

## Influences and spatial effects on subjective well-being

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**Abstract.** *In this paper we explain the influence of some economic-social and psychological factors on a higher life satisfaction, as an expression of the subjective state of well-being, on a sample of 32 European countries. In the analysis, we used results of surveys on quality of life conducted during 2011-2012 and 2016 by Eurofound. We opted for estimating spatial models to highlight influences on well-being due to the existence of spatial autocorrelation between variables. The findings reveal that there is consistent positive relationship between life satisfaction and satisfaction in the fields and a significant negative relationships were found in relation to negative emotions, perception of a high degree of corruption in society or, even more importantly, unequal income distribution.*

**Keywords:** subjective well-being, life satisfaction, positive and negative affect.

**JEL Classification:** I31, C33, D31.

## 1. Introduction

As an essential human right, well-being, is defined as a prolonged state of contentment, of harmony of an individual, due to a good physical and mental health, personal and economical safety or of the feeling of social affiliation. It assumes satisfying the basic needs, the fact that individuals have a purpose in life and the objectives that they feel they can achieve. Also, it is strengthened by elements as personal relationships, membership in strong communities, freedom to make key life decisions, a good job, a reliable environment and a clean climate. Well-being can be considered a combination of what a person has, what he can do, and how satisfied he is with what he can do.

Well-being excludes depression, suffering, feelings of pressure and frustration, but it is more than that. So, the term of subjective well-being (SWB) is a comprehensive construct, that refers to how people experience and evaluate their lives in a positive way (Tov, 2018) and which includes several dimensions: mental, physical, emotional, psychological, societal, related to the job, personal development or individual values.

In the last decades, an important development in the field consists of recognition and acceptance of the fact that well-being embodies several aspects and can not be represented only by one measure. To describe and evaluate the well-being, objective considerations are used, economic or related to the individual's own characteristics (age, gender, marital status, etc.), his personality, the integration on the labor market. Also, subjective considerations are taken into account, regarding the way in which individuals perceive and evaluate their own life, mood, feelings and emotions, in general, psychic and mental factors (Diener, 1984; Diener et al., 2000; Diener et al., 2002; Seligman, 2018).

Components used in the assessment of subjective well-being are distinctively treated in literature, from a double perspective. The cognitive dimension (*cognitive well-being* – CWB), the extent to which individuals are satisfied in achieving their aspirations and based on beliefs, attitudes towards life satisfaction, both in global terms and in specific domains (job satisfaction, family life satisfaction, education, health, living standard, institutional trust) (Diener et al., 1999). For a person with a high CWB objectives, desires and standards are largely met by the current conditions of his life (Diener, 1984; Tov, 2018). *The affective component of subjective well-being* (*affective well-being* – AWB) refers to the individual's emotions and experiences, reflecting the amount of pleasant and unpleasant feelings, positive and negative affect that people are experiencing in their daily lives (e.g. happiness, joy, contentment, sadness, anger, concern, etc.) (Diener et al., 2002, p. 63).

From the economical point of view, well-being is analyzed in terms of income and/or its distribution. From the psychological and behavioral sciences' point of view, subjective factors must also be taken into account, as well-being transcends the economic dimension, focusing on social, cultural, political, environmental values, etc. That is why it is important that these dimensions are treated in their interdependence with each other.

Usually, achieving objectives leads to a pleasant feeling, while lack of fulfillment can have an unpleasant effect. Human well-being means taking into account what people say, their opinions and perceptions. Thus, emotional experiences provide information about how well one's life is going, and can be judged in terms of *life satisfaction (LS)*. This is the degree

to which a person positively assesses the overall quality of his or her life, i.e. how much a person likes his or her life (Veenhoven, 1996, 2005). Life satisfaction is how people show their emotions, feelings and how they feel about their directions and options for the future.

Thus, life satisfaction is a measure of well-being regarding mood, satisfaction with social and family relationships, the achieved objectives, ability to cope with everyday life. Life satisfaction is a key component of well-being "... it is the subjective appreciation of our life as a whole" (Veenhoven, 2015, p. 207).

## 2. Literature review

Literature in the fields of sociology, psychology, health, socio-economic and even political sciences comprises a very rich theoretical and empirical perspective on well-being or life satisfaction. The importance of different life circumstances in shaping the overall life satisfaction is a topic for various studies and researches, with a growing interest of economic approaches. Šoltés, Nováková and Szabo (2018, p. 60) cites specialists who have focused on the role of income, as a gain of individual satisfaction with life. Observing time series data in countries with different levels of development confirmed that between short-term fluctuations in people's happiness levels and their incomes there is a positive association, but without them being linked in long-term trends. The failure to confirm a relationship between GDP per capita and happiness has been widely analyzed in the literature, becoming a reference principle called the Easterlin paradox, after the name of Easterlin (1974) which highlighted it. As Clark, Frijters and Shields (2008) affirmed, the Easterlin paradox is not specific to the US. Developed countries have seen obvious increases in per capita income in the recent decades, but without the level of happiness of the population to increase. The authors captured data from Japan and from five European countries (Italy, Germany, France, Holland and Great Britain), where despite the increase in income, there was no evidence of an increase in life satisfaction.

In an analysis of happiness in the US and Great Britain in the last quarter of twentieth century, Blanchflower and Oswald (2004), using primary data from General Society Surveys (GSS) in the US, made a number of observations: if in the early 1970s, the percentage of those who declared themselves very happy was 34%, and the proportion of women with the highest score of happiness was slightly higher, 36%, by the end of the 1990s, the overall percentage dropped to 30% and only 29% of women still fell into this category. In relation with different demographic characteristics, white population seems to be less happy, and depending on the age, the configuration of the evolution of the level of happiness takes the form of a U-shape curve. For Great Britain, the association between income and life satisfaction was a flat one.

Stevenson and Wolfers (2013) mention different authors according to whom a high level of subjective well-being is not successive to a high income, once a basic level of satisfaction is met. To support this idea we find authors of reference for defining and assessing well-being, such as Diener and Seligman (2004), who see only a small improvement if it, if the essential needs of people are met. In another study, Diener and Biswas-Diener (2002) report a small effect of money on happiness in developed countries. For Layard (2003), the

threshold of independence for improving the level of happiness intervenes only for an income higher than 15.000 dollars per capita. Di Tella and MacCulloch (2008) or Clark, Frijters and Shields (2008) reached the same conclusions.

One of the findings drawn from the literature is that the higher the level of economic development and wealth of a country, the weaker the impact on the reported satisfaction. (Frey and Stutzer, 2002; Veenhoven, 2005, 2015). The fact that we are witnessing a general decrease in well-being in parallel with the increase in income, wealth in general has been explained by the fact that people are increasingly dependent on lucrative activity, at the expense of leisure time or consumer goods, which would certainly have an impact on their level of satisfaction, and their quality of life in general (Eaton and Eswaran, 2009).

However, these are not the only results and observations, other studies contest the Easterlin paradox. Blanchflower and Oswald (2004), following econometric estimates, concluded that there was a positive association between high income and a high levels of happiness. Using a scale that measures one's broad vision or assessment of their life, the valuation constantly increases with income. Kahneman and Deaton (2010) also identify an effect of increasing income in the direction of a better evaluation of life satisfaction, but not an emotional well-being. On a scale that measures wide vision or the assessment of one's own life, assessment increases together with income. Kahneman and Deaton (2010) identify the effect of income growth upon a better assessment of life satisfaction, without referring to emotional well-being.

Stevenson and Wolfers (2013) note, however the absence of a relationship between income and life satisfaction, appreciating that the relationship between well-being and income is a logarithmic one that does not indicate reductions when income increases. Layard, Clark and Senik (2012, p. 5) also highlight the importance given to logarithmic income transformation in the subsequent assessment of life satisfaction, the result being a linear variation of the absolute level of satisfaction with income logarithm.

Another research in this area identifies that people in richer countries are more satisfied with material conditions or life as a whole and this life satisfaction is significantly affected by other objective conditions in poor countries (Schyns, 2002). According to Zagórski, Kelley and Evans (2010), for rich countries, an increase in household income as well as an increase in higher education in a country with a high average educational level do not affect the happiness of individuals in the same way, but there is a strong beneficial impact of a country's level of development on their well-being, an aspect highlighted especially for poorer countries. Wiese (2014) tested the impact and importance of PIB on the well-being of citizens in European countries. He identified important differences in life satisfaction and the deviation from increased trends among certain countries (Spain, Italy, Portugal and Greece) and confirmed that some characteristics of their welfare state could determine their citizens to be more dependent on certain economic variables, such as income growth.

In a recent study on the importance of material living conditions, Šoltés, Nováková and Szabo (2018) concluded that both the richer population and the population of richer countries are more satisfied with life. These results are obtained by separate econometric estimates on three territorial areas, UE-15, countries from the Visegrad group (V4, Czech

Republic, Slovakia, Poland and Hungary) and Romania, using data from European Quality Life Survey (EQLS). Nevertheless, in the opinion of the authors, life satisfaction is not the most appropriate indicator for measuring well-being, omitting the objective dimension of quality of life.

### 3. Empirical evidence

Through this study, we set out to be able to identify a number of causalities with a strong impact on the subjective state of well-being, on a sample of 32 European countries, which would explain what socio-economic, demographic, political or cultural characteristics have a significant role for a better life. For this purpose, we used primary data regarding life quality obtained through annual or multiannual thematic surveys conducted by Eurofound and Gallup World Poll. Questions about life satisfaction (and happiness) are presented as separate aspects in such surveys, with certain distinctive elements more or less emphasized in some languages and cultures. All surveys provide a summary indicator of the extent to which the expectations and needs of the individual are met, at the level of coverage considered.

European Quality Life Survey, EQLS (Eurofound, 2018) comprises a unique set of subjective well-being indicators (26 indicators in the 2016 survey), to capture subjective general well-being including two global measures: life satisfaction, which allows people to provide an overall assessment of their lives, and overall happiness, which allows people to provide a more emotional assessment of how they feel. The conceptual framework used in EQLS is generally in line with OECD guidelines, the subjective well-being approach being focused through three groups of indicators:

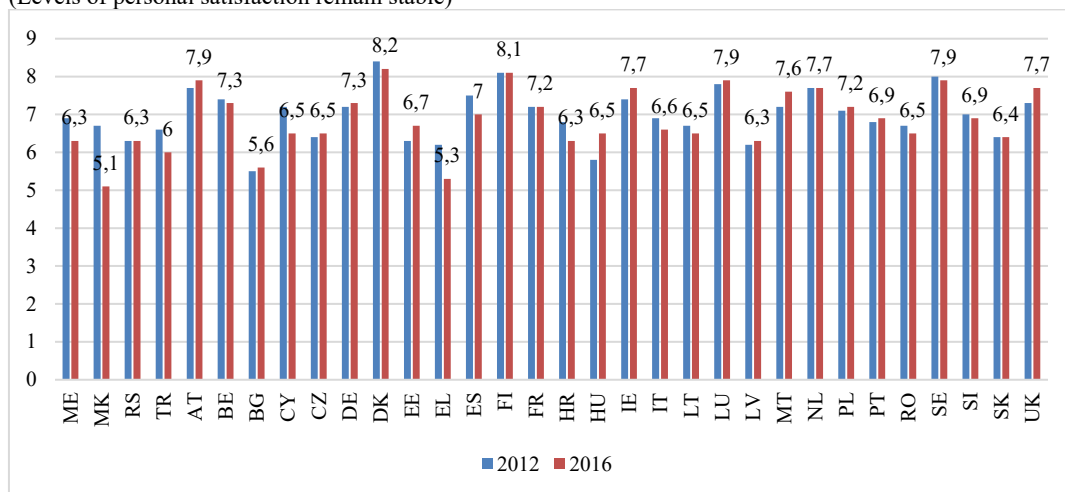
- evaluative well-being – life satisfaction and satisfaction with domains of life;
- positive and negative affect – happiness, vitality, feeling of calm, feeling of joy, feeling of depression;
- eudaimonic well-being – optimism, autonomy, sense of purpose, having time to enjoy life and endurance.

The EQLS results indicate that the ones who are content, the most satisfied with their lives and happiest have a purpose to pursue, are optimistic about their future and the freedom to live their lives autonomously (deciding for themselves). Physical and mental health is another key determinant for well-being. In the last survey (2016), two elements measuring resistance were added to capture the perceived ability to solve problems and the time it takes to return. Perceived resistance correlates positively with mental well-being variables.

On a scale of 1 to 10, the average score recorded in the European Union of personal satisfaction is, according to EQLS 2016, 7.0-7.1. At national level, the best located are the northwestern countries: Finland, Denmark, Luxembourg, whose performance slightly exceeds 8.0 points, followed by Sweden, the Netherlands, the United Kingdom, Ireland (7.8), Austria (7.9). Values above the EU average are in Germany, France, Belgium, Poland, Portugal, Croatia (7.4-7.5). The lowest scores were recorded in EU countries such as Bulgaria (6.4) and Greece (6.0; down from 2012 when the score was 6.5 due to a prolonged crisis), but also in some candidate countries (Macedonia – 6.1; Turkey – 6.2).

Relatively low levels are also found in Italy or the Czech Republic (6.8). Very close to the score of 7 are many states: Romania, Hungary; Lithuania; Latvia, Serbia (7.0), Slovakia, Cyprus (7.1), Estonia, Slovenia (7.2), Spain, Montenegro (7.3).

**Figure 1.** Personal satisfaction (with life in general, average scores), 2012 and 2016  
(Levels of personal satisfaction remain stable)



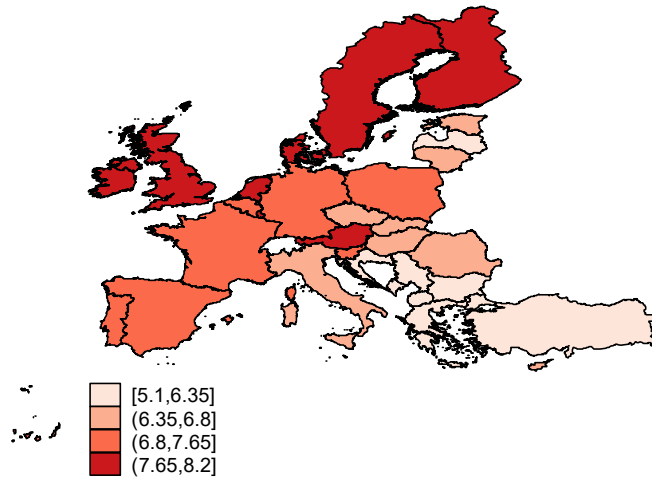
Source: Eurofound, EQLS, 2018.

Compared to the previous estimate (2011-2012), the indicator did not register any spectacular evolution in 2016, the data remaining relatively constant on the whole community space. More significant changes can be seen at the country level. Thus, between 2003 and 2007, life satisfaction and happiness increased in several Eastern European countries, so that in the period 2007-2011, against the background of the economic crisis, there were reductions in the perception scores on life satisfaction, and this especially in countries affected by the recession and where severe austerity measures have been taken. Lower values resulted in Croatia, Cyprus, Greece, Italy, Spain, and happiness in the Czech Republic. An increase in life satisfaction is observed in Austria, Estonia, Malta, Great Britain, Hungary and Ireland. Only Greece, Macedonia and Turkey are the countries where personal satisfaction has experienced a significant decline (even about 10%).

The largest differences between countries are directly observable in the analysis by age groups of the population. In the vast majority of countries, there is a tendency for the indicator score to decrease with age, as well as a significantly higher average score than the total average for the 18-24 age group. The largest gaps in personal satisfaction are in Eastern and Central European, EU and candidate countries, but also in some former EU member states. Thus, in Greece the average score of personal satisfaction among the population over 50-65 years is about 11% lower than the average for the total population, while the same score for the young population (18-24 years) exceeds by 26% general average. Equally high discrepancies are in Croatia (-9.5% for the elderly and + 22% for young people), Lithuania (-16.9%; + 18.5%), Romania (-12%; + 13.8%), Slovakia (-11%; + 17%), Slovenia (-8.7%; + 15.9%), Estonia (-11%; + 13%) etc. In only a few countries, the average score among the elderly is relatively close to the general average ( $\pm 1-3\%$ ), and

even for young people the score is not much higher than it (Austria, Finland, Belgium). A special case is that of Sweden where, paradoxically, the personal satisfaction of people aged 50-64 is 5% higher than the national average, while for young people aged 18-24, the average score is lower by more than 11%.

**Figure 2.** National differences in well-being, 2016, average score of life satisfaction



Source: Stata processing.

#### 4. General model and research hypothesis

Life satisfaction is a wide used indicator for measuring well-being, incorporating both the affective dimension of subjective well-being (the sense of satisfaction) as well as the cognitive dimension (the assessment of life as a whole). In the estimated econometric models we aimed to evaluate the influence of socio-economic, social, psychological factors on the subjective state of well-being, measured by life satisfaction or life ladder (as alternatives to the dependent variable), using spatial estimation techniques and procedures. To evaluate the role of these determinants we considered a sample of 32 European countries (EU-27, Great Britain, Montenegro, Northern Macedonia, Serbia and Turkey), and the period considered is summarized in two years, 2011-2012 and 2016. Factorial dimensions (independent variables) were grouped into several categories: i) influences of specific areas of life satisfaction; ii) social foundations of personal satisfaction with life (the role of social support, freedom to make choices in life, generosity, absence of corruption); iii) the impact of economic performance and unequal income distribution; iv) influences of some characteristics of the society in which people live. As econometric techniques and procedures, we used spatial econometrics models that take into account the existence of spatial interdependencies at the level of the national units considered. Such spatial models estimated in our paper are Spatial Autoregressive Model (SAR), Spatial Error Model (SEM), Spatial Durbin Model (SDM) and Spatial Autoregressive Confuse (SAC).

The most extensive model includes, along with the explanatory variables of interest, expressing objective and subjective factorial dimensions of SWB influence, and the spatial gap of all embedded variables, having the following specification:

$$\log y = \alpha + \rho \log Y \times W + \theta \log X \times W + \beta \log X + \lambda \times W \mu + \varepsilon, \quad (1)$$

where, the dependent variable, Y (well-being), is expressed by measuring life satisfaction (life\_satisf) and life\_ladder, the last more associated with happiness.

The independent variables used (vector X of the specification) concern satisfaction in different areas of life, self-optimism and the future of children, freedom to choose decisions, absence of corruption, participation in democratic life, trust in institutions, emotional well-being (positive emotions or negative), material living conditions, health status, education and possibilities for integration into work, profession, etc. Correlations between life satisfaction and some of these indicators showed fairly strong, or at least moderate, associations with large differences between countries.

The proposed hypothesis for testing are:

- I<sub>1</sub>: Areas specific to life satisfaction, such as health, work, education, family, housing, standard of living (areas) have a positive influence on subjective well-being.
- I<sub>2</sub>: Positive/negative emotional experiences provide information about how well someone's life is going and thus can be a factor in an assessment of well-being.
- I<sub>3</sub>: A number of economic elements support the sustainability of well-being: economic performance, a more equal income distribution.
- I<sub>4</sub>: Subjective determinants (the freedom to make key decisions in life, generosity) or related to the quality of society (absence of corruption) positively influence the well-being.
- I<sub>5</sub>: There are direct and indirect effects of predictors on life satisfaction.

## 5. Results and discussions of spatial analysis

### 5.1. Construction of the neighbourhood matrix and testing autocorrelation

Spatial analysis involves, on the one hand, the estimation of the existence of spatial self-correlation, i.e. the random scattering (spread) of phenomena in space, starting from the construction of a neighbourhood matrix, the testing of spatial autocorrelation using the Moran test and then the inclusion in the regression analysis of the weighted neighbourhood and space matrices, respectively, in the estimation of the econometric models. Since the territorial units of analysis have different surfaces and locations in the continental plan, we opted for an inverse matrix of distances and, given the large distances between capitals and not to exclude any country from the sample, the countries in the vicinity of others will be those between whose capitals have a distance of about 1.000 km (the limit chosen not to remove any of the observations (countries) from the analysis).

The *I*'Moran Global Index simultaneously measures spatial autocorrelation based on both characteristic locations (32 countries in Europe) and the values of the characteristics considered (life satisfaction). It evaluates whether the expressed pattern is grouped (as a



cluster), scattered, or random. In addition to the *I* Moran index, the value of a *z-score* and *p-value* are also calculated to assess the significance of this index. The *I* Moran test involves the interpretation of the results in the context of the null hypothesis. Table 1 summarizes the results. Since *p-value* is statistically significant and *z-score* is positive, we reject the null hypothesis, the spatial distribution of high and/or low values in the data set is more spatially grouped than would be expected if the underlying spatial processes were random.

**Table 1.** Measuring spatial global autocorrelation between well-being variables, 2016

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Type: Distance-based (binary)
Distance band: c1.c2 < d <= c3.c4
Row-standardized: Yes
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Moran's I
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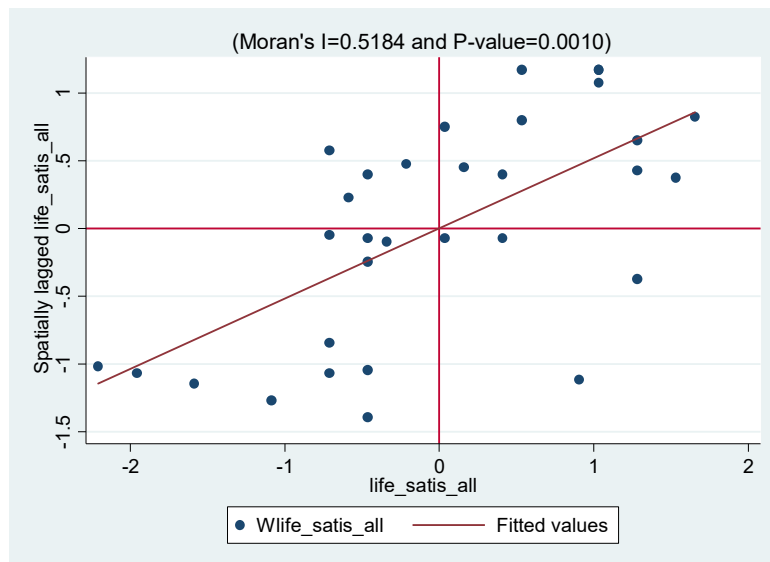
Variables	I	sd(I)	z	p-value
life_satis_all	0.518	0.090	6.094	0.000
life_satis_employed	0.459	0.090	5.456	0.000
life_satis_female	0.502	0.090	5.910	0.000
life_satis_male	0.524	0.090	6.156	0.000
happy_all	0.446	0.090	5.327	0.000
happy_employed	0.391	0.089	4.776	0.000
happy_female	0.421	0.090	5.023	0.000
happy_male	0.426	0.090	5.099	0.000
satisf_edu_all	0.170	0.089	2.273	0.023
satif_job_employed	0.404	0.090	4.859	0.000
satif_job_all	0.404	0.090	4.859	0.000
satis_stdviata_all	0.528	0.091	6.186	0.000
satisf_accomodall	0.189	0.091	2.439	0.015
satisf_family_all	0.091	0.091	1.349	0.177
optimism_own_all	0.277	0.088	3.506	0.000

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**Figure 3.** Moran charts in relation with lie satisfaction, 2016



Source: Stata processing.

This indicates a relatively high spatial autocorrelation in the satisfaction distribution among the analysed territorial units.

## 5.2. Main results

Estimation of the spatial models (Table 2) can be achieved through various methods, which are different depending on the used estimators, namely GMM and Quasi-Maximum Likelihood (QML). The first four models have life satisfaction as a dependent variable, while in the last four models we used, as a proxy of satisfaction, the Gallup measure – *cantrill life ladder*. The accent is put on the highlighting of the specific feels of satisfaction, combined with indicators of material conditions, social support, economic performance and inequality in income distribution among households, healthy life expectancy (healthy).

On the estimated models, the coefficients obtained have relatively similar values, which makes it difficult to choose a single model. A defining element in the choice of the optimal spatial model is the log-likelihood function, the selection of the model in relation to it assuming the choice of the model having the highest value of the function. Thus, the highest log likelihood value being confirmed also in the spatial Durbin Model – SDM. Other validation tests that indicated the preference for estimation by The Spatial Durbin Model (the model with the highest log-likelihood function value) are the Akaike Information Criterion (AIC) test and the Schwarz Criterion (BIC) test, whose minimum values confirm the preference for the SDM model. As such, in view of the selection of this estimate, I will interpret only the coefficients obtained and the direct and indirect effects of the SDM assessment (Models 3, 7 and 11) and which result to have statistical significance.

**Table 2.** Spatial influences on subjective well-being

<i>Var depend.</i>	SAR(1)	SEM(2) <i>life_satisfaction</i>	SDM(3)	SAC(4)	SAR(5)	SEM(6) <i>life_ladder</i>	SDM(7)	SAC(8)
<i>Main</i>								
satisf_education	0.0142 (0.10)	0.0161 (0.11)	0.503*** (3.81)	-0.000322 (-0.00)	-0.0961 (-0.85)	-0.0533 (-0.44)	-0.229 (-1.77)	-0.0929 (-0.81)
satif_job	0.336 (1.59)	0.348 (1.62)	-1.701*** (-6.50)	0.299 (1.29)	-0.680*** (-3.89)	-0.680*** (-3.32)	-0.724*** (-3.83)	-0.709*** (-3.81)
satis_standard	0.512*** (3.44)	0.463** (2.66)	-0.379* (-2.45)	0.554*** (3.43)	0.0357 (0.28)	0.0320 (0.24)	0.00666 (0.05)	0.0324 (0.26)
satisf_accomodat	0.285 (1.76)	0.321 (1.78)	1.231*** (6.30)	0.228 (1.13)	0.671*** (4.94)	0.765*** (5.35)	1.133*** (5.75)	0.699*** (4.84)
satisf_family	-0.0504 (-0.30)	-0.0689 (-0.41)	1.402*** (6.63)	0.0140 (0.06)	0.383** (3.26)	0.264* (2.16)	0.0664 (0.52)	0.355** (2.83)
health_expect	-0.00322 (-0.35)	-0.00449 (-0.42)	-0.0741*** (-5.09)	-0.000686 (-0.06)	-0.0248** (-3.26)	-0.0346*** (-4.55)	-0.0285*** (-4.24)	-0.0265** (-3.22)
log_gdp_pc	-1.301** (-2.59)	-1.155* (-2.21)	1.395** (2.82)	-1.375** (-2.74)	1.617*** (4.18)	1.782*** (4.22)	1.299** (3.05)	1.746*** (4.01)
positive_affect	0.00737 (0.01)	-0.0152 (-0.03)	-2.207*** (-4.20)	0.0130 (0.03)				
negative_affect	1.191 (1.40)	1.125 (1.32)	3.299*** (4.62)	1.264 (1.47)				
gini_housing	-1.327** (-2.62)	-1.346* (-2.57)	-3.803*** (-6.04)	-1.286* (-2.57)				
freedom_choices					1.989*** (4.88)	1.786*** (3.68)	2.651*** (5.74)	1.901*** (4.31)
generosity					-0.825* (-2.41)	-0.737* (-2.05)	-0.602 (-1.27)	-0.792* (-2.29)

<i>Var depend.</i>	SAR(1)	SEM(2) <i>life_satisfaction</i>	SDM(3)	SAC(4)	SAR(5)	SEM(6) <i>life_ladder</i>	SDM(7)	SAC(8)
corruption perception					0.135 (0.45)	0.326 (1.06)	0.286 (1.00)	0.168 (0.55)
<i>Spatial</i>								
rho	-0.232 (-0.71)		-1.216* (-1.99)	-0.471 (-0.72)	-0.856* (-2.25)		-2.498*** (-4.66)	-0.775* (-2.00)
lambda		-0.426 (-0.55)		0.497 (0.51)		-0.883 (-0.99)		-0.458 (-0.57)
Variance sigma2_e	0.014*** (5.65)	0.0144*** (5.60)	0.0055*** (5.44)	0.0283*** (10.40)	0.00955*** (5.61)	0.0101*** (5.40)	0.00414*** (5.00)	0.0189*** (11.17)
R <sup>2</sup>	0.7135	0.7100	0.8697	0.7144	0.7345	0.7199	0.8028	0.7299
Log-likelihood	44.6850	44.5805	73.9957	44.7384	57.1726	55.2781	77.9675	57.3631
AIC	-65.3699	-65.16105	-103.9913	-63.47688	-90.34526	-86.55626	-111.935	-88.7262
BIC	-39.4633	-39.25446	-56.4959	-35.4114	-64.43866	-60.64966	-64.4395	-60.6607
N	64	64	64	64	64	64	64	64

t statistics in parentheses

\* p < 0.05, \*\* p < 0.01, \*\*\* p < 0.001.

Source: Stata processing.

**Positive impact.** Analyzing the obtained results, the main positive influences on the general satisfaction of life and the variable *life\_ladder* are those exerted by the satisfaction in education, in the possibilities of living and regarding the family. Thus, an increase in the educational satisfaction score would contribute to an increase in the overall satisfaction score of 0.503 (Model 3). Living conditions also prove important for individual well-being (+1,231 in Model 3 and +1,133 in Model 11, respectively). A key place is also thanks to family fulfillment, with satisfaction increasing by 1,402 (Model 3) or 0.066 (Model 11). Economic performance has the expected, positive effect of a 1% increase in GDP per capita indicating an increase in the satisfaction score of 1.3 points (Models 3 and 11). In the equation having satisfaction (*life\_ladder*) as a measure of subjective well-being (SWB), we introduced as a variable of influence and the measure of freedom in decisions, which turns out to be directly related to the outcome variable (SWB).

**Negative influences.** Estimates also show a number of negative influences on job satisfaction or standard of living. Nor is the measure of health likely to contribute beneficially to better well-being. Relevant and expected is the negative impact of income distribution and the perception of corruption. A high Gini coefficient or a significant perception of corruption clearly reduces the overall satisfaction of life.

However, we cannot say in a general way that these influences are favorable in all situations. Using the measure of life satisfaction as a dependent variable, they have a positive relationship with work and family satisfaction, education or economic performance failing to support a higher degree of well-being. However, even in this case, corruption negatively influences life satisfaction, which could refer to the importance of actions towards reducing it for an adequate (experienced) hedonic well-being.

### Spatial effects

The parameters  $\rho$  (rho) in Table 1, Models 3 and 7 (all of SDM type), have the minus sign and statistical significance at 99% or 95%, indicating a pure negative spatial effect of the dependent variable, thus revealing the influence of the dependent variable from -a country on the same dependent variable from neighboring countries. The  $\lambda$  (lambda) parameters, related to the error terms, also record negative values, but are statistically insignificant, raising a question mark related to the presence of a spatial effect of the residues.

In order to assess the magnitude and impact resulting from changes in explanatory variables, the interpretation of the coefficients resulting from the estimates is not always correct, it being necessary to consider direct and indirect spatial effects. A number of empirical studies use estimates of the coefficients rho ( $\rho$ ), theta ( $\theta$ ) and lambda ( $\lambda$ ) to draw conclusions about whether or not spillovers have spatial effects. However, this is considered inappropriate (LeSage and Pace, 2009), requiring the interpretation of the impact of regressor changes in models. In this way, LeSage and Pace (2009) explain the possibility that a change of an independent variable in a given country has implications not only on the dependent variable in their own region – in which case we are talking about a direct effect, but also on the same variable. Dependent on other regions – when the estimated effect is indirect. In Table 3 we find these effects, for the models described above.

Direct effect estimates measure the impact of changing an independent variable on the dependent variable of a space unit. The direct effect includes the feedback effect that arises as a result of influences passing through neighboring countries and then returning to the country where the change is being investigated. Therefore, there are differences between the direct effects (Table 3) and the estimated coefficients of the explanatory variables (Table 2) for the SAR, SAC, SDM models (Elhorst, 2014, p. 16). According to LeSage and Pace (2011, p. 7), the global effects of spillovers include these feedback effects (the impact passing through neighboring regions, for example from region  $i$  to a region  $k$ , and back to the region where the change originates – region  $i$ ), unlike the local effects of spillover region where the change has its origin- *region i*), in contrast to local spillover effects).

**Table 3.** Direct, indirect and total effects on subjective well-being

<i>Var depend</i>	Sar (1)	SDM (3)	SAC(4)	SAR (5)	SDM (7)	SAC (8)
	<i>life_satisfaction</i>			<i>life_ladder</i>		
<i>LR_Direct</i>						
Satisf_educat	0.0195 (0.14)	0.341* (2.35)	0.00512 (0.03)	-0.0950 (-0.79)	-0.393* (-2.57)	-0.0912 (-0.75)
Satif_job	0.327 (1.57)	-1.134*** (-3.38)	0.297 (1.23)	-0.711*** (-3.93)	-0.245 (-0.88)	-0.738*** (-3.89)
satis_standard	0.531*** (3.69)	-0.195 (-1.22)	0.588*** (3.47)	0.0517 (0.40)	-0.201 (-1.12)	0.0477 (0.38)
satisf_accomod	0.282 (1.81)	0.851*** (3.76)	0.224 (1.11)	0.684*** (5.26)	0.999*** (6.49)	0.710*** (5.20)
satisf_family	-0.0494 (-0.31)	1.230*** (6.08)	0.0202 (0.08)	0.396*** (3.36)	0.296 (1.77)	0.366** (2.89)
health_expect	-0.00301 (-0.33)	-0.0595*** (-4.11)	-0.000168 (-0.01)	-0.0254*** (-3.38)	-0.0285*** (-3.89)	-0.0270*** (-3.35)
log_gdp_pc	-1.352** (-2.70)	1.255* (2.55)	-1.455** (-2.76)	1.636*** (4.01)	1.642* (2.54)	1.760*** (3.95)

<i>Var depend</i>	Sar (1)	SDM (3) <i>life_satisfaction</i>	SAC(4)	SAR (5)	SDM (7) <i>life_ladder</i>	SAC (8)
positiv_affect	-0.0107 (-0.02)	-2.307*** (-4.69)	-0.000707 (-0.00)			
negative_affect	1.237 (1.43)	2.750*** (3.74)	1.338 (1.51)			
gini_hou-g	-1.298* (-2.57)	-3.444*** (-6.04)	-1.281* (-2.44)			
Freedom_choices				2.030*** (5.25)	2.109*** (4.42)	1.933*** (4.59)
generosity				-0.826* (-2.42)	-1.473* (-2.52)	-0.791* (-2.28)
percepti-n				0.141 (0.45)	0.795 (1.77)	0.173 (0.55)
<b>LR_Indirect</b>						
satisf_educat	-0.00345 (-0.15)	1.403** (2.86)	0.0171 (0.08)	0.0277 (0.74)	0.490 (1.60)	0.0248 (0.69)
satif_job	-0.0272 (-0.50)	-5.019** (-2.76)	0.0311 (0.04)	0.202* (2.12)	-1.508** (-2.91)	0.191* (1.96)
satis_standard	-0.0434 (-0.57)	-1.509* (-2.52)	-0.0476 (-0.06)	-0.0145 (-0.38)	0.669* (2.53)	-0.0123 (-0.34)
satisf_accomod	-0.0278 (-0.62)	3.177** (3.14)	0.0298 (0.04)	-0.189* (-2.57)	0.409- (1.22)	0.179* (-2.29)
satisf_family	0.00566 (0.22)	1.696 (1.87)	-0.0756 (-0.11)	-0.113* (-2.00)	-0.664** (-2.71)	-0.0985 (-1.68)
health_expect	0.000467 (0.32)	-0.127* (-2.49)	-0.00240 (-0.10)	0.00674* (2.43)	-0.000323 (-0.02)	0.00651* (2.16)
log_gdp_pc	0.123 (0.61)	1.033 (0.49)	0.0967 (0.05)	-0.460* (-2.22)	-1.220 (-1.24)	-0.451* (-2.05)
positive_affect	0.00677 (0.08)	0.555 (0.35)	-0.0178 (-0.03)			
negativ_affect	-0.113 (-0.52)	4.669 (1.63)	-0.183 (-0.22)			
gini_hou-g	0.113 (0.59)	-2.733 (-1.96)	0.0372 (0.02)			
Freedom_choices				-0.570* (-2.39)	1.636 (1.31)	-0.506* (-2.00)
generosity				0.232 (1.77)	2.595 (1.79)	0.206 (1.57)
percepti-n				-0.0355 (-0.39)	-1.491** (-2.80)	-0.0386 (-0.44)
<b>LR_Total</b>						
satisf_educat	0.0160 (0.12)	1.744** (2.98)	0.0222 (0.08)	-0.067 (-0.79)	30.0970 (0.34)	-0.0664 (-0.74)
satif_job	0.300 (1.50)	-6.154** (-2.92)	0.328 (0.33)	-0.509*** (-3.90)	-1.752*** (-3.62)	-0.547*** (-3.63)
satis_standard	0.487** (3.05)	-1.704** (-2.59)	0.540 (0.69)	0.0372 (0.40)	0.468* (2.14)	0.0355 (0.38)
satisf_accomod	0.254 (1.80)	4.028*** (3.37)	0.254 (0.32)	0.495*** (4.14)	1.408*** (3.69)	0.531*** (3.87)
satisf_family	-0.0437 (-0.29)	2.927** (2.85)	-0.0553 (-0.07)	0.283*** (3.37)	-0.368 (-1.80)	0.267** (3.04)
health_expect	-0.00254 (-0.30)	-0.186** (-3.02)	-0.00257 (-0.09)	-0.0186** (-2.69)	-0.0288* (-2.19)	-0.0204** (-2.60)
log_gdp_pc	-1.229* (-2.53)	2.288 (1.10)	-1.358 (-0.67)	1.176*** (3.79)	0.422 (0.62)	1.309*** (3.47)

<i>Var depend</i>	Sar (1)	SDM (3)	SAC(4)	SAR (5)	SDM (7)	SAC (8)
	<i>life_satisfaction</i>			<i>life_ladder</i>		
positiv_affect	-0.00397 (-0.01)	-1.752 (-1.02)	-0.0185 (-0.02)			
negative_affect	1.124 (1.40)	7.420* (2.51)	1.155 (1.10)			
gini_hou-g	-1.185* (-2.40)	-6.176*** (-3.49)	-1.244 (-0.58)			
Freedom_choices				1.460*** (4.64)	3.745** (3.22)	1.427*** (4.36)
generosity				-0.595* (-2.31)	1.122 (0.85)	-0.585* (-2.22)
percepti-n				0.105 (0.46)	-0.696 (-1.89)	0.135 (0.56)

**Source:** Stata processing.

n the spatial context, indirect effects (known as spillovers) imply that changes occurring in one region exert effects on other regions. Indirect effects estimates measure the impact of changing an independent variable in a particular unit on the dependent variable in the other units of analysis. By construction, SEM estimation does not differentiate between direct and indirect effects, because perturbations (the unspecified set of causes of the effect variable) are not used when considering the partial derivative of the dependent variable in terms of changes in explanatory variables (Elhorst, 2014, p. 22).

In SAR, SDM and SAC models, the direct effects may be different, due to the influence of spatially shifted endogenous variables (dependent variable \* correlation matrix, WY), respectively any change in well-being in a region (country) will affect the state well in all regions. This is the logical consequence of models of simultaneous spatial dependence that take into account the dependent variables of other regions, and these (dependent variables) are determined by the characteristics of those regions (LeSage, 2008, p. 33).

All these influences combined make differences in the impact of changes in explanatory variables. Elhorst (2014, p. 31) describes these interactions as feedback effects, in that influences on well-being in a given region pass through neighboring regions and then back to the original region, causing a progressive change. The size of this feedback effect will depend on: (1) the position of the region in space; (2) the degree of interdependence between regions, according to the reference spatial matrix; (3) the size of the other estimated coefficients ( $\beta$  and  $\theta$ ), including the strength of the dependence spatial data given by the coefficient  $\rho$ .

We can see that there are differences between the coefficients in Table 2 and the direct effects in Table 3, due to the endogenous interaction effects between the neighborhood matrix and the dependent variable (WY). These interaction effects cause feedback effects, i.e. an impact that affects the well-being in certain neighboring countries/regions that pass into the surrounding regions and back to the initial region, which causes the change.

As Elhorst (2014, p. 9) shows, many empirical studies use point estimates of one or more spatial regression models to test the hypothesis of the existence or spatial spillovers. However, LeSage and Pace (2009, p. 74) point out that this may lead to erroneous

conclusions and that a partial interpretation derived from the impact of changes on variables of different model specifications is a more valid basis for testing this hypothesis.

According to Elhorst (2014, p. 15) the reason why the direct effects of the explanatory variables are different from the estimates (coefficients of elasticity) is due to the so-called direct effects of the dependent variable and the independent variables, respectively the feedback effects that occur/concern as a result of influences passing through neighboring states and then returning to the states from which they originated. These feedback effects are due in part to the coefficient of the spatially shifted dependent variable ( $W * life\_satisfact$ ) which proves to be statistically significant but negative ( $\rho = -1.216$  in model 3) and in part to the coefficients of the spatially shifted explanatory variables. Thus, these coefficients are statistically significant, positive for the variables:  $W * satisfaction$  in education (4.784),  $W * satisfaction$  in accommodation (10.97),  $W * family$  satisfaction (6.676) and negative for  $W * satisf\_job$  (-16.97), respectively),  $W * standard$  satisfaction (-4.908),  $W * Gini$  (-12.87).

In the following table we have summarized the direct, indirect effects and the estimated coefficients of the variables of influence of the subjective state of well-being (measured by life satisfaction). Thus, the direct effect of satisfaction in education in Model 3 (Durbin spatial type, Table 3) is 0.341, and the estimated coefficient of the variable (Table 5.3a, column 3) amounts to 0.503. As such, the feedback effect will be equal to  $0.341 - 0.503 = -0.162$ , which corresponds to -32.21% of the estimated coefficient. For job satisfaction the feedback effect is 0.567 (-33.33%), the standard of living satisfaction +0.184 [-0.195 - (-0.379)], representing -48.55% of the coefficient of elasticity; the feedback effect of the variable home satisfaction is -0.380 (-30.87%), the feedback for family satisfaction is -0.172 (-12.27%), for health +0.0146 (+19, 70%), for the economic performance measured by GDP/capita of -0.140 (-10.04%) and the one induced by the inequality in income distribution of -0.359 (-9.44%).

**Table 4.** *Proportion of the feedback and indirect effects of the explanatory variables upon well-being*

	Direct effect	Indirect effect	Elasticity coefficient	Feedback effect = direct effect – estimated coefficient	% from the estimated coefficient	% of the feedback effect in the direct effect	% indirect effect in the direct effect	Proportion of the WB modification in a country that leads to a modification in the explicative variable in surrounding countries
satis edu	0.341	0.0171	0.503	-0.162	-32.20	-47.51	5.01	19.94
satis job	-1.134	0.0311	-1.701	0.567	-33.33	-50	-2.74	-36.46
satis standard	-0.195	-0.048	-0.379	0.184	-48.55	-94.36	24.41	4.09
satis accomod	0.851	0.0298	1.231	-0.38	-30.87	-44.65	3.50	28.56
satis family	1.23	-0.076	1.402	-0.172	-12.27	-13.98	-6.14	-16.27
healthy_expect	-0.0595	-0.002	-0.074	0.0146	-19.70	-24.54	4.03	24.79
gdp	1.255	0.0967	1.395	-0.14	-10.03	-11.15	7.70	12.98
positive affect	-2.307	-0.018	-2.207	-0.1	4.53	4.33	0.77	129.61
negative affect	2.75	-0.183	3.299	-0.549	-16.64	-19.96	-6.65	-15.03
gini	-3.444	0.0372	-3.803	0.359	-9.44	-10.42	-1.08	-92.58

**Source:** calculated on the basis of the results of the estimated models.



In parallel, we also calculated how much the feedback effect and the indirect effect represent from the direct effect. Estimates would show, for example, that for the variable satisfaction in education, the feedback effect (-0.162) represents -47.51% of the direct effect, and the indirect effect of the change in the explanatory variable appears to be 5.01% of the same direct effect. This means the change in neighboring countries when the change in a particular country is in the proportion of about 1 to 19.9 in the case of job satisfaction, from 1 to -36.5 if job satisfaction changes.

Increasing satisfaction in education in a country will increase WB not only in that country (0.341) but, to some extent, in neighboring countries (0.0171); the same for home satisfaction. However, the decrease in job satisfaction in one country does not indicate a decrease in WB in neighboring countries.

## 6. Conclusion

The subjective state of well-being is a multidimensional concept that reflects the way in which an individual evaluates his own life in relation to the conditions in which he lives, with the possibilities of adapting to the environment and the society to which he belongs. In evaluating the subjective state of well-being, life satisfaction and/or cantril life ladder are mainly used as alternative measures, obtained following surveys regarding the quality of life, satisfaction in life or happiness. The study is conducted on a sample of 32 European countries (EU-27, Great Britain, Montenegro, Northern Macedonia, Serbia and Turkey), using spatio-temporal observations obtained under EQLS, and the period considered is summarized in two years, 2011 -2012 and 2016. As econometric techniques and procedures, the spatial regressions allowed to take into account in the estimates the spatial interdependencies at the level of national units, and which could be tested. Moran's I statistics showed a relatively high spatial autocorrelation in the distribution of life satisfaction among the countries in the sample. On this basis, we continued the estimation by spatial models, in which the dependent variable was alternatively life satisfaction or life ladder.

The factorial dimensions (independent variables) are grouped on several categories: i) influences of specific domains of life; ii) social basic elements of personal life satisfaction (the role of social support, freedom of choice, generosity, absence of corruption); iii) the impact of economical performance and of unequal income distribution; iv) influences of some society characteristics where individuals live.

The main conclusions regarding the effects registered in supporting life satisfaction can be expressed as follows:

1. The H1 hypothesis is confirmed regarding the favorable effects induced by satisfaction in different fields, especially related to education, family life, accommodation satisfaction, standard life, in relation to the general satisfaction of life.
2. Material well-being can be a supporting factor of SWB, but not absolutely, in the sense that in relation to the life satisfaction measure, the effect is not conclusive, unlike the life ladder measure, which is more attributed the sense of state of happiness. However,

what is unequivocal is the unequal distribution of income, the greater the inequalities, the lower the degree of satisfaction with life.

3. It is also particularly relevant and robust the role of social connections, the feeling of freedom to live according to their own choices and decisions, but also the hedonic side of SWB, respectively positive affect seem to have the same beneficial contribution in the perception of a better life satisfying. Thus, the research hypotheses are verified, SWB being strongly affected (negatively) by the feelings of frustration, which individuals experience throughout their lives. The total negative effect of the influence of positive emotions is obvious, in combination with variables related to the perception of corruption.
4. There are spatial effects, mainly direct, which can lead to a better perception of one's life, with particular reference to satisfaction in the educational field or with family life. On the other hand, a better general satisfaction of life in one country is not reflected in other countries, with the mention that the effect is clearer in terms of the level of happiness.

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