

Well-being and the *Great Recession* in Spain

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Abstract. This letter assesses the impact of the *Great Recession* on well-being in Spanish provinces using two alternative composite indicators of objective well-being that include somewhat different dimensions. Whereas the crisis notably eroded *economic well-being*, its impact on *overall well-being* –which in addition to economic dimensions also includes non-economic ones– was imperceptible. This result points to the need to carefully define and assess well-being in empirical analyses.

Keywords: composite indicators; economic crisis; Spain; well-being.

JEL Classification: C61; I30.

Introduction and motivation

Assessing well-being is a challenging task. Whereas traditional measures have been based on simple economic indicators, mostly GDP per capita, society as a whole calls for a more comprehensive way to gauge well-being. In addition to economic issues, fresh measures should include other non-economic dimensions of well-being such as health, education or the environment, to name just a few. In response to this social demand, the *Human Development Index* was created by the United Nations in the 1990s, and included income per capita, education and life expectancy (see UN, 2016). Later on, the *Commission on the Measurement of Economic Performance and Social Progress* –launched in 2009 and headed up by the Nobel laureate Joseph Stiglitz– suggested several non-economic dimensions that, beyond economic ones, can affect well-being (Stiglitz *et al.*, 2009). Furthermore, the OECD provides data at both national (*Better Life Index* dataset), and regional (*OECD Regional Well-being Database*) levels on these dimensions (see Durand, 2015).

Recently, several papers have employed these datasets to building objective composite indicators of well-being, mostly at the country level (e.g., Lorenz *et al.*, 2017; Peiró-Palomino and Picazo-Tadeo, 2018). Nonetheless, the rankings of countries result-

ing from these indicators are not significantly different from those derived from conventional measures of well-being, including GDP per capita. In addition, other recent research papers also conclude that there is a close relationship between subjective well-being and income (Stevenson and Wolfers, 2013).

According to the arguments outlined above, it might be sensible to assume that indicators based on economic dimensions such as GDP per capita are good proxies of overall well-being. However, in this letter we show that this might not be the case when it comes to assessing the impact of an economic crisis on well-being. In doing so, we empirically evaluate the impact of the *Great Recession* that began in 2008 (IMF, 2009; Camacho *et al.*, 2018) on well-being in Spanish provinces, using two composite indicators of objective well-being computed with *Data Envelopment Analysis* (DEA) and *Multi-Criteria-Decision-Making* techniques (MCDM). One of them –referred to as *economic well-being*– just includes GDP per capita and the unemployment rate as essential economic dimensions of well-being, whereas the other –named *overall well-being*– also includes 5 non-economic dimensions. We find that: i) there are notable disparities in well-being across Spanish provinces; ii) when objective well-being is assessed only with economic dimensions a sharp decline is observed as a result of the *Great Recession*; conversely, when non-economic dimensions are also accounted for the decline is imperceptible. Accordingly, our conclusion is that the choice of well-being indicators should be carefully justified in empirical analyses.

Data and methodology

We employ information about 7 well-being dimensions at the level of the 50 Spanish provinces¹, built with data from different sources for the period 2000-14 (*Table 1*). In constructing this dataset, we have attempted to catch a set of indicators as close as possible to those proposed by Stiglitz *et al.* (2009) and provided by the OECD at both national and regional levels, but using the much more limited information available for the Spanish provinces. Using these figures, we have computed averages for each indicator in the growth period 2000-07 and the crisis period 2008-14. To ensure comparability across dimensions, and given that the indicators have different measurement units, the data have been standardized on a 0-1 scale using the *min-max* method, with higher values representing better performance; minimum and maximum values are chosen from the whole 2000-14 period to ensure comparability over time. Finally, normalized data on dimensions have been used to build a couple of composite indicators of objective well-being: the first, *economic well-being*, includes only the

¹ Spanish provinces correspond to NUTS 3 in the Eurostat nomenclature, while regions correspond to NUTS 2. The autonomous cities of Ceuta and Melilla have been excluded from the analysis.

economic dimensions of income and jobs, while the other, *overall well-being*, considers all 7 dimensions.

Table 1 here

Regarding the methodology, we have used DEA and MCDM techniques as in Peiró-Palomino and Picazo-Tadeo (2018). First, following Lovell *et al.* (1995) we have computed a composite well-being indicator for each province p' with DEA as:

$$\begin{aligned}
& \text{Composite indicator}_{p'} = \text{Maximise } w_{dp'} \sum_{d=1}^D w_{dp'} \text{ dimension}_{dp'} \\
& \text{Subject to:} \\
& \sum_{d=1}^D w_{dp'} \text{ dimension}_{dp} \leq 1 \quad p = 1, \dots, 50 \\
& w_{dp'} \geq 0 \quad d = 1, \dots, D
\end{aligned} \tag{1}$$

where dimension_{dp} is the observed value for dimension d in province p , and w_{dp} is the *idiosyncratic* weight assigned to dimension d in the composite indicator of province p . Moreover, composite indicators from (1) are, by construction, bounded between zero and one, the latter representing highest-well being; i.e., the lower the score the smaller the well-being

Whereas DEA provides a successful approach to the building of a composite well-being indicator, it might be less effective when it comes to ranking provinces. In this respect, comparisons might be meaningless as provinces' well-being indicators are computed with different sets of weightings (Kao and Hung, 2005); besides, program (1) could assign a score of one –meaning highest well-being– to some provinces just because of lack of discriminating power (see technical details in Dyson *et al.*, 2001). In order to ensure comparability and also increase the discriminating power, in a second stage we have employed MCDM techniques to compute a composite well-being indicator with *common* weights across provinces for dimensions, as proposed by Despotis (2002). Formally:

$$\begin{aligned}
& \text{Minimise } m_d, w_d, h \quad t \frac{1}{50} \sum_{p=1}^{50} m_p + (1-t) h \\
& \text{Subject to:} \\
& \sum_{d=1}^D w_d \text{ dimension}_{dp} + m_p = \text{Composite indicator}_p \quad p = 1, \dots, 50 \\
& (m_p - h) \leq 0 \quad p = 1, \dots, 50 \\
& m_p \geq 0 \quad p = 1, \dots, 50 \\
& w_d \geq \varepsilon \quad d = 1, \dots, D \\
& h \geq 0
\end{aligned} \tag{2}$$

where w_d is the common weight assigned to dimension d ; ε is a non-Archimedean small number; h is a non-negative parameter to be estimated; m_p represents the devi-

ation between the composite indicator for province p calculated with DEA, and that computed with MCDM; finally, t is a parameter ranging from 0 to 1, which we have set to 1 (see details in Peiró-Palomino and Picazo-Tadeo, 2018).

Results and discussion

Table 2 displays population-weighted averages for *economic* and *overall well-being* in both growth (2000-07) and crisis (2008-14) periods for provinces and regions; in this respect, as well-being affects people we have considered population-weighted averages to be much more illustrative than simple averages.² Besides, Figure 1 illustrates the geographic distribution of well-being in Spain, with darker colours representing better performance. *Overall well-being* is unevenly distributed across space with no clear patterns, although the lowest scores are found in the Mediterranean coast and Southern provinces. Furthermore, it is observed a positive (although moderate) association between *overall well-being* and the level of development of provinces and regions –approached by real GDP per capita–, particularly in the recession period.³ Besides, lower *economic well-being* is found in Southern and Western provinces while Northern and Eastern provinces perform notably better. Lastly, intraregional heterogeneity is high in most cases, especially for *overall well-being*.

Table 2 and Figure 1 here

Generally speaking, the geographic patterns of well-being derived from our results are in line with those from other studies of well-being (or quality of life) in Spain carried out using different methodological approaches, aggregation levels and time periods. González *et al.* (2011; 2018) focused on quality of life at the municipal level, although they only considered a limited sample of municipalities and overlooked temporal variation. Murias *et al.* (2006) and Zarzosa and Somarriba (2013) examined well-being and social welfare, respectively, at the province (NUTS 3) level, also omitting temporal comparisons. Jurado and Pérez-Mayo (2012) elaborated a multidimensional well-being index for the Spanish regions (NUTS 2) with data for years 2000 and 2006. More recently, Herrero *et al.* (2018) also assessed well-being at the region level for the period 2006-2015, but they failed to provide a composite indicator.

Regarding the impact of the *Great Recession*, a severe deterioration is observed in all provinces between 2000-07 and 2008-14 when well-being is assessed considering only

² Provincial weights correspond to the share of the population in each province over total Spanish population in each period.

³ For the case of provinces, Spearman rank correlation coefficients are statistically significant at standard confidence levels (p -values are 0.095 and 0.002 for the growth and crisis periods, respectively).

economic dimensions; e.g., population-weighted average *economic well-being* decreases from 0.809 to 0.439. Conversely, well-being remains much more stable when it is assessed with our *overall well-being* indicator, with an average that even increases slightly from 0.747 to 0.792;⁴ These findings can be clearly seen in *Figure 1*, which also suggests that the geographical North-East *versus* South-West division observed in the growth years persisted during the crisis. Furthermore, the population-weighted distributions of *overall well-being* among Spanish provinces are not statistically different between 2000-07 and 2008-14 (*Figure 2*); conversely, those of *economic well-being* are statistically different; i.e., a notable shift to the left has occurred as result of the crisis.

Figure 2 here

Conclusion

In this note we report two main conclusions. First, the *Great Recession* has profoundly affected the economic dimensions of well-being in Spain, whereas the effect on *overall well-being* –which also includes other *non-economic* dimensions– has been negligible. Second, beyond the demand of academics, international organisations and society as a whole to broaden the notion of *well-being*, this concept needs to be carefully defined and assessed in empirical studies as different measures may lead to quite different interpretations.

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⁴ We have computed an additional well-being indicator excluding dimensions income and jobs from the *overall* indicator, showing that average *non-economic* well-being in the crisis (0.800) is noticeably higher than in the preceding growth period (0.624). Results for this indicator at the province and region levels are available to readers on request.

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Table 1. Well-being dimensions and indicators

Dimension	Indicator (<i>unit of measurement</i>)	Source	Years
Income	GDP per capita (<i>constant € at 2011 prices</i>)	Spanish Statistical Office (INE)	2002-2014
Jobs	Unemployment rate (%)	INE	2002-2014
Health	Life expectancy at birth (<i>years</i>); mortality rate (%)	INE	2000-2014
Education	Years of education (<i>people aged 16-64</i>)	Valencian Institute of Economic Research	2000-2013
Environment	Air particles PM10 (<i>yearly average</i>)	<i>Ecologistas en Acción</i> , and Spanish Ministry of Agriculture, Fishing and Environment	2001-2014
Safety	Homicide rate (<i>per 100,000 inhabitants</i>)	Spanish Ministry of Home Affairs	2000-2004; 2010-2014
Civic engagement	Voter turnout in general elections to congress, Spanish residents (%)	Spanish Ministry of Home Affairs	2000, 2004, 2008, 2011

Note: The dimension health has been measured as the simple average of its two indicators.

Table 2. Well-being scores: from 0 (worst) to 1 (best)

Regions (NUTS 2) and their provinces (NUTS 3)	<i>Economic well-being</i>		<i>Overall well-being</i>	
	2000-07	2008-14	2000-07	2008-14
Andalucía	0.582	0.115	0.640	0.648
Almería	0.789	0.080	0.668	0.654
Cádiz	0.431	0.010	0.595	0.564
Córdoba	0.505	0.114	0.727	0.738
Granada	0.615	0.083	0.669	0.675
Huelva	0.548	0.144	0.536	0.650
Jaén	0.548	0.129	0.779	0.765
Málaga	0.666	0.111	0.612	0.578
Sevilla	0.583	0.203	0.609	0.670
Aragón	0.966	0.618	0.864	0.895
Huesca	0.989	0.721	0.938	0.970
Teruel	1.000	0.677	1.000	0.949
Zaragoza	0.955	0.585	0.826	0.870
Asturias	0.797	0.539	0.823	0.816
Illes Balears	0.899	0.495	0.569	0.665
Islas Canarias	0.746	0.160	0.580	0.690
Las Palmas	0.750	0.112	0.595	0.666
Santa Cruz de Tenerife	0.741	0.212	0.563	0.715
Cantabria	0.848	0.624	0.872	0.965
Castilla y León	0.820	0.561	0.918	0.918
Ávila	0.833	0.375	0.868	0.829
Burgos	0.911	0.642	0.921	0.931
León	0.810	0.512	0.882	0.841
Palencia	0.885	0.572	0.881	0.889
Salamanca	0.714	0.528	0.956	0.967
Segovia	0.877	0.638	0.957	0.995
Soria	0.982	0.708	0.988	0.952
Valladolid	0.791	0.613	0.931	0.987
Zamora	0.752	0.464	0.919	0.833
Castilla - La Mancha	0.810	0.333	0.910	0.866
Albacete	0.817	0.297	0.888	0.830
Ciudad Real	0.777	0.279	0.822	0.821
Cuenca	0.853	0.430	0.917	0.858
Guadalajara	0.884	0.509	1.000	1.000
Toledo	0.793	0.300	0.964	0.872

Table 2. Well-being scores: from 0 (worst) to 1 (best) (*Continued*)

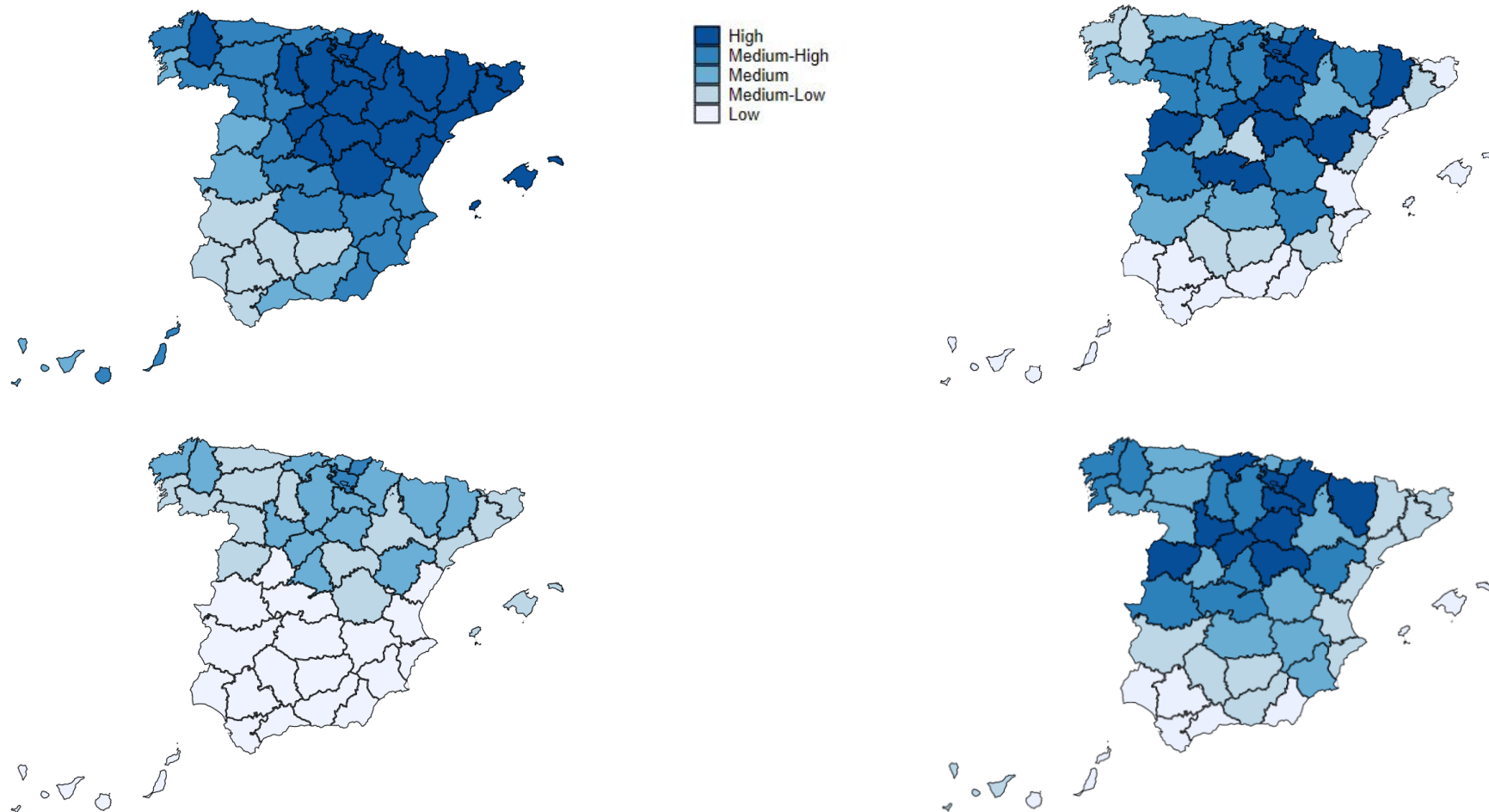
Regions (NUTS 2) and their provinces (NUTS 3)	<i>Economic well-being</i>		<i>Overall well-being</i>	
	2000-07	2008-14	2000-07	2008-14
Cataluña	0.902	0.553	0.701	0.716
Barcelona	0.890	0.556	0.709	0.712
Girona	0.907	0.502	0.628	0.714
Lleida	0.999	0.710	0.997	0.798
Tarragona	0.932	0.496	0.545	0.703
Comunidad Valenciana	0.808	0.351	0.649	0.755
Alicante	0.769	0.311	0.613	0.751
Castellón	0.928	0.350	0.764	0.781
Valencia	0.809	0.380	0.649	0.753
Extremadura	0.557	0.230	0.843	0.841
Badajoz	0.532	0.195	0.820	0.807
Cáceres	0.600	0.288	0.880	0.898
Galicia	0.760	0.559	0.794	0.876
A Coruña	0.748	0.611	0.790	0.890
Lugo	0.858	0.675	0.684	0.875
Ourense	0.795	0.553	0.843	0.832
Pontevedra	0.724	0.457	0.824	0.874
Madrid	0.971	0.658	0.794	0.915
Murcia	0.809	0.330	0.812	0.844
Navarra	1.000	0.735	1.000	1.000
País Vasco	0.907	0.758	0.880	0.892
Álava	0.952	0.787	0.969	0.960
Bizkaia	0.848	0.704	0.823	0.840
Guipuzkoa	0.984	0.834	0.933	0.946
La Rioja	0.956	0.622	0.961	1.000
Population-weighted average	0.809	0.439	0.747	0.792
Simple average	0.807	0.449	0.806	0.828
Standard deviation	0.144	0.220	0.144	0.118

Note: Regions' averages are weighted by population; also note that some Spanish regions are single-province regions.

Figure 1. Provincial distribution of *economic* and *overall well-being* in 2000-07 (top maps) and 2018-14 (bottom maps)

Economic well-being

Overall well-being



Note: Well-being is categorised through the distribution by quintiles of our composite indicators for the entire period, in order to evaluate disparities across regions and also over time.

Figure 2. Population-weighted densities of *economic* and *overall well-being* for 2000-07 (solid lines) and 2008-14 (dashed lines)

