning and purpose in life.

Each of these dimensions is approximated with several partial indicators, which are aggregated into a composite indicator by applying the Adjusted Mazziotta-Pareto method (Mazziotta and Pareto, 2016). Then, INE constructs an overall index of quality of life (named IMCV) as the arithmetic average of the nine composite indicators of the dimensions. In other words, an equal weighting system is used. Complete information about how the composite indicator is constructed is provided by INE (2024). Figure 1 depicts the average IMCV for the Spanish ACs during the period considered. There is a clear division between North-East and South-West. Northeastern regions such as Navarra, La Rioja or Aragón obtain the highest scores, followed by the País Vasco, Cantabria and Asturias (also in the North) and Cataluña, Comunidad Valenciana and Islas Baleares (in the East) and Madrid (in the center). In contrast, the Southern regions (Andalucía and Islas Canarias) show the lowest values, together with Galicia in the Northwest. Intermediate values are obtained for the rest of the regions.

FIGURE 1.
IMCV index in Spanish regions



Note: average data for overall index of quality of life -IMCV-
Source: Own elaboration from INE.

While we will use the overall IMCV index as a benchmark, we think it is more valuable and coherent with the well-being literature to separate three different components in exploring convergence patterns across regions. In order to do this, first we need to do consider which dimensions can be used in the analysis of convergence. We have to exclude Dimension 7 (Governance and basic rights), because the INE database does not report any temporal variation regarding this dimension. The four partial indicators employed to elaborate this construct are only provided for year 2013. It is easy to understand how the inclusion of a time-invariant variable into an overall composite indicator would bias convergence results. Second, since

the different dimensions included in the INE database refer to varied aspects of social progress, the analysis can be enriched if they are examined separately. The first dimension measures the material conditions of life and, as such, is related to (although quite different from) traditional economic measures of progress, such as GDP per capita. Finally, the ninth dimension, general experience of life, is the conventional measure of SWB. Information for this variable is only available in two periods. Although it is technically possible to estimate convergence with these data, the results may be unreliable and we prefer not to include this variable in the analysis. However, we will display information about this dimension in the description of the data. Therefore, we will consider the following two indicators of social progress:

1) MC - Material conditions: Dimension 1. The measure includes a partial indicator of average income but is complemented with measures of inequality[7] such as severe deprivation.

2) QoL - Quality of life: Dimensions 2 to 8, excluding Dimension 7 due to time invariance. Therefore, our QoL composite indicator is computed as the arithmetic mean of Dimensions 2, 3, 4, 5, 6, and 8.

Table 1 reports the descriptive statistics of these indicators for the 17 Spanish ACs, including also the SWB dimension and the INE's IMCV global indicator. We can observe an improvement in the four indicators during the period considered. The improvement is especially important regarding SWB, with about an 8% increase. The evolution of the coefficient of variation (CV) can provide a preliminary notion of sigma convergence/divergence. We can appreciate a smooth process of sigma divergence regarding material conditions, with an increase of 10.48% during the period, while there is a very slight sigma convergence in the case of quality of life, lowering only 2.56%. Finally, there is a large reduction in the CVs of SWB, pointing to convergence in this variable. However, this is only a descriptive first approach to the issue. We need to perform a more elaborated analysis of club convergence to endogenously identify the possible existence of convergence clusters in the data.

Table 1.
Descriptive statistics

	IMCV		MC		QoL		SWB	
	2008	**2020**	**2008**	**2020**	**2008**	**2020**	**2008**	**2020**
Average	100.67	102.41	100.86	101.16	100.81	102.62	100.73	108.95
Std. dev.	2.13	2.08	2.95	3.26	2.32	2.30	5.11	4.68
CV	0.0211	0.0203	0.0292	0.0323	0.0230	0.0224	0.0508	0.0430
Min	97.25	98.55	95.60	93.72	97.26	98.52	87.64	99.53
Max	105.44	105.92	105.68	105.31	105.89	106.44	108.24	117.64
Range	8.18	7.38	10.07	11.58	8.62	7.92	20.61	18.11

Note: IMCV: overall index of quality of life; MC: material conditions of life; QoL: quality of life; SWB: subjective well-being.
Source: INE and own elaboration.

In order to complete the description of the data, Table 2 provides the ranking of the different regions regarding the variables available (IMCV, material conditions, quality of life, subjective well-being and GDP per capita). Navarra occupies the first position of the ranking in IMCV and also in MC and QoL, scoring second in SWB and third in GDP. This is a non-surprising result, since it has been recurrently reported in previous studies of QoL in Spanish regions (González *et al.*, 2011; 2018; Cárcaba *et al.,* 2017). Other expected results are the lagging rank positions of Andalucía, Canarias, and Murcia (Cárcaba *et al.*, 2017). In contrast, the results for Madrid are striking, since it occupies the first position in GDPpc, but only moderate positions regarding QoL or SWB outcomes. Cataluña also shows the same lack of correspondence between GPD and the other indicators.

[7] In a related recent paper, Apergis *et al.* (2025) studied the convergence of inequality and poverty across Spanish regions.

TABLE 2.
Ranking for averages 2008-2020

Region	IMCV	MC	QoL	SWB	GDPpc
Navarra	1	1	1	2	3
Rioja, La	2	5	4	6	6
Aragón	3	3	5	4	5
Asturias	4	4	6	5	10
Cantabria	5	6	3	10	9
País Vasco	6	2	2	13	2
Balears, Illes	7	10	11	1	7
Comunitat Valenciana	8	12	12	3	12
Madrid	9	8	8	12	1
Cataluña	10	9	9	8	4
Castilla - La Mancha	11	11	10	14	15
Castilla y León	12	7	7	16	8
Murcia	13	16	15	7	14
Extremadura	14	14	13	15	17
Canarias	15	17	17	9	13
Andalucía	16	15	16	11	16
Galicia	17	13	14	17	11

Note: IMCV: overall index of quality of life; MC: material conditions of life; QoL: quality of life; SWB: subjective well-being.
Source: INE and own elaboration.

4. RESULTS

4.1. CLUB CONVERGENCE ANALYSIS

In order to find convergence patterns within the sample of regions, we performed a club convergence analysis for two of the three indicators described above: MC and QoL, but not for SWB due to the limited data available. In addition, the Appendix (Table A.4 and Figure A.1) contains the results for the IMCV overall index of social progress. It should be noted that our disaggregated analysis allows identifying the strengths and weaknesses of each region in different aspects of well-being. We also performed a club convergence analysis for GDP per capita. The results are included in the Appendix (Table A.5 and Figure A.2)[8].

Table 3 contains the results of the club convergence analysis performed on the data. The first remark is that, in accordance with the above-mentioned evolution of the coefficients of variation, the null hypothesis of full sample convergence is rejected for the two indicators of social progress analyzed. From this finding, we could be tempted to conclude that there is no convergence in social progress across Spanish regions during the period studied. Our position is that such a conclusion would be premature, since there may be other patterns of regional convergence which are not shared by all the regions in the sample. This is precisely the reason why we employ the club convergence analysis, which is able to identify such patterns.

[8] As with the rest of the variables, the results reveal three clubs -with low speed of convergence-, with five divergent regions. The differences shown between GDP per capita and other metrics of progress evidence the need for analysing economic development from several perspectives.

Material conditions

Concerning the material conditions of living (MC), the analysis identifies three convergence clubs and all of them show relative convergence (that is, convergence over time in growth rates, but not in levels). The speed of convergence (indicated by the value of the parameter $\hat{\gamma}$ divided by 2) is between 0.254 (Club 3) and 0.333 (Club 2), denoting a moderate relative convergence. The first club includes the regions with the highest MC levels, dominated by rich regions, such as País Vasco, but including other of intermediate income regions, such as Asturias. We must remember that this indicator is not restricted to income figures. It also includes information about inequality and deprivation. It is revealing that two of the Spanish richest regions, namely Madrid and Cataluña, are included in Club 2: the high cost of living (especially the part related to housing) and the prevalence of inequality in these regions are factors that may explain this result. Finally, and not surprisingly, the third club is composed of the poorest regions, where inequality is also an important issue (Murcia, Extremadura, Andalucía, and Canarias).

Quality of life

Regarding QoL, three convergence clubs are found again. The three clubs present relative convergence, but the speeds of convergence over time in growth rates within clusters are now notably lower than in the case of material conditions (from 0.047 in Club 2 to 0.226 in Club 3) and are very far from absolute convergence. The third club is almost identical to the one identified for material conditions, with Murcia, Andalucía, and Canarias forming it. In addition, Madrid and Cataluña are classified again within the intermediate club. Navarra, Aragón, Castilla-León and Cantabria, some of the leading regions identified in the recent literature on the territorial distribution of the QoL in Spain, appear in Club 1, as expected. It is also interesting the position of Extremadura which jumps from Club 3 in material conditions to Club 1 in QoL. This result is also within the expectations, since it has been documented in González *et al.* (2017). Other regions such as País Vasco or Asturias drop from Club 1 to Club 2 in QoL convergence.

Peiró-Palomino and Picazo-Tadeo (2018) identify a severe deterioration in *economic well-being* (a concept similar to the MC construct presented here) due to the so-called Great Recession, dated between 2008 and 2014 in Spain. In contrast, QoL remained more stable during the same period. The transition curves plotted in Figure 2 reflect that the negative effects of the economic crisis after 2008 were especially severe in the regions of Club 3, for the MC dimension. Regarding QoL, the first years of the crisis had a negative impact on Clubs 1 and 3. Interestingly, a positive evolution is observed in Club 2, which almost converges with Club 1 in 2014. The gap increased again after 2014 and remains almost constant with Club 3.

Table 3.
Convergence club results. MC and QoL

MC				QoL			
Club	**Regions**	$t_{\hat{\gamma}}$	$\hat{\gamma}$	**Club**	**Regions**	$t_{\hat{\gamma}}$	$\hat{\gamma}$
Full sample		-1.666*	-0.436	Full sample		-3.174*	-0.469
1	La Rioja País Vasco Aragón Navarra Castilla y León Cantabria Asturias Baleares Castilla-La Mancha	1.312	0.630	1	Navarra Cantabria Aragón Castilla y León Galicia Extremadura	0.965	0.332
2	Madrid Cataluña Galicia Com. Valenciana	0.714	0.666	2	País Vasco La Rioja Asturias Baleares Madrid Com. Valenciana Castilla-La Mancha Cataluña	0.268	0.094
3	Murcia Extremadura Andalucía Canarias	0.435	0.508	3	Murcia Andalucía Canarias	0.390	0.453

Note: MC: material conditions of life; QoL: quality of life.
* Indicates rejection of the null hypothesis of convergence at the 5% level.
Source: Own elaboration.

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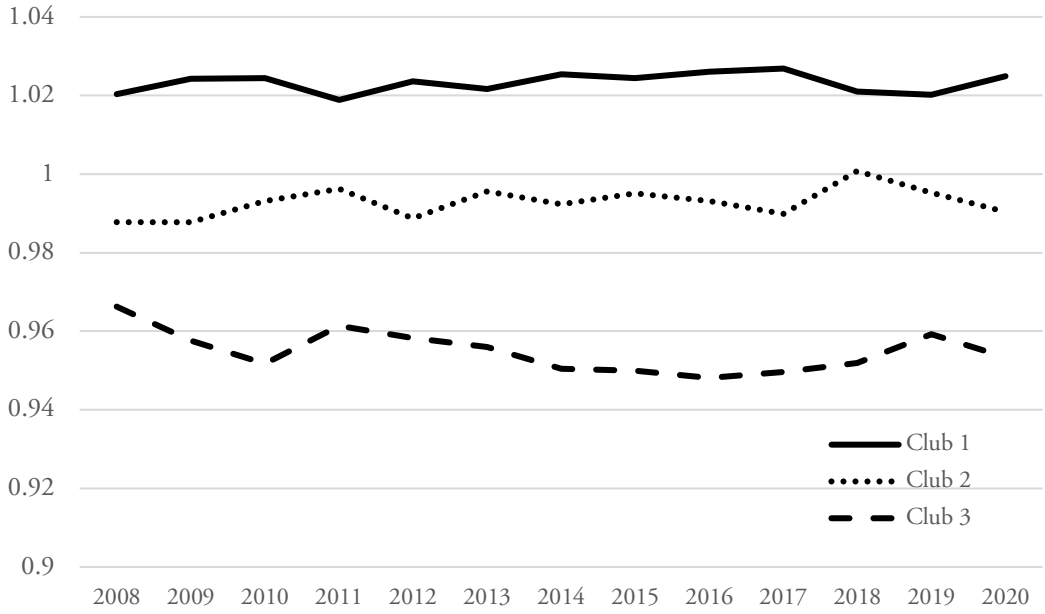
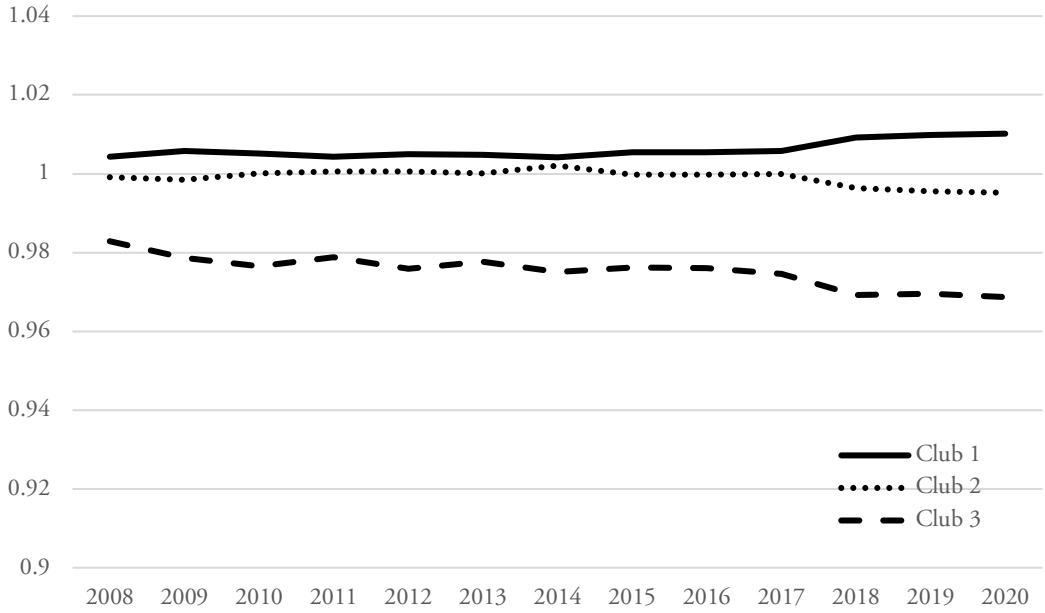
FIGURE 2.
Transition curves of clubs
2.a. MC



2.b. QoL



Note: MC: material conditions of life; QoL: quality of life.
Source: Own elaboration.

4.2. Discussion

The results from the club convergence analysis point to some interesting issues regarding the evolution and distribution of well-being in Spain in recent times. The analysis done reveals the absence of overall convergence across Spanish regions in all the constructs analysed. In other words, there is not a shared trend towards reducing the differences that existed in the base year (2008). However, we find some clusters or clubs of regions that show relative convergence within the period studied.

If we focus on material conditions, the first club contains regions that have been traditionally rich (in terms of GDP), such as País Vasco or Navarra, to which other less affluent regions (for instance, Asturias or Castilla-La Mancha) seem to be catching-up. At the other extreme, the less developed southern regions (Andalucía, Canarias, Extremadura, and Murcia) form the third convergence club. While these regions are converging, their distance to the leading clusters has increased during the period, consolidating the gap in material conditions. Another notable finding is that Madrid and Cataluña, two of the four richest regions in Spain in terms of GDP per capita, are included in the second club. This evidences a lack of correspondence between GDP and MC for these regions. Along with income, the MC construct includes variables of inequality and material deprivation. The evolution of the indicator shows that Clubs 1 and 2 have recovered well from the financial crisis. In contrast, Club 3 regions have not been able to return to pre-crisis figures.

Regarding the QoL construct, the results of convergence are very similar, although the speed of relative convergence is much slower. The hypothesis of overall convergence is rejected and the regions are assigned to three clubs with internal relative convergence. The composition of the groups is slightly different than the one obtained for the MC construct. The first club still includes Navarra as a referent, but País Vasco falls with Madrid and Cataluña to the second club. The position of these rich regions in the second club illustrates the differences between income (GDP) and complex measures of well-being. Although positive correlation is expected and is commonly found (Peiró-Palomino and Picazo-Tadeo, 2018), important deviations are always detected. The cases of Madrid and Cataluña are interesting precisely because of the lack of correspondence between GDP per capita and the two social progress indicators studied in this paper (MC and QoL). These regions rank high in GDPpc (Madrid occupies the first position) but are only average in MC and QoL (they do not do better in SWB). In terms of convergence, they are placed in Club 2 in both dimensions. The material conditions dimension is a composite indicator that includes rent and economic satisfaction, but also variables such as material deprivation, risk of poverty or inequality. The quality of life construct includes measures, such as physical and personal security or health status. A look at the raw data shows that these regions do not score too high in such variables (relative to other regions) and that the time evolution has not been positive. Future research may delve into the causes that keep these economically powerful regions from converging with the best regions in terms of MC and QoL.

The third club contains the southern regions, except Extremadura that jumps to Club 1. The finding that Murcia, Andalucía, and Canarias belong to the lowest social progress club is consistent with previous literature (González *et al.*, 2017; Peiró-Palomino and Picazo-Tadeo, 2018). The evolution of the curves shows that the distance with the best clubs is getting bigger. Table 2 shows that this case is exactly the opposite to the abovementioned situation of Madrid and Cataluña. Murcia, Andalucía, and Canarias score poorly in GDP per capita and the position is similar in terms of MC and QoL. Therefore, there is indeed a high correspondence between average GDP and average well-being. The major comparative problem in these regions is with material conditions and it did not improve during the period analyzed. In consequence, the strategy for convergence in these regions may emphasize improvements in income and material conditions, which should create the basis for additional advances in QoL. The case of Extremadura deserves special attention. In terms of material conditions, this region is converging within Club 3, composed with the economically less developed regions. However, in terms of QoL, Extremadura is converging with cluster 1 regions, the ones that show the highest levels. Even though the rank of Extremadura is still low in all the variables, the results of the club convergence analysis indicate that its evolution regarding QoL is promising.

Finally, the cases of Asturias and Galicia, two regions located in the northwest of Spain, illustrate two very different situations. Asturias ranks below average in GDP per capita, but its accomplishment in terms of MC and QoL is good. Taking a closer look to the variables that compose the MC dimension, we find that inequality is low in Asturias as compared to other regions (although it has increased during the period). Deprivation levels are minimum and, even though average income is not high, about 60% of the population declares to be highly satisfied with their economic situation (this figure is consistently below 50% in much more affluent regions such as Madrid or Cataluña). The case of Galicia is markedly different. It ranks slightly below average in terms of GDP per capita, but occupies the worst position in the IMCV index. Taking a closer look at the raw data, we cannot appreciate big problems of inequality. Instead, variables related with feelings and emotions regarding perceptions of own life are behind Galicia's low figures (satisfaction with economic conditions, satisfaction with personal relations, own perception of health status, satisfaction with life, etc.).

5. Conclusions

Understanding the time evolution of welfare requires exploring different sets of economic and social variables. The Material Conditions composite indicator analyzed in this paper provides a much richer perspective on economic development than single measures such as income or GDP *per capita*. This is because it incorporates relevant information on inequality, such as severe deprivation, or satisfaction with the material situation of the individual. There are important subtleties behind these metrics. For instance, while income per capita is largest in Madrid, satisfaction with the economic status is consistently higher in less affluent regions, such as Asturias. In turn, the composite indicator of Quality of Life used in this paper includes other dimensions that are necessary for having a good life (health, education, safety, personal relations, etc.). Combined, all these indicators provide a comprehensive picture of social progress, which goes beyond what GDP figures alone can achieve.

In this paper, we carried out a convergence analysis of social progress indicators for the Spanish regions in the period 2008-2020. The results reject the hypothesis of overall convergence among the regions during the period studied. However, following the club convergence approach developed by Phillips and Sul (2007, 2009), we were able to identify three convergence clubs for Material conditions (MC) and Quality of Life (QoL). Therefore, there are indeed common patterns in the evolution of these variables and evidence of convergence within the clubs identified. As noted in previous research, the region of Navarra emerges as the top reference of well-being in Spain. On the opposite side, the regions of Murcia, Andalucía, and Canarias fall to the lowest convergence club, a result also expected from the evidence published in past literature.

By comparing these results with the ranking of regions in terms of GDP per capita, we provide some interesting insights about the situation of different Spanish regions. Of particular concern is the situation of Madrid and Cataluña, two of the richest Spanish regions, which fail to convert their high economic power in similarly high well-being outcomes. The cases of Asturias and Galicia also illustrate important deviations from the expected correspondence between GDP and well-being. In the case of Asturias, the deviation is positive, while in the case of Galicia it is negative.

Some policy recommendations emerge from the results obtained. First, the situation of Madrid and Cataluña regarding well-being should be a serious concern. It is clear that the outstanding economic outcomes of these regions is not translating into equally superb well-being results. The raw data behind the indicators point to problems in the distribution of material prosperity. These regions should work to reduce inequalities in order to be able to increase the general levels of well-being and achieve values in accordance with their economic status. Another interesting challenge comes from the region of Galicia. The population of this region has worse perceptions of their conditions of living than they should. Objective conditions are only slightly below average, but perceptions of well-being are lowest. Finally, the results in this paper confirm the underperformance of the southern regions (Murcia, Andalucía, and Canarias), which has been largely documented in past research. It seems that the role of the different administrations in reducing the gap between north and south has not been effective. The future system for the distribution of funds across regions –the Spanish regional financing system, whose reform is pending

since 2014- should carefully consider this reality. Without interregional solidarity, there is little hope that the patterns of convergence shown in this paper will change over the next years.

Some of the results discussed in this paper must be interpreted with caution. Although the publication of well-being indexes by the INE is a milestone for QoL research in Spain, the time period available (2008-2020) is still very short. Additionally, the SWB indicator was provided only for two specific periods, and hence more data would be necessary to perform the club convergence analysis for that interesting indicator. Another limitation is that the data only shows averages for the existing regions, but we lack information about the distribution of the variables within the regions. It is well-known that regions such as Madrid can be clearly divided into a richer north and a poorer south, a circumstance we cannot evaluate with the data available. Some of the indicators point to this type of problems, especially in Madrid and Cataluña. Finally, alternative approaches could enrich the results achieved in this manuscript, as complementary research.

As future extensions, this research would benefit enormously if data were available for smaller administrative/territorial units. As noted by Peiró-Palomino and Picazo-Tadeo (2018), intraregional heterogeneity in overall well-being is high. Unfortunately, the required information at lower levels of analysis (province, municipality) is difficult to obtain. Future research should make an effort to gather this data in order to assess convergence patterns within regions as well as across regions.

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Appendix[9]

A.1. Quality of life rankings (2008, 2020 and average)

Table A.1.
Quality of life 2008 (ranking)

Region	IMCV	MCDim 1	QoL	Dim 2	Dim 3	Dim 4	Dim 5	Dim 6	Dim 7	Dim 8	SWBDim 9
Navarra	1	1	1	1	2	2	2	4	6	1	2
Rioja, La	2	6	4	2	9	10	1	2	4	2	7
Asturias	3	3	6	9	16	4	8	3	9	5	4
Cantabria	4	5	3	8	4	8	3	1	13	3	10
Aragón	5	4	5	4	7	6	6	9	12	10	6
País Vasco	6	2	2	3	5	1	4	12	16	8	13
Balears, Illes	7	11	14	7	6	17	10	14	1	9	1
Madrid	8	9	8	5	1	3	7	17	5	12	14
Comunitat Valenciana	9	12	15	10	10	9	9	15	2	16	3
Cataluña	10	8	9	6	3	11	5	16	7	14	8
Murcia	11	14	13	13	12	13	11	11	3	11	5
Castilla - La Mancha	12	10	10	11	17	16	12	8	8	7	12
Castilla y León	13	7	7	12	8	7	13	6	17	4	16
Extremadura	14	15	12	17	15	14	14	7	11	6	15
Andalucía	15	16	16	16	13	15	15	13	14	17	9
Canarias	16	17	17	15	11	12	17	10	10	13	11
Galicia	17	13	11	14	14	5	16	5	15	15	17

Note: IMCV: overall index of quality of life; MCDim 1: material conditions of life; QoL: quality of life; Dim 2: work; Dim3: health; Dim4: education; Dim5: leisure and social relations; Dim 6: physical and personal security; Dim 7: governance and basic rigths; Dim 8: environment; SWBDim 9: subjective well-being, general experience of life.
Source: INE and own elaboration.

[9] The ordering of the regions follows the official by INE and not the alphabetical order.

TABLE A.2.
Quality of life 2020 (ranking)

Region	IMCV	MCDim 1	QoL	Dim 2	Dim 3	Dim 4	Dim 5	Dim 6	Dim 7	Dim 8	SWBDim 9
Navarra	1	4	1	3	2	2	6	7	6	1	5
Rioja, La	2	1	5	6	4	9	5	3	4	8	7
Aragón	3	3	3	2	7	8	2	6	12	4	2
Balears, Illes	4	8	8	5	5	13	3	11	1	10	1
Cantabria	5	6	2	9	10	4	1	1	13	2	9
Asturias	6	7	7	11	14	5	12	2	9	6	10
País Vasco	7	2	4	1	3	1	11	14	16	7	13
Comunitat Valenciana	8	13	11	12	12	10	9	10	2	11	3
Madrid	9	10	9	7	1	3	10	17	5	13	11
Cataluña	10	11	13	4	6	7	15	16	7	12	8
Castilla y León	11	5	6	8	11	11	4	5	17	3	16
Castilla - La Mancha	12	9	12	13	8	15	13	9	8	5	15
Extremadura	13	15	14	17	9	17	7	8	11	9	6
Galicia	14	12	10	10	13	6	8	4	15	14	17
Murcia	15	14	15	14	17	12	16	15	3	16	12
Canarias	16	17	17	15	15	14	17	13	10	17	4
Andalucía	17	16	16	16	16	16	14	12	14	15	14

Note: IMCV: overall index of quality of life; MCDim 1: material conditions of life; QoL: quality of life; Dim 2: work; Dim3: health; Dim4: education; Dim5: leisure and social relations; Dim 6: physical and personal security; Dim 7: governance and basic rigths; Dim 8: environment; SWBDim 9: subjective well-being, general experience of life.
Source: INE and own elaboration.

TABLE A.3.
Quality of life average 2008-2020 (ranking)

Region	IMCV	MCDim 1	QoL	Dim 2	Dim 3	Dim 4	Dim 5	Dim 6	Dim 7	Dim 8	SWBDim 9
Navarra	1	1	1	1	2	2	4	8	6	1	2
Rioja, La	2	5	4	3	6	9	2	3	4	5	6
Aragón	3	3	5	4	7	5	3	7	12	6	4
Asturias	4	4	6	10	15	6	10	2	9	3	5
Cantabria	5	6	3	8	8	4	1	1	13	4	10
País Vasco	6	2	2	2	4	1	5	12	16	7	13
Balears, Illes	7	10	11	6	5	17	6	15	1	10	1
Comunitat Valenciana	8	12	12	11	10	10	7	14	2	11	3
Madrid	9	8	8	5	1	3	8	17	5	13	12
Cataluña	10	9	9	7	3	11	9	16	7	12	8
Castilla - La Mancha	11	11	10	13	13	14	13	6	8	8	14
Castilla y León	12	7	7	9	9	7	12	5	17	2	16
Murcia	13	16	15	14	16	12	14	13	3	15	7
Extremadura	14	14	13	17	14	16	11	9	11	9	15
Canarias	15	17	17	16	11	13	17	10	10	14	9
Andalucía	16	15	16	15	12	15	15	11	14	16	11
Galicia	17	13	14	12	17	8	16	4	15	17	17

Note: IMCV: overall index of quality of life; MCDim 1: material conditions of life; QoL: quality of life; Dim 2: work; Dim3: health; Dim4: education; Dim5: leisure and social relations; Dim 6: physical and personal security; Dim 7: governance and basic rigths; Dim 8: environment; SWBDim 9: subjective well-being, general experience of life.
Source: INE and own elaboration.

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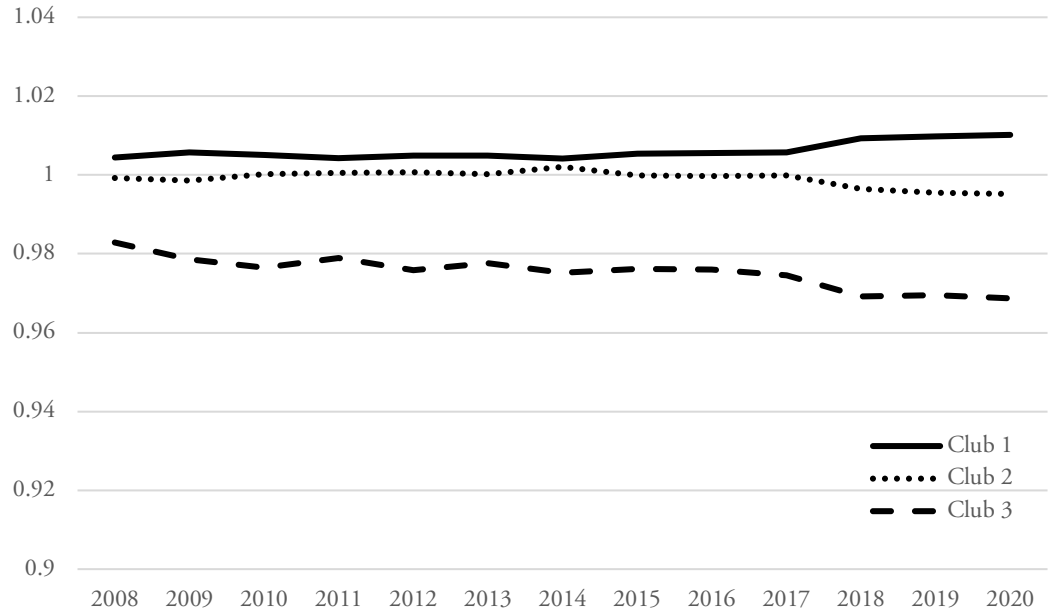
A.2. Convergence club results for the IMCV

Table A.4.
Convergence club results – IMCV

Club	Regions	$t_{\hat{\gamma}}$	$\hat{\gamma}$
	Full sample	-2.103*	-0.371
1	Navarra Rioja Aragón Baleares Cantabria Com. Valenciana Castilla y León Extremadura Galicia	0.533	0.171
2	Asturias País Vasco Madrid Cataluña Castilla La Mancha Canarias	0.637	0.296
3	Murcia Andalucía	0.008	0.003

Note: IMCV: overall index of quality of life.
Source: Own elaboration.

Figure A.1.
Transition curves of clubs - IMCV



Note: IMCV: overall index of quality of life.
Source: Own elaboration.

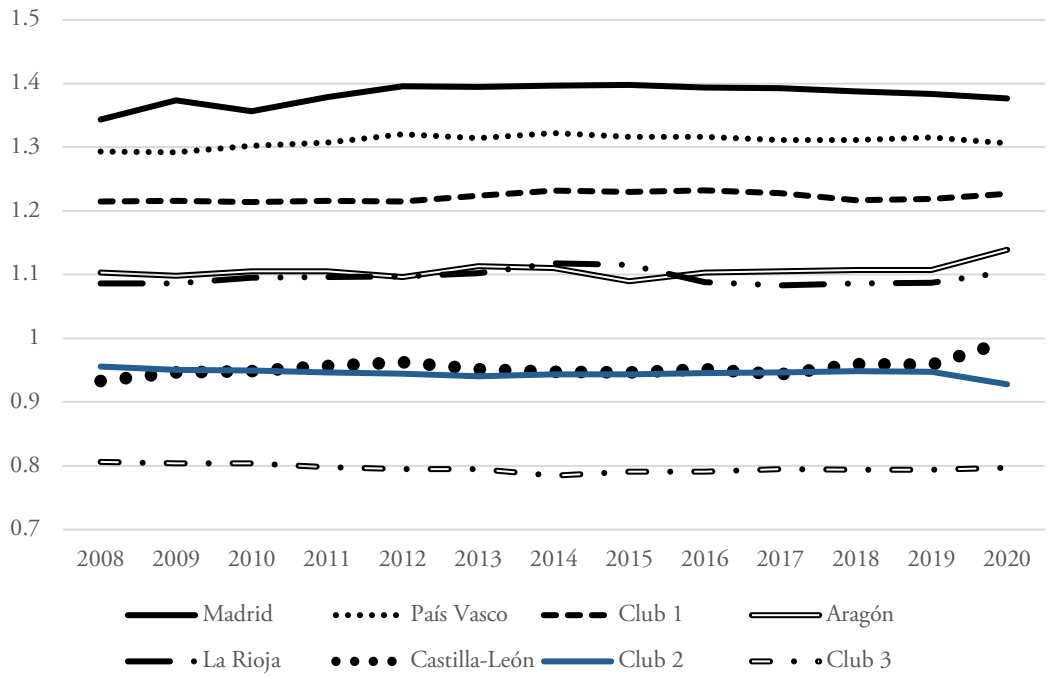
A.3. Club convergence for GDP per capita

Table A.5.
Convergence club results. GDP per capita

Club	Regions	$t_{\hat{\gamma}}$	$\hat{\gamma}$
	Full sample	-13.794*	-0.742
1	Navarra Cataluña	0.187	0.158
2	Cantabria Baleares Galicia Asturias Com. Valenciana	0.293	0.270
3	Murcia Castilla-La Mancha Extremadura Andalucía Canarias	0.822	0.126
Divergent	Madrid País Vasco Aragón Rioja Castilla-León		

* Indicates rejection of the null hypothesis of convergence at the 5% level.
Source: Own elaboration.

Figure A.2.
Transition curves of clubs – GDPpc



Source: Own elaboration.