



# Measurement of Quality of Life in Spanish Regions

Manuel de Maya Matallana<sup>1</sup>  · María López-Martínez<sup>2</sup> · Prudencio José Riquelme-Perea<sup>1</sup>

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## Abstract

The present paper measures quality of life through a set of dimensions included in the following partial indicators of objective well-being: demography, economic endowment, academic training, employment, health, cultural goods, environment, housing habitability, security and family. Additionally, and independently, subjective well-being is studied to measure the degree of happiness of the population. As a result, a quality of life indicator is obtained that combines both objective and subjective indicators. The methodology used corresponds to that provided by Pena Trapero through the distance measure DP2, which has been widely used in many empirical studies on well-being and quality of life. Among the results obtained, it is worth noting that happiness diminishes as per capita income grows, and that prosperity, understood as social welfare, can be achieved without relying exclusively on material growth. Thus, the Spanish development model must be revised since the material objectives and economic growth do not guarantee the happiness of the population.

**Keywords** Quality of life · Social welfare · DP2 indicator · Autonomous communities

**JEL Classification** I3 · R13

## Introduction

This paper examines social welfare through a set of indicators including variables from different areas, given the multidimensional nature of well-being. More specifically, eleven dimensions have been synthesised in the following dimensions: demography,

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✉ Manuel de Maya Matallana  
manueldem@gmail.com

<sup>1</sup> Department of Applied Economics Faculty of Labor Sciences, University of Murcia, 30100, Campus of Espinardo Murcia, Spain

<sup>2</sup> Department of Applied Economics Faculty of Economics and Business, University of Murcia, 30100, Campus of Espinardo Murcia, Spain

economic endowment, housing habitability, employment, academic training, health, cultural goods and activities, environment, security, family and subjective well-being. It is necessary to provide a new model of integral development that does not focus exclusively on the achievement of material goals, but rather reflects the socioeconomic reality within a spatial framework. The territorial scope of this study is restricted to the Spanish Autonomous Communities.

In the last half century, substantial progress has been made in the differentiation between the terms *economic growth*, *development* and *well-being*. Yet it has been in the last three decades that the interest in the analysis of the quality of life has increased to a great extent (Cárcaba et al. 2017a, b). Despite the difficulties involved in any attempt to measure the quality of life of the population in a given geographical area, the techniques and statistics for quantification have been improved and expanded in recent years.

There is currently consensus on the need to consider composite indicators of well-being that not only include economic magnitudes, but also collect indications of other important aspects of well-being through labour, educational, health, environmental, cultural or family indicators, among others. This extended conception of quality of life, measured through different dimensions, does not imply that there is agreement on the specific variables that should be included in the analysis, as Navarro-Azorín and Artal-Tur (2015) have pointed out. Therefore, Peiró et al. (2019) emphasise the importance of continuing to make progress in the delimitation and measurement of the concept of well-being, given that the use of different indicators can lead to different results and interpretations.

Another relevant issue in this field of research is the availability of comparable information about living conditions over time. Empirical works often use countries and regions as an analysis unit, although González et al. (2018) have recommended a higher level of geographical disaggregation, such as the municipal one, to better assess the quality of life of people. However, this work focuses on the Spanish autonomous communities in order to incorporate some variables that we deem relevant and are not available at the municipal level. Likewise, the time interval considered fluctuates between 2008 and 2017, depending on statistical availability. It should be clarified that, in general, the indicators that include less updated years tend to be structural, so it cannot be expected that they have undergone significant changes.

There is a vast amount of literature aimed at examining quality of life or social welfare in the international context, such as the contributions of Cuenca and Rodríguez (2010) and Rodríguez Martín (2012), who focus on the least developed countries in Asia or Africa, or Somarriba and Pena (2009a, b, 2010, 2015), on EU's countries. Some scholars have conducted comparative analyses in some regions of southern Europe, such as Holgado et al. (2015), Alcaide Inchausti (1988) and Somarriba and Pena (2008a, b). Various approaches have also been adopted by Spanish authors at municipal level, as in Economic Analysts of Andalusia (1997), López et al. (2003), Sánchez and Rodríguez (2003) and González et al. (2011). Additionally, López and Sánchez (2009) and De Maya et al. (2018) researched the Autonomous Communities of Galicia and Murcia, respectively.

This paper is organised as follows. The second section begins by giving an overview of the theoretical currents that have tried to explain the different behaviour of territories based on the main dimensions of well-being, and presents the methodology, including

the territorial classification used and the selected variables, together with the estimate of the partial synthetic indicators for all seventeen Autonomous Communities. Finally, Section 3 presents the results and Section 4 discusses the conclusions drawn.

## Theoretical Framework and Methodology

The measurement of the factors that affect social welfare is not an easy task because of the complexity of the term. As Cuenca and Rodríguez (2010) stated, although significant progress has been recently made, there is still room for improvement regarding the instruments and procedures used, together with the necessary theoretical formalization.

In the last half century, a distinction has been made between the concepts of economic growth, development and well-being, because growth can have harmful effects on the environment and it is necessary to include other variables related to the quality of work, health, trust or job security. Therefore, although economic growth is a necessary condition for welfare, it is not sufficient (Sánchez and Rodríguez 2003). On the other hand, the notion of development does not only depend on the optimal combination of production factors, but also on the adequate use of untapped competences and resources (Pérez Yruela et al. 2016). Likewise, the concept of human development used since the last decade of the twentieth century by the United Nations includes income (as a means of achieving a decent standard of living), and two other dimensions necessary in human progress: education and a long and healthy life.

The terms social welfare, quality of life and development are often used as synonyms and their assessment may take different standpoints (economic, psychological, sociological, geographical, medical or philosophical, among others). It is convenient to take a multidimensional approach in which income is regarded as part of the economic dimension but other variables linked to family assets (e.g. use of the Internet or the possibility to take on certain expenses) are added too, together with other dimensions, such as demography, housing, health, social participation, environment, education, employment, security and family.

The present paper uses both objective and subjective indicators of satisfaction, following the approach of social welfare indices. These quantitative variables are synthetic, because they summarise the information contained in different partial indices; multidimensional, because several areas related to well-being are considered; and established for a specific spatiotemporal framework, as they refer to a specific geographical area and a period of time: Spanish regions between 2010 and 2017, depending on the availability of data.

This paper supports the hypothesis that the classification of Spanish regions may vary from the usual north-south separation, which tends to locate the more “developed” regions in the northern part of the country (unlike Great Britain). To corroborate this idea, we have studied a wide set of indicators that account for the traditional dimensions of income and other economic endowments, such as education and health, and other labour, cultural, environmental and family indicators, as well as perceived well-being. In fact, after enriching the analysis with other areas, the geographical typification becomes more complex. Although the traditional pattern is not reversed, the location in the ranking of some regions may be striking.

## Indicator of Socioeconomic Differences

The methodology used for the elaboration of partial indicators and, subsequently, the construction of a synthetic welfare indicator, is mainly based on Pena Trapero's DP2 method, which has been profusely used in the empirical works on welfare economics that have been previously cited. There are other estimation methods based on econometric theory, such as Factor Analysis or Data Envelopment Analysis DEA, but these have not been able to fulfil all the requirements of a good indicator (Pena 2009).

To apply this methodology, first the DP indicator for each dimension is calculated and then a new synthetic indicator is obtained using the dimensions calculated in the previous step. This prevents the weight of each dimension from being conditioned by the number of variables included.<sup>1</sup>

It must be emphasised that the values obtained for each Autonomous Community in the different indicators are dimensionless values, which means that only their relative value compared to other regions matters. Below are the formulae used to obtain the values for each indicator:

$$DF_i = \sum_{j=1}^n \frac{(x_{ij} - x_{min,j})}{\sigma_j} = \sum_{j=1}^n \frac{d_{ij}}{\sigma_j} \quad (1)$$

i	Region
j	variable
$x_{min,j}$	Minimum value achieved by a variable
$x_{ij}$	Value of variable j in territory i
$\sigma_j$	Standard deviation of the variable j with respect to the mean value of the seventeen Autonomous Communities

$$DP_{2,i} = \sum_{j=1}^n \frac{d_{ij} \left( 1 - \bar{R}_{j,j-1,j-2,\dots,1}^2 \right)}{\sigma_j} \quad (2)$$

$\bar{R}_1^2 = 0$  (the first variable has a null correction factor)

Correction factor<sup>2</sup>:  $\bar{R}_{j,j-1,j-2,\dots,1}^2$  (coefficient of determination corrected for the regression of the variable j (the last one to be incorporated) on the rest of the variables already introduced (j-1, j-2, ..., 1))

$$r_{xy} = \frac{\sigma_{xy}}{\sigma_x \sigma_y} \text{ (Pearson's linear correlation coefficient)} \quad (3)$$

<sup>1</sup> For example, the most representative indicators for well-being in this work have been those of family, housing and work, each with 2, 3 and 5 variables, respectively. Therefore, the weight that each dimension receives in the calculation of well-being is independent of the number of variables used in each indicator.

<sup>2</sup> If the correction factor approaches one, the corresponding variable will have a minor influence on the synthetic indicator.

Finally, the variables are normalised based on the following expression, which indicates the distance between the value reached by a variable in a territory and its minimum value, with respect to the distance between the maximum and minimum values of the variable.

$$XSTAND = \frac{X - X_{min}}{X_{max} - X_{min}} 10 \quad (4)$$

The values obtained for every region have been transformed into index numbers to display a more useful ordering of the data obtained for each indicator and to better interpret the results. The mean value of each variable at national level (weighted by the population) is taken as the base. The standard deviation is used as a measure of dispersion, also expressed as an index number in relation to the average for Spain. Level 3 represents values close to the average (between 90% and 110%) and the extreme levels correspond to much lower and much higher values, level 1 and level 5, respectively. The interpretation of the five levels that the regions can reach in each synthetic indicator is shown in Table 1.

### Explanatory Power of the Variables on Regional Differences

The variables that contribute to explaining the differences across regions are identified for each synthetic indicator, in order to enrich the information provided by each distance indicator. The process is summarised in the following four mathematical expressions. The first one is the Ivanovic Discrimination Coefficient, which indicates the selective or differentiating power of each variable.

$$CD_j^{Iva} = \frac{2}{m(m-1)} \sum_{i,l=1(l>i)}^m \left| \frac{x_{ij} - x_{lj}}{\bar{x}_j} \right| \quad (5)$$

$m$  number of Spanish regions

$\bar{x}_j$  average (without weighting by the population of each territory) of variable  $j$  for the seventeen Spanish regions

$x_{ij}$  value of variable  $j$  in the region  $i$

This coefficient is adjusted according to the new information provided by each variable with respect to the data already provided by the previous variables (correction

**Table 1** Interpretation of levels

Level	
1	Less than $90 - \sigma$
2	Between $90 - \sigma$ and 90
3	Between 90 and 110
4	Between 110 and $110 + \sigma$
5	Greater than $110 + \sigma$

Source: Elaborated by the authors

factor), so that the Ivanovic-Pena Global Information Quantity is obtained for a given variable. This information can be grouped in a specific synthetic indicator for all the variables included, obtaining the coefficient in an aggregate form.

$$CIP_j = CD_j^{Iva} \left( 1 - \bar{R}_{j,j-1,\dots,1}^2 \right) \quad (6)$$

$$CIP^{Iva-Pe} = \sum_{j=1}^n CIP_j \quad (7)$$

$n$  number of variables

The coefficient  $\alpha$  is calculated to obtain the explanatory power of each variable with respect to the differences observed in each indicator.

$$\alpha_j = \frac{CIP_j}{CIP^{Iva-Pe}} 100 \quad (8)$$

## Differentiation Between Subjective and Objective Well-Being

When counting on objective and subjective variables, the social well-being of territories is not totally comparable to one another; in other words, it cannot be ascertained that well-being in one territory is strictly greater than in another, since the quality of life is not a universal category, but a culturally and territorially defined notion (Celemin et al. 2015: 72). Based on their differential characteristics, each territory can define an alternative way of quality of life. To formalise this idea, and to give equal importance to the objective and subjective aspects, the synthetic indicator has been broken into two main components, following the recommendations of the Sen-Stiglitz-Fitoussi Report on Economic Welfare and Social Progress (Stiglitz et al. 2009). First, the “real” component or objective component with its corresponding dimensions and, second, the “psychological” or subjective component (in which variables are collected in a single dimension related to happiness), according to the following expression:

$$W_i^{O+S} = W_i^{Object} + W_i^{Subject} \cdot i \quad (9)$$

According to the new expression, and taking into account the particularity of complex numbers,<sup>3</sup> the modulus of the complex number is used; it informs of the distance between the well-being of a territory and the well-being of a hypothetical region reaching the minimum levels of well-being, both in the objective and in the subjective component (distance to coordinate origin). In this way, an ordination of the territories based on the modulus obtained is performed. The modulus is obtained by means of the following formula:

<sup>3</sup> Complex numbers have the general expression  $a + bi$ , where  $a$  and  $b$  are real numbers and  $i$  is the so-called imaginary unit, being equivalent to the square root of the integer “-1”. The set of complex numbers is not an ordered body, so it cannot be affirmed that a complex number is strictly greater than another (Fernández Arias 2016: 9–11).

$$|W_i^{O+S}| = \sqrt{(W_i^{Object.})^2 + (W_i^{Subject.})^2} \quad (10)$$

### Selected Variables for Objective Well-Being

Ten partial synthetic indicators have been used to study objective well-being in the Spanish regions (Table 2). These synthetic indicators have been developed through a set of variables that are representative of each sphere of welfare. Specifically, 60 variables related to the different dimensions of socioeconomic well-being were selected, and every dimension includes between two and seven variables.

1. The **partial demographic indicator** summarises the community vitality (possibilities of generational replacement) and the degree of attractiveness for the native population and population from other areas (economic and employment opportunities). A high value in this indicator favours the socioeconomic well-being of the population.
2. Regarding the **economic endowment indicator**, the communities with higher levels will be those regarded as the most economically developed; that is, the territories where people can meet their individual and collective needs involving a greater monetary cost. This has a positive impact on welfare, as this fosters the development of the capacities of individuals and families to achieve a decent standard of living.
3. The **academic training indicator** uses variables related to the academic degree attained (bachelor's, master's and doctoral degrees) as well as variables that reflect the extent of public sector intervention in key sectors for a knowledge-based economy, such as investment in research and development (R&D) or in education (Table 2). This area is included in many studies carried out by international organizations such as the OECD or the United Nations (Human Development Index), since it is crucial to guarantee the full development of the capabilities, both at individual level and in terms of conflict resolution and emotional and creative intelligence.
4. Regarding the **employment indicator**, socioeconomic policies should aim at reducing the high unemployment rates of some developed countries like Spain. In addition, although no prominence has been given to the differentiation of employment by neoclassical currents, we have considered that social and labour policies must foster not only an improvement in the quantity, but also in the quality of employment. The economic stability of workers would be improved by the promotion of permanent contracts and the creation of qualified jobs. Finally, entrepreneurship could be promoted to increase and diversify the business network, so we have included a variable that is a good approximation of entrepreneurial attitudes, such as self-employment.
5. The **environmental acquis** has a positive impact on the socioeconomic welfare of both present and future generations, reflecting a greater ecological awareness.
6. The **housing indicator** includes a series of variables related to the level of habitability. For the calculation of this indicator, property ownership (Somarriba

- and Pena 2010) and high housing satisfaction are considered as positive, while dwellings with certain shortcomings or deficiencies are deemed negative.
7. In the **health dimension**, the variables report the incidence of chronic diseases, mental health (depression) and malignant tumours.
  8. The **security indicator** includes five variables: homicide and crime rates, people affected by delinquency problems or excessive noise caused by neighbours or noise in the street, and people who feel very safe walking alone at night.
  9. The **family dimension** includes variables that inform on the possibility of asking for help from family and friends and the level of trust in others and in the political system. Other indicators of the degree of family stability, such as the divorce rate, are also included. This dimension is strongly correlated with levels of social welfare, since family is a fundamental pillar of Western societies that fosters economic and social stability.
  10. As for the **dimension of cultural goods and artistic activities**, access to extensive goods of cultural interest contributes to well-being. Access to goods of a historical-artistic nature, which have an increasing intangible value in society, increases the feeling of identification in citizens. Additionally, the artistic habits of the population are taken into account, such as the number of people who write, paint, draw or play a musical instrument over a year. The imaginative capacities that foster innovation are sought because they are crucial to create employment in a society focused on the development of the knowledge economy. This means that the growing weight of intellectual capital is regarded as part of the goods produced as a factor of competitive advantage of a nation or region.

## Results

Due to lack of space, the information provided by each synthetic indicator<sup>4</sup> is not included in the present paper, although it is available in a complementary way. However, prior to the analysis of the synthetic results of Tables 3 and 4, the most relevant issues of each dimension will be outlined.

### Dimensions of the Synthetic Indicator of Objective Well-Being

#### Demography

The selected variable that most influences the result in this dimension is the nuptiality rate, with a correlation with the indicator of demographic dynamics close to 0.9.

<sup>4</sup> For a more comprehensible reading of the results obtained in each indicator, the variables were normalised based on the following expression. The closer to 10, the closer to the maximum value (the regions that reach the maximum value are assigned the value of 10), while regions with minimum values will be assigned the value of zero.

$$DP_{2,i}^{stand} = \frac{DP_{2,i} - DP_{2,i}^{min}}{DP_{2,i}^{max} - DP_{2,i}^{min}} \cdot 10$$



**Table 2** Variables and indicators used for the calculation of the global synthetic objective indicator

Partial synthetic indicators	Variables	Year or reference period	Source
Demography	Total migratory balance per thousand inhabitants	Average of the period 2011–2016	Spain's National Statistics Institute (INE)
	Rate of natural increase per thousand inhabitants	2016	
Economic endowment	Marriage rate (number of marriages celebrated in one year per thousand inhabitants)	2016	
	Gross disposable income of households per capita, GDH (euros)	2014	
	Poverty risk rate (with imputed rent) (percentage of population below 60% of the median annual income per consumption unit)	2016	
	Percentage of people who have had difficulties in the payment of expenses related to the main dwelling (mortgage or rent, gas bills, community, etc.) in the last 12 months		
	Percentage of people who do not have the capacity to face unforeseen expenses		
Academic training	Percentage of main dwellings with Internet access	2017	
	Investment in Research and Development per capita (euros)	2015	
	Investment in education per capita (euros)		
	Average of the results in the PISA Report related to Science, Reading and Mathematics		
	Percentage of the population aged 18 to 24 who has not completed the level of Secondary Education (2nd stage) and does not pursue any type of education-training	2016	
	Residents of 16 or more years in main dwellings that reach at least the level of studies of Degree or Official Master (%)	2011	
	Residents of 16 or more years in main dwellings who reach the degree of Doctorate (%)		
Employment	Unemployment rate (% of the active population)	2016	
	Temporality rate (%)		
	Percentage of self-employed workers		
	Percentage of R&D staff over the total employed population (%)	2015	

Table 2 (continued)

Partial synthetic indicators	Variables	Year or reference period	Source
Environment	Long-term unemployment rate (% of the active population)	2016	Ministry of Agriculture, Fisheries, Food and Environment
	Forest area (hectares) per thousand inhabitants		
	Area allocated to family gardens (hectares) per thousand inhabitants		
	Population suffering from pollution and other environmental problems (%)	2015	INE
	Emissions per capita (CO <sub>2</sub> tons) Emissions per capita (CO <sub>2</sub> tons)	2014	Atlas of Climate Change by Autonomous Community, 2016 (Observatory of Sustainability)
	Number of fauna species (vertebrates) per one hundred thousand inhabitants	2008	Report: "Analysis of the richness and diversity of the Valencian flora and fauna with respect to other Autonomous Communities and European countries" (Generalitat Valenciana)
Housing habitability	Number of species of native vascular flora per one hundred thousand inhabitants	2011	
	Renewable energy over the total energy generated (%)	2017	Renewable energies in the Spanish electricity system. Report 2017 (Red Eléctrica de España)
	Households with ownership of the property or access to the property (%)	2016	INE
	Households that suffer from problems in the dwelling and its surroundings (shortage of natural light) (%)		
Health	Population living in households with certain deficiencies in the dwelling (%)	Average of the period 2010–2015	
	Life expectancy at birth (years)	2014	
	Population aged 15 and over who have suffered these problems or chronic diseases in the last year: high blood pressure, heart attack, angina pectoris and other heart diseases (%)		
	Population aged 15 and over that has suffered diabetes and cholesterol in the last year (%)		
	Population aged 15 and over that has suffered depression in the last year (%)		
Population aged 15 and over that has suffered malignant tumours in the last year (%)			

Table 2 (continued)

Partial synthetic indicators	Variables	Year or reference period	Source
Security	Population aged 15 and over that has suffered injuries or permanent defects caused by an accident in the last year (%)		
	Homicide rate (number of homicides and murders completed or known per 100,000 inhabitants)	2015	Statistical Yearbook of the Spanish Ministry of Internal Affairs
	Crime rate (number of crimes and offenses per 1000 inhabitants)	2014	
Population that suffers noise problems caused by neighbours or from the street (%)	2015		
Community and family	People aged 16 and over who have the possibility of asking for help from relatives, friends or neighbours (%)	2013	
	Divorce rate (percentage of nullities, separations or divorces between all new marriages celebrated in a year)	2016	
Cultural goods and artistic activities	Goods of cultural interest (immovable) per thousand inhabitants	2016	Cultural Statistics Yearbook 2017
	Goods of cultural interest (movable) per thousand inhabitants		
	Library stocks (volumes) per capita	2014	
	Museums and museum collections for ten thousand inhabitants	2016	
	People who carried out artistic activities (writing) in the last year (%) with respect to the population aged 15 and over)	2015	
	People who carried out artistic activities (painting or drawing) in the last year (%) with respect to the population aged 15 and over)		

Source: Elaborated by the authors

Moreover, the rate of natural increase is the variable that explains most of the differences across Autonomous Communities.

According to the results, Asturias, Extremadura and Castile and Leon recorded the lowest values, since they show significant population declines with a negative migratory balance. The latter is especially negative in Castilla-La Mancha, Castile and Leon and La Rioja because of the population loss in some areas of the north and interior of the country. On the contrary, the Canary and the Balearic Islands have the best value for this indicator (level 5), as they are the only regions that have a favourable migratory balance. The regions of Madrid, Andalusia and Murcia reach level 4, the latter having the highest rate of natural increase.

The slight positive correlation between the demographic indicator and per capita income (0.1) should be noted; that is, economic growth in the Spanish Autonomous Communities produces a rise in the rate of natural increase and the nuptiality rate, but a slight reduction of the migratory balances.

**Table 3** Variables associated with the global synthetic indicator of happiness and subjective well-being

Variables	Year or reference period	Source
Percentage of employees who declare maximum satisfaction with their current job (%)	2013	INE
Percentage of people aged 16 and over who have a high satisfaction level with housing and neighbourhood (on a 1 to 10 scale) (%)		
Percentage of people who feel very safe walking alone at night (%)		
Percentage of people who rely very highly on others (on a 1 to 10 scale) (%)		
Percentage of people who rely very highly on the political system (on a 1 to 10 scale) (%)		
Percentage of people who feel high satisfaction with their current life (on a 1 to 10 scale) (%)		
Percentage of people who feel high satisfaction with the time available to do what they like (on a 1 to 10 scale) (%)		
Percentage of people who feel high satisfaction with personal relationships (on a 1 to 10 scale) (%)		
Percentage of people who have experienced a feeling of happiness very often in the last four weeks (%)		
Percentage of people who make a very positive evaluation of the meaning and purpose of life (on a 1 to 10 scale) (%)		
Percentage of population aged 15 and over whose assessment of perceived health status is good or very good in the last 12 months (%)	2014	
Suicide rate	2016	
Percentage of people who claim to have problems related to delinquency or vandalism in the area (%)	2015	Statistical Yearbook of the Spanish Ministry of Internal Affairs

Source: Elaborated by the authors

**Table 4** Values obtained for each objective partial indicator by Autonomous Community\*

	Family	Housing	Employm.	Environment	Economic endowment	Health	Cultural goods	Security	Academic training	Demography
Andalusia	10	8	16	8	17	12	10	11	14	5
Aragon	6	1	6	5	5	3	6	6	5	14
Asturias	12	9	10	16	7	14	4	1	10	15
Balearic Islands	13	17	11	13	4	5	7	17	17	1
Basque Country	3	4	1	11	1	15	11	8	2	10
Canary Islands	17	16	17	17	15	16	12	15	13	2
Cantabria	4	6	8	9	8	10	17	5	12	6
Castile and Leon	2	2	4	3	10	7	3	3	7	17
Castilla-La Mancha	8	7	14	4	16	4	5	7	11	12
Catalonia	15	11	5	12	6	9	15	14	4	7
Extremadura	5	14	15	7	14	13	16	2	16	16
Galicia	14	13	7	6	11	17	9	9	6	13
Madrid	9	15	9	15	3	1	2	13	1	3
Murcia	11	10	13	10	13	11	13	12	15	8
Navarre	1	5	2	2	2	8	1	10	3	4
Rioja, La	7	3	3	1	9	2	8	4	9	11
Valencia	16	12	12	14	12	6	14	16	8	9

\*The seventeenth position is assigned to the Autonomous Community that registers the lowest value, and the first position to the one that holds the highest value  
Source: Elaborated by the authors

## Economic Endowment

In this case, the poverty risk rate and per capita income are the variables that contribute most to the synthetic indicator. As expected, per capita income and the ability to cope with unforeseen expenses are highly correlated with the poverty rate, so they provide less than 30% of new information in both cases. The percentage of main dwellings with Internet access explains only 2.4% of the territorial differences, which is a reflection of the successive access to the global communication network by families.

The variables that explain more than 80% of the differences observed are the following: the risk of poverty rate (48.6%), the percentage of people with difficulties in the payment of expenses related to the main dwelling, and the percentage of people who do not have the capacity to face unforeseen expenses.

The communities with the highest economic endowment are the Basque Country (leading the hierarchy in the first three variables) and Navarre, both reaching level 5. Community of Madrid (the second with the highest per capita income), Balearic Islands (leader in employed population and internet access), Aragon and Catalonia follow them. According to the results obtained in this indicator, a clear geographical pattern divides the map of Spain into two main areas: the north, including the Balearic Islands (levels 3, 4 and 5), and the south, which includes Valencia, Murcia, Extremadura, Canary Islands, Castilla-La Mancha and Andalusia (levels 1 and 2).

## Academic Training

The variables that have been most significant for the calculation of this indicator are the investment in R&D and the percentage of residents who have Bachelor's or Master's degrees. The high correlation between investment in R&D and Doctorate degrees means that the percentage of doctorates only provides 16% of new information for the calculation of the synthetic indicator due to its high correction factor (much of the information is already incorporated in the investment in R&D). Investment in education is the variable that correlates the least with the level of academic training, providing only 19% of new information.

This is due to the high dependence between this variable and the rest, for most of the information is already included in the other variables. In addition, a larger amount of educational resources does not necessarily ensure better academic results if they are not accompanied by other complementary measures. Governments should be working on legislative reforms that prioritise effort and excellence and an educational pact among all political forces that emphasises humanities (Classical languages, Philosophy or History of religions), critical thinking and interest in general culture and science (multidisciplinary training). To our view, training must not only be focused on the most practical aspects related to attaining a job (de Maya Matallana 2016: 163 and 164).

In the light of results, Madrid is the region with the highest percentage of people with Bachelor and Doctorate's degrees, so it holds the first position in the ranking of this partial indicator. Madrid is followed by the Basque Country (leader in educational investment or R&D expenditure, with the lowest dropout rate) and Navarra (level 5), together with Catalonia (level 4) and Aragon (level 3). With less than 1 point and reaching level 1 are Andalusia, Murcia, Extremadura and Balearic Islands, which have fewer human resources. The lowest investment in R&D and the highest dropout rate are found in the Balearic Islands, but this region reaches level four in economic endowment.

A reduction in dropout rates and larger investments in R&D in the regions with lower levels of human resources are needed to reduce regional differences, as this variable accounts for more than 60% of the differences. The investment in education only explains about 2% of the differences, below the rest, due to the similar coverage in all the Spanish regions. Finally, the high linear correlation between per capita income and all variables is remarkable, especially investment in R&D; regions with the highest economic endowment usually have higher levels of human resources, except for the Balearic Islands.

## Employment

Precisely Balearic Islands has a highest value for this indicator, since it is the second with the lowest rate of long-term unemployment, after Navarre. In addition, it is the region with the largest number of employees experiencing maximum satisfaction with their current job. It is followed by Navarre, the Basque Country, La Rioja and Aragon (all very close to the maximum value reached). The regions with lower values are Extremadura, Andalusia and the Canary Islands. The latter reaches level 1, especially due to its high rates of unemployment and temporality, which reveals the wide territorial gap in the employment dimension.

The most significant variable for well-being is a reduced long-term unemployment rate, with a correlation with the partial synthetic indicator close to unity. The rates of standard unemployment and temporary employment also have a significant influence on the indicator, but they are strongly correlated with the long-term unemployment rate, so the correction factors reach percentages of 60% or over.

The variables with greater explanatory power on regional differences are by far the following: the percentage of R&D staff (accounting for 38.2% of the differences), the long-term unemployment rate (29.1%) and the number of employees experiencing maximum satisfaction with their current job (15.7%). The high correlation between per capita income and unemployment, temporary employment and R&D staff rates must be highlighted.

Therefore, economic growth reduces unemployment, including the long-term type, and the incidence of temporary or precarious work. In addition, it increases the proportion of research staff because it is mainly state-funded, especially in fundamental research, and public revenues strongly rely on the economic cycle. However, the number of self-employed workers and employees claiming maximum satisfaction with their work diminishes in boom times, which shows that the jobs created do not always coincide with people's preferences.

## Environment

In this dimension, La Rioja (which stands out for its diversity of species of fauna and flora) and Navarre are the regions with the better results in environmental quality, followed by Castilla-La Mancha, Castile and Leon, Aragon, Galicia (largest surface devoted to home gardens) and Extremadura. Castile and Leon stands out as the region with the lowest percentage of population suffering from pollution problems, while Aragon has the largest forest area per inhabitant.

The most determining variables in well-being are the use of renewable energy, the number of species of flora and fauna and the percentage of population suffering from pollution problems, whereas CO<sub>2</sub> emissions is the least representative variable. The two variables related to the variety of flora and fauna species are highly correlated, so the

latter only provides 2% of new information, whereas the remaining 98% is redundant information already included in the variables that came first in the calculation of DP2.

Regarding the impact of an increased per capita income, economic growth is slightly positive when it comes to raising the variety of flora and fauna species and reducing the percentage of population that is subject to pollution problems and promoting renewable energies. On the contrary, economic growth reduces the area devoted to family gardens and forest and produces a small increase in the CO<sub>2</sub> tons emitted per capita. Overall, conventional economic well-being hardly has a positive influence on the synthetic environment indicator, which reveals that the productive structure of the Spanish economy is not sufficiently promoting the so-called “green employment” (recycling, leisure activities in the natural environment, rural tourism, handicrafts, ecological agriculture) and the use of renewable energies.

The Autonomous Communities with lower levels of environmental well-being (level 2) are Madrid (despite being the one with the lowest CO<sub>2</sub> emissions per capita), Asturias and the Canary Islands (with the most serious pollution problems). The variables with the greatest explanatory power on regional differences (they explain more than 75% of the differences found) are those involving flora, family gardens, renewable energies and population suffering from pollution-related problems.

### **Housing Habitability**

All the variables included have a positive correlation with the partial synthetic indicator, those related to problems (shortage of natural light) and deficiencies in the dwelling being the most influential ones. The two variables explain more than 75% of the regional differences. It must be emphasised that all the variables included provide a significant percentage of new and useful information, over 70% in all cases.

By regions, Aragon remarkably stands out from the rest (level 5), followed by the Basque Country, Castilla-La Mancha and Castile and Leon. Strikingly, Madrid (natural light shortage) is at level 1, along with Galicia (lower satisfaction with housing) and Canary Islands (housing deficiencies).

An increase in per capita income produces a slight improvement in the housing indicator, which reduces the percentage of households with housing problems and deficiencies. However, the number of households owning property and those that claim high satisfaction is reduced. Therefore, although economic growth slightly improves housing provision, there is room for improvement in the promotion of public housing policies.

### **Health**

The most correlated variables in this indicator are the assessment of perceived health status and the proportion of the population that has suffered from depression, diabetes or cholesterol in the last year. On the contrary, the variables that explain most of the differences (more than 80%) are related to injuries caused by an accident, malignant tumours and depression.

The regions with higher values in this indicator are Madrid (highest life expectancy), La Rioja, Aragon (smallest incidence of malignant tumours and injuries by accident) and Castilla-La Mancha. On the contrary, the Canary Islands (lower life expectancy and



higher incidence of chronic diseases) and Galicia (worst values in the rest of the variables -perception of health status, depression, diabetes and malignant tumours-) hold the last positions.

Regarding the impact of economic growth on the health indicator, it has positive effects on the variables that are most correlated with the synthetic indicator and on the increase in life expectancy. However, it has deleterious effects on the population's health (increased percentage of population with malignant tumours or injuries caused by an accident).

## Security

The security indicator is mainly represented by the crime rate and the percentage of people who claim to suffer from delinquency problems. Whereas the least explanatory variable is the percentage of people who feel very safe walking alone at night, the variables with most explanatory power are the homicide rate and the crime rate, both explaining more than 50% of the differences found.

The regions with the highest level of security are Asturias, Extremadura, Cantabria, La Rioja (level 5) and Aragon (level 4). Asturias has the lowest values in problems of delinquency and noise produced by neighbours, while Extremadura has the lowest rate of crimes and homicides. On the other hand, Balearic Islands has the highest crime rate and the highest percentage of population with neighbourhood noise problems.

As for the impact of economic growth on this indicator, an increased per capita income leads to a rise in the crime rate and the percentage of people who report having problems related to crime or security when walking alone at night. The result is a slight negative correlation between the security indicator and per capita income (-0.12).

## Family

Andalusia and Extremadura are the best-positioned regions in the family dimension. The former has the highest percentage of people who trust others and rely on the political system to a great extent. Navarre occupies the third position thanks to its low divorce rate (50.3%). Galicia and the Canary Islands are located in the last places, the latter having the highest divorce rate (over 70%) and the lowest percentage of people who have the possibility of asking for help.

The most significant variables for family-related well-being are the percentage of people who trust others, the divorce rate and the possibility of asking for help. Each variable that is incorporated last in the iteration provides a large amount of new information. It should be noted that there is a high negative correlation (below 0.1) between per capita income and the percentage of people who strongly rely on the political system, which means that economic growth hardly affects the improvement of the family indicator.

## Cultural Goods and Artistic Activities

The variables that are most correlated with the synthetic indicator are the percentage of people who undertook artistic activities, such as painting or drawing and playing a musical instrument. As there is a high correlation between them, the variable related to musical activities only provides 26% of useful information. On the contrary, movable cultural heritage (44% of the differences found originate from this variable), museums, and

museographic collections (18%) have a great discriminating power to show differences across regions.

Navarre and Madrid have the highest values in this indicator (level 5). In fact, Madrid is close to the target or maximum level due to its leading position in drawing or painting activities and in library funds. In contrast, Extremadura and Cantabria occupy the last positions.

In general, economic growth has positive effects on this indicator because five out of the seven variables analysed have a positive correlation with per capita income. The partial synthetic indicator shows a positive correlation close to 0.5, which can be explained by the large public and private investments needed to maintain historical heritage.

### **Global Synthetic Indicator of Objective Well-Being**

This section analyses the final data obtained for each objective indicator and the synthetic index that brings the ten dimensions analysed together (Tables 4 and 5). According to the methodology used, the regions with higher levels of socioeconomic well-being are Navarre, La Rioja and Aragon (level 5), along with Castile and Leon, Madrid, Castilla-La Mancha and Basque Country (level 4). On the contrary, according to the statistical information consulted (see Map 1), the regions with the worst results in the estimation of well-being are Galicia and Valencia (level 2), together with the Canary Islands (level 1).

The most representative indicators for the calculation of social well-being are those related to family, housing, work and environment, with a correlation coefficient close to or over 70% with the objective synthetic indicator in the four cases. The indicator of economic endowment occupies the fifth place, because part of the new information provided by the latter has already been included in the first four indicators (its correction factor exceeds 86%).

The dimensions that best account for regional differences are those related to academic training, cultural goods and family. It would be very convenient to focus on these areas in order to bridge the well-being gap between Spanish regions.

Every partial synthetic indicator studied contributes positively to well-being because the correction factors never reach the unit value, although there is a negative correlation between the synthetic indicator and the demographic dynamic. Therefore, the productive model of the Spanish economy does not safeguard the reconciliation of work and family life, as can be concluded from the economic, educational and employment difficulties encountered by the people who decide to start a family.

The high correlation between per capita income and economic endowment, academic training and employment is also noticeable. There is also a positive correlation with the rest of the indicators, but it should be noted that the Spanish development model hardly prioritises the dimensions of security, environment, demography, health, housing and family. It would be advisable to find a better balance between the biosphere, the human being and the economic and cultural activities.

These results, in terms of the ordination by regions, coincide approximately with those obtained in other works, being the autonomous communities (CA) of the center and north of Spain those that obtain the best results, whereas the Mediterranean and southern regions obtain the lower objective welfare values. However, improvement trends are more favourable in regions with worse positions. For example, González et al. (2018) conducted a study for Spanish municipalities using data from the 2011 census and, by adding data by

**Table 5** Linear correlation coefficients and correction factors of objective partial synthetic indicators

	Family	Housing	Employment	Environm.	Econ. endow.	Health	Cultural goods	Security	Academic training	Demog.	SISW <sub>0</sub>
Pearson (1)	0.83	0.72	0.71	0.69	0.57	0.57	0.57	0.5	0.49	-0.31	1
Pearson (2)	0.54	0.37	0.16	0.31	0.14	0.76	0.18	0.08	-0.05	0.13	0.58
Pearson (3)	0.31	0.27	0.82	0.06	0.92	0.26	0.46	0.01	0.87	0.12	0.56
Correction factor	0	0.36	0.21	0.34	0.86	0	0	0.35	0.96	0.65	
$\alpha_i$ (%)	12.21	9.85	10.35	9.23	2.42	8.9	14.58	11.05	16.05	5.38	

- (1) Pearson's linear correlation coefficient with the synthetic index of objective well-being
- (2) Pearson's linear correlation coefficient with the synthetic index of global well-being (objective and subjective)
- (3) Pearson's linear correlation coefficient with per capita income

Source: Elaborated by the authors

Autonomous Community, they obtained that the region with the best overall profile is Navarre, followed closely by La Rioja and Basque Country.

Together with these three regions of the central-northern geographical area of Spain, Aragon, Castile and Leon, Cantabria, Galicia and, as an “atypical” result, Extremadura, which ranks first in some indicators, are defined as intermediate communities. According to Cárcaba et al. (2017a), the reason could be that some rural regions may not be well represented, given that the study only incorporates large municipalities. The most negative profiles correspond to the Canary Islands, Andalusia, Catalonia, Valencian Community, Murcia and the Balearic Islands (southern and Mediterranean). Madrid reaches an intermediate position, but gets the municipalities with the highest quality of life index.

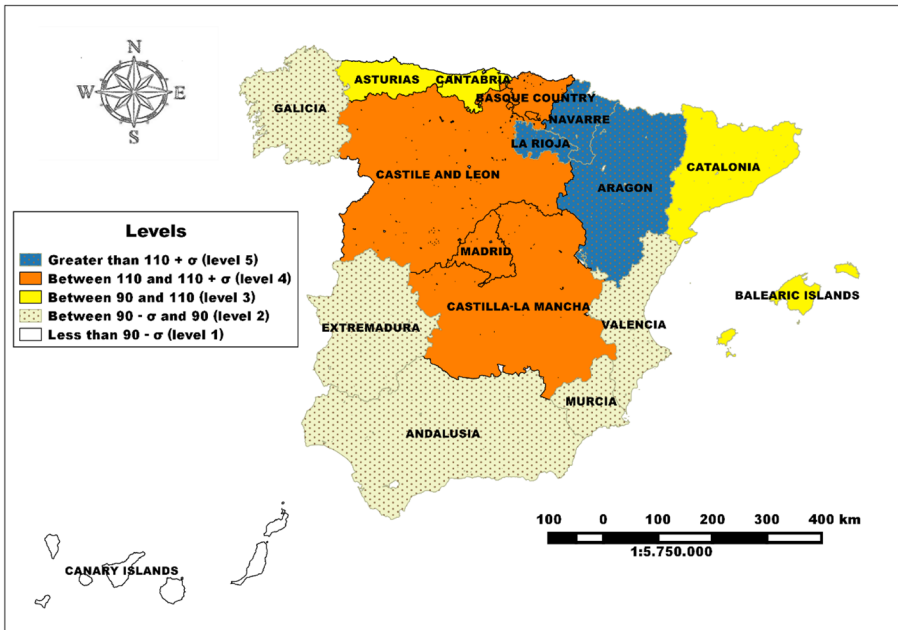
Peiró et al. (2019) also reveal that the lowest level of well-being is located on the Mediterranean coast and the southern provinces, although they do not find a clear geographical pattern. Herrero et al. (2018) obtain a different classification of the autonomous communities when considering objective well-being: higher levels in La Rioja, Basque Country, Navarre and Madrid; intermediate-high in Cantabria and Castile and Leon; around the average in Aragon, Catalonia, Asturias, Balearic Islands and Galicia; and below average in the Valencian Community, Castilla-La Mancha, Extremadura and Murcia, being Andalusia and the Canary Islands the communities with the worst overall results.

## Synthetic Indicator of Happiness and Subjective Well-Being and Global Synthetic Indicator

The variables that most influence the results of the indicator of happiness (with correlation coefficients of 80% or over) are those related to personal relationships, work, trust in others and satisfaction with free time. More than 66% of the regional differences are explained by five variables: trust in the political system, delinquency, security, personal relationships and trust in others.

The region with the highest level of subjective well-being is the Balearic Islands, occupying the first position in satisfaction with current job (along with Castilla-La Mancha), housing and happiness and satisfaction with life. Valencia, Murcia and Aragon also occupy the first positions, followed by Extremadura, Castilla-La Mancha and Andalusia (all reach level 4). In contrast, Castile and Leon and Galicia are in level 1.<sup>5</sup>

<sup>5</sup> Different results on life satisfaction have been obtained in the work of Herrero et al. (2018), where the best values are found in Navarre, the Basque Country and Catalonia, followed by Asturias, La Rioja, Balearic and Canary Islands. Those regions around the average are Castilla-La Mancha, Extremadura, Madrid, Cantabria, Valencian Community, Castile and Leon and Aragon, whereas Andalusia, Murcia and Galicia are below average. When comparing the values of the objective variables with the average values of satisfaction with life, an added level of satisfaction is found in the Mediterranean, except for Andalusia, which maintains a similar position when using objective and subjective variables. On the contrary, Galicia and Castile and Leon are the communities that show a satisfaction with life far below the objective data. Other authors, such as Portela and Neira (2012), obtain the highest values of subjective well-being in Madrid, the Basque Country, Navarre, La Rioja and Aragon, and the lowest values in the Canary Islands, Galicia, Asturias and Cantabria. However, the results in Navaro-Azorin and Artal-Tur (2015) are more similar to those obtained in this work, since the municipalities of the Mediterranean axis show greater levels of well-being, given their attractiveness as a destination for migratory flows. Therefore, they consider that the well-being of the inhabitants of a territory is reflected in their migratory decisions, given that the population is supposed to move to improve quality of life. Nevertheless, a converging trend in well-being favourable to central-northern regions has been observed due to the economic crisis.



**Map 1** Ordination of Autonomous Communities by levels according to the synthetic indicator of objective social well-being (SISW<sub>0</sub>). Source: Elaborated by the authors

The partial synthetic indicator of subjective well-being has a negative correlation with per capita income ( $-0.21$ ), which especially affects the percentage of people who trust the political system and those who are satisfied with their current job. Additionally, it has a negative impact on seven other variables (sense of life, security, satisfaction with personal relationships, happiness, crime, housing and spare time). However, it has positive effects on perceived health status, satisfaction with life and trust in others, and it reduces the suicide rate. Nevertheless, if we take into account the information provided by both objective and subjective indicators, there is a slight positive contribution of per capita income to global well-being ( $0.11$ ).

The ranking obtained with the subjective indicator differs significantly from that obtained with objective indicators of well-being or with the overall synthetic index. The regions that are most favoured by the introduction of subjective indicators in the global well-being index are Valencia, Murcia, the Balearic Islands, Andalusia and Extremadura (ascending at least four places in the ranking). The most negatively affected are Castile and Leon (loses 10 positions), Madrid, the Basque Country and Catalonia (Tables 6, 7, 8; Maps 2 and 3).

## Discussion and Conclusions

This section discusses some economic policy measures aimed at bridging the well-being gap between Spanish regions. An improvement of the current socioeconomic

model needs to be sought, where the integral development of people prevails, beyond strictly material welfare. Without neglecting economic welfare, it needs to be more compatible with other dimensions, such as environment, security, family or subjective well-being.

Spain embraces various socioeconomic realities as proved by the different levels of quality of life reached in each region. In this way, Aragon, Navarre and La Rioja achieve the highest levels of well-being, whereas the Canary Islands and Galicia occupy the last two positions in the classification. This separation differs from the one usually obtained with other indicators, in which the Basque Country and Madrid are in the first group and the southern regions in the second.

The dimensions that are most correlated with objective well-being are those related to family, housing, work and environment. The positive effects of economic growth on the improvement of all the partial synthetic indicators must be underlined, except for the indicator of subjective well-being (Annex Tables 9 and 10).

It may be concluded that prosperity, understood as social welfare, can be achieved without relying on material growth exclusively. Actually, a decrease in happiness or subjective well-being is occurring as per capita income grows. Therefore, the hypothesis that income growth is hardly related to an increase in happiness, while other non-monetary variables are more important, is fully fulfilled. This thesis, known as the Easterlin paradox in the field of the Economy of Happiness and supported by some authors (Easterlin 2001; Frey and Stutzer 2002; Iglesias et al. 2013), could explain the reduction of growth in some cases, and even the economic decline in rich countries (Victor and Rosenbluth 2007; Victor 2010; Jackson 2011; Daly 2013). The Spanish economy must be reconverted to place greater emphasis on the reduction of working time and employment distribution, the promotion of the green economy and RDI, labour-intensive public services, the collaborative economy and a development that is more focused on own resources. Additionally, it is increasingly difficult for the young to start a family, since the labour market is not sufficiently adapted to family needs (job insecurity, rigid work schedules, shortage of free time to for leisure activities, discrimination against women, among others).

As for the environmental dimension, the Spanish business network is not taking advantage of the new sources of employment related to the so-called “green employment” and the use of renewable energies. Economic growth not only reduces the surface devoted to family gardens and forests but it also increases CO<sub>2</sub> tons of emitted per inhabitant (Victor 2010).

In order to reduce the regional gap, it would be advisable to focus on the areas of culture, security and academic training. A review of the regional financing model is necessary so that certain regions can increase their investment in R&D, especially in those territories lagging behind in this respect, such as Extremadura and the Balearic Islands.

In addition, dropout rates should be reduced through an overhaul of the education system with the agreement of all political parties and with the help of teachers and experts in education. In conclusion, Spain needs to provide the population with general basic training so that citizens can successfully face the challenges of a new economy based on knowledge and happiness, and adapt to

**Table 6** Values obtained for each subjective variable by Autonomous Community

	Pers. relat.	Satisf. job	Trust others	Satisf. time	Satisf. housing	Happiness	Satisf. life	Purpose of life	Health	Trust system	Suicide	Security walking alone	Delinq.
Andalusia	5	4	1	7*	6	7	11	6*	10	1	8	14	8
Aragon	3	6	8	5	3	6	2	5	12	5*	12	6	4
Asturias	9	9	13	2	8	5	14	14	13	7*	17	4*	1
Balearic Islands	2	1*	4	6	1	1	1	3	3	5*	11	8	13
Basque Country	10	11	9	3	7	16	13	9	8	10	10	12	2
Canary Islands	15	12	14	10	16	12*	10	11	15	6*	13	2	14
Cantabria	13	7	7	4*	11	9	15	13	5	8	5	3	10
Castile and Leon	16	15	15	12	15	14	16	15	16	9	14	16	7
Castilla-La Mancha	7	1*	9	4*	5	13	5	7	11	5*	2	7	5
Catalonia	12	8	5	8	10	12*	3	4	6	5*	4	15	16
Extremadura	4	3	3	7*	4	11	12	6*	7	3	6	5	12
Galicia	17	16	16	13	17	15	17	16	17	7*	16	13	9
Madrid	8	14	11	7*	13	10	7	10	2	6*	1	10	17
Murcia	1	5	10	1*	12	8	6	1	14	4	9	1	15
Navarre	14	13	2	11	9	4	9	12	1	9	7	4*	6
Rioja, La	11	10	12	9	14	3	8	8	4	6*	15	9	3
Valencia	6	2	6	1*	2	2	4	2	9	2	3	11	11

\*The asterisk is used when two or more Autonomous Communities share the same values

Source: Elaborated by the authors

**Table 7** Synthetic index of objective social well-being (SISW<sub>O</sub>), synthetic index of subjective social well-being (SISW<sub>S</sub>) and synthetic index of global social well-being (SISW<sub>O+S</sub>)

	SISW <sub>O</sub>	Ordination	SISW <sub>S</sub>	Ordination	SISW <sub>O+S</sub>	Ordination	Difference in the ordination SISW <sub>O</sub> - SISW <sub>S</sub>	Difference in the ordination SISW <sub>O</sub> - SISW <sub>O+S</sub>
Andalusia	4.73	12	8.48	7	7.18	8	+5	+4
Aragon	8.78	3	9.08	4	10.00	1	-1	+2
Asturias	5.92	9	7.44	10	6.87	11	-1	-2
Balearic Islands	4.96	10	10.00	1	8.74	4	+9	+6
Basque Country	7.02	7	5.92	12	6.30	13	-5	-6
Canary Islands	0.00	17	5.33	15	2.09	16	+2	+1
Cantabria	5.97	8	7.65	8	7.08	9	0	-1
Castile and Leon	8.70	4	1.64	16	4.99	14	-12	-10
Castilla-La Mancha	7.32	6	8.63	6	8.73	5	0	+1
Catalonia	4.78	11	5.73	13	4.71	15	-2	-4
Extremadura	3.99	14	8.73	5	7.07	10	+9	+4
Galicia	3.82	15	0.00	17	0.00	17	-2	-2
Madrid	7.43	5	5.61	14	6.35	12	-9	-7
Murcia	4.61	13	9.62	3	8.22	6	+10	+7
Navarre	10.00	1	7.52	9	9.58	2	-8	-1
Rioja, La	9.44	2	7.08	11	8.86	3	-9	-1
Valencia	3.68	16	9.78	2	7.97	7	+14	+9

Source: Elaborated by the authors



**Table 8** Linear correlation coefficients and correction factors of subjective variables

	Personal relation.	Satisf. job	Satisf. with time in others	Satisf. with housing	Happiness	Satisf. with life	Purpose of life	Health	Trust in the political system	Suicide	Security walking alone	Delinq.	SISW <sub>s</sub>
Pearson (1)	0.9	0.88	0.8	0.77	0.75	0.74	0.73	0.59	0.57	0.38	0.37	0.03	1
Pearson (2)	-0.01	-0.16	-0.04	0.03	0.06	0.01	-0.21	0.39	-0.42	0.11	-0.23	0.31	0.01
Pearson (3)	0.72	0.63	0.71	0.6	0.65	0.61	0.49	0.67	0.24	0.37	0.16	0.2	0.82
Pearson (4)	-0.17	-0.43	0.04	-0.06	-0.11	0.08	-0.28	0.43	-0.64	0.14	-0.25	0.11	-0.21
Correction factor	0	0.66	0.51	0.52	0.08	0.56	0.7	0.62	0.42	0.33	0	0	
$\alpha_i$ (%)	9.2	3.42	7.11	4.62	3.69	5.29	3.71	1.06	19.66	7.46	11.15	19	

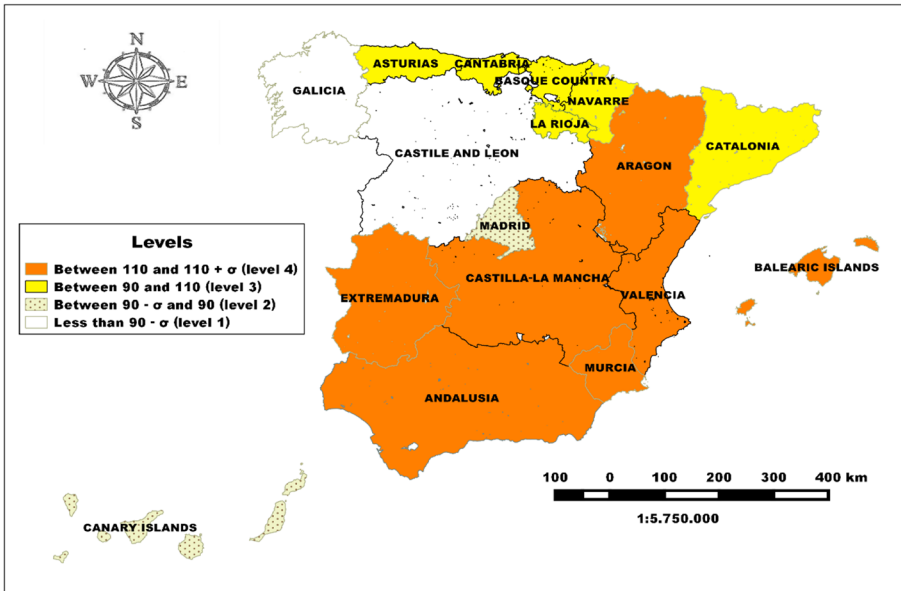
(1) Pearson's linear correlation coefficient with the synthetic index of subjective well-being

(2) Pearson's linear correlation coefficient with the synthetic index of objective well-being

(3) Pearson's linear correlation coefficient with the synthetic index of global well-being (objective and subjective)

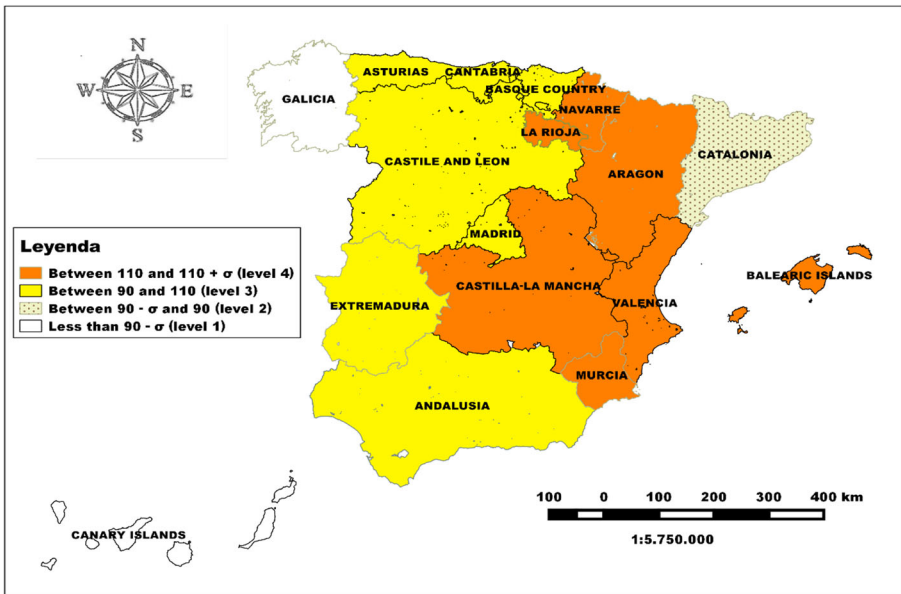
(4) Pearson's linear correlation coefficient with per capita income

Source: Elaborated by the authors



**Map 2** Ordination of Autonomous Communities by levels according to the synthetic index of subjective social welfare (SISW<sub>S</sub>). Source: Elaborated by the authors

the future changes that quantum technologies and robotics will bring about in the labour market and business production.



**Map 3** Ordination of Autonomous Communities by levels according to the synthetic index of global social welfare (SISW<sub>O+S</sub>). Source: Elaborated by the authors

**Annex**

**Table 9** Partial synthetic indicators of family, housing, employment, environment and economic endowment

	Family (stand.)	Level	Housing (stand.)	Level	Employment (stand.)	Level	Environment (stand.)	Level	Econom. endowm. (stand.)	Level
Andalusia	7.43	4	5.88	4	1.85	1	3.49	3	0	1
Aragon	8.73	4	10	5	8.05	4	5.72	4	7.43	4
Asturias	6.27	3	5.64	4	7.05	4	0.13	2	6.67	4
Balearic Islands	5.62	2	0	1	7.01	4	2.09	2	8.28	4
Basque Country	9.3	4	7.51	4	10	5	3.2	3	10	5
Canary Islands	0	1	0.5	1	0	1	0	2	1.21	2
Cantabria	9.07	4	6.11	4	7.76	4	3.41	3	6.67	4
Castile and Leon	9.31	4	8.44	5	8.65	4	6.23	4	5.99	4
Cast-La Mancha	8.33	4	6.02	4	3.56	2	6.1	4	1.17	2
Catalonia	5.34	2	4.54	3	8.52	4	2.28	2	7.33	4
Extremadura	9	4	2.03	2	2.16	1	4.6	4	1.64	2
Galicia	5.47	2	3.62	2	7.88	4	5.43	4	5.66	4
Madrid	7.71	4	2.03	2	7.75	4	1.7	2	8.32	4
Murcia	7.06	3	4.59	3	4.77	2	3.33	3	2.57	2
Navarre	10	5	6.7	4	9.81	5	7.56	5	9.93	5
Rioja, La	8.68	4	7.63	4	9.23	4	10	5	6.23	4
Valencia	4.14	2	4.54	3	5.54	3	1.72	2	3.07	2
Average 17 Autonomous Communities	7.14	3	4.79	3	6.45	3	3.94	4	5.42	3
(weighted by population)	6.61	3	4.41	3	5.98	3	3.14	3	4.84	3
Pearson's coefficient (%)	34.04		39.55		34.9		32.18		44.69	

Source: Elaborated by the authors

**Table 10** Partial synthetic indicators of health, security, cultural goods, academic training and demography

	Health (stand.)	Level	Security (stand.)	Level	Cultural goods (stand.)	Level	Academic training (stand.)	Level	Demography (stand.)	Level
Andalusia	5.9	3	4.82	3	4.15	3	0.81	1	5.43	4
Aragon	9.29	4	7.35	4	5.33	3	4.55	3	2.49	2
Asturias	5.19	2	10	5	6.96	4	3.52	2	2.30	2
Balearic Islands	8.42	4	0	1	4.99	3	0	1	10.00	5
Basque Country	4.82	2	6.91	4	3.89	2	8.86	5	3.58	2
Canary Islands	3.99	2	1.68	2	3.65	2	2.22	2	6.38	4
Cantabria	6.64	3	7.9	4	0	1	2.86	2	4.77	3
Castile and Leon	7.14	3	8.79	5	7.32	4	3.93	3	0.00	1
Cast-La Mancha	9.01	4	6.93	4	6.54	4	2.92	2	2.85	2
Catalonia	6.77	3	2.93	2	2.89	2	5.66	4	4.73	3
Extremadura	5.32	2	9	5	0.6	1	0.44	1	2.10	2
Galicia	0	1	6.34	4	4.42	3	4.5	3	2.69	2
Madrid	10	4	2.98	2	8.65	5	10	5	6.22	4
Murcia	5.97	3	3.74	2	3.48	2	0.76	1	4.67	3
Navarre	6.94	3	5.66	4	10	5	8.63	5	5.59	4
Rioja, La	9.42	4	8.73	5	4.74	3	3.79	2	3.21	2
Valencia	7.49	3	0.74	1	3.4	2	3.92	3	4.48	3
Average 17 Autonomous Communities (weighted by population)	7.05	3	5.56	4	4.76	3	3.96	3	4.2	3
Pearson's coefficient (%)	6.68	3	4.39	3	4.79	3	4.41	3	4.55	3
	24.05		43.44		38.22		51.81		40.99	

Source: Elaborated by the authors

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