A Proposal to Broaden Poverty Indicators in the EU Based in Key Social Needs

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1. INTRODUCTION

There is a widely recognised collective demand to develop unmet social needs measures for developed countries that incorporate indicators that go beyond monetary poverty. Over the last decades, several social researchers have investigated poverty through a broader lens incorporating different aspects related to the quality of living conditions into its measurement. As a result, an increasing number of studies provide new advances in this area, many of them search for a best way of assessing a variety of well-being conditions that determine household social deprivation.

Moving from one to more well-being dimensions has relevant implications in relation to the necessary methodological choices to be made in poverty analysis. The analyst must decide which dimensions to consider, how to best approximate them and how to aggregate them, at both individual and society level. Despite the variety of proposals put forward in the literature, up to now no general agreement has been reached for a new measurement standard of key social needs. Since the 1970's some authors tried to respond to the necessity of measuring poverty-related social needs performance in a wide sense by developing aggregate indices of economic well-being. The best-known proposals in this area were the *Measure of Economic Welfare* (MEW) proposed by Nordhaus and Tobin (1972) and the *Index of Economic Well-being* (IEWB) by Osberg and Sharpe (2002). Both approaches, however, only focussed on the economic aspects of well-being while, in some cases, economic improvement might even be inversely correlated with certain dimensions of quality of life and the coverage of social needs. Other proposals focussed on the poor such as Morris (1978, 1979) combined non-monetary indicators of literacy, infant mortality, and life expectancy in the *Physical Quality of Life Index* (PQLI) to analyse whether the very poor were benefitting from economic growth.

The main aim of this paper is to propose a set of dimensions and indicators to measure the incidence and trends of poverty-related social needs and aggregate them in a composite index for a selected sample of European countries. In the analysis of poverty-related social needs, the selection of sub-dimensions and indicators capable of identifying situations of social need must be based on both theoretical and empirical criteria, in addition to the normative criteria implicit in a social rights approach. In particular, the multidimensional deprivation literature offers several possibilities for choice. The key question is, in general, whether the multifaceted character of social needs can be measured and whether it is possible to define comparable indicators in space and time. Therefore,

the main aim is not to use completely alternative concepts and indicators to the traditional ones, but to improve the measurement of social needs through broader and more systematic indicators than income poverty or other strictly distributional outcomes.

The paper is structured as follows. In section 2, we present a brief literature review where we discuss the main approaches to the measurement of social needs. In section 3 we provide a brief explanation of the dimensions and indicators chosen. In section 4, we present our empirical approach. In section 5, we discuss the results. Section 6 concludes.

2. A BRIEF LITERATURE REVIEW

For many years, the United Nations have considered material standard of living, years of education and health key dimensions of well-being and have used the Gross Domestic Product (GDP) per capita as a proxy for measuring the material standard of living to construct the well-known *Human Development Index* (HDI). However, the HDI approximates the average value of household income in an economy but does not capture how economic growth is distributed among the population, so that no social deprivation analysis can be performed. In line with the definition of human development based on Sen's (1985) conceptual framework of capabilities to achieve valued outcomes ("functionings") of being and doing, the HDI has been supplemented by an inequality adjusted HDI, and indexes of multi-dimensional poverty and gender inequality. In 1996, the Human Development Report introduced the *Capability Poverty Measure* (CPM) as a composite index focused on the poor considering the basic capability shortfalls in three dimensions: living a healthy and well-nourished life, having the capability of safe and healthy reproduction and being literate and knowledgeable. However, this index focused on the deprivations of part of the country's population only: women and children.

As Seth and Villar (2018) underline, indicators that consider multiple dimensions of well-being may be classified in two large groups: composite indices and multidimensional indices. The main difference between these two approaches to the measurement of social needs is that composite indices use the information regarding each relevant dimension from any dataset available on the population of interest, while multidimensional indices need to be constructed using the information from a single dataset and are therefore able to capture joint distributions across the population. The most well-known multidimensional index focussed on the poor and measuring social

needs deprivation was developed by Alkire and Foster (2007, 2011): the *Multidimensional Poverty Index* (MPI). Both the HDI and MPI indices consider three key social needs dimensions: health, knowledge, and economic well-being and base their measurement either on four (HDI) or ten underlying indicators (MPI).

From a broad well-being perspective, other indicators that assess the extent and intensity of social needs in different population groups should be incorporated and the selection and weighting of social indicators have garnered a great deal of research attention over the years. These expanded indicators are linked to different well-being dimensions (economic well-being, employment, education, health, or housing) and to diverse concepts, such as vulnerability, subjective economic dissatisfaction, personal autonomy, risk of poverty or material deprivation. All these concepts inform which part of the population has resources and to what extent these are not sufficient to achieve a decent standard of living in their society.

This idea has already been explored by the *Unsatisfied Basic Needs* (UBN) approach, introduced by the Economic Commission for Latin America and the Caribbean (ECLAC) at the end of the 1980s. This strategy proposed the use of indicators of economic capacity, for instance the probability of insufficient income enabling households to reach minimum levels of consumption. However, these sources do not include complete data on income, consumption, or wealth, so researchers must use proxy variables as the number of income earners in the household or the years of education of the main breadwinner. An aggregate index is then constructed from these indicators, which allows to determine a minimum acceptable degree of need satisfaction or "critical level" and to identify deprived households in that basic need.

More recent approaches such as the OECD's *Measuring Progress* or *Better Life Index*, together with those developed by the European Union (*Beyond GDP initiative* and *Quality of life indicators*), use indicators of material living conditions focused on the direct analysis of the economic situation, such as material deprivation or income. Similarly, the development of the European Social Agenda prompted the elaboration of a broad set of social indicators to monitor the compliance of countries within its strategy to promote social inclusion. As Atkinson et al. (2002) point out, the selection of a common set of indicators would allow countries to use the "same language" in assessing social reality. All these more modern approaches are based on detailed and individualised

information on both income and the possession of certain material goods obtained from specific household surveys.

Among the different approaches, the OECD one to measuring well-being is probably the most complete. It follows the recommendations of the Stiglitz, Sen and Fitoussi Report (2009) and captures some of the main elements of the capabilities approach (Sen, 1985; Alkire and Sarwar, 2009). Some of the dimensions considered take into account aspects related to the expansion of people's choices and opportunities to live the lives that they value (OECD, 2013). One interesting question, in terms of a possible aggregation of complementary indicators of monetary poverty, is whether it is possible to collect a sufficient number of indicators that capture not only capabilities but also the coverage of social needs. The two concepts, although interrelated and with common problems of implementation, are different.

Focusing on needs, dissatisfaction with monetary measures of poverty contributed to the development of the basic needs approach (BNA) during the 1970s. This approach argued that a person is said to be poor if he or she is unable to meet his or her basic needs (Watson, 2014). However, consensus has not been reached in the practicalities and fundamentals of social needs. While the first definitions of need stated that it existed when there was a gap between the state desired by a person or group and the actual state, later proposals expanded it by defining needs as the basic requirements necessary to sustain human life. Even in the latter case, there is substantial disagreement about if these needs should be confined to a minimal set necessary to sustain human existence or should be a long list of dimensions ensuring complete well-being.

It is also unclear whether the definition of needs should be absolute or relative or whether the concept offers a complementary or subordinate view to that of capabilities. Regarding the former, many of the definitions subsequently accepted have relied on Wiggins's (1998) essentially relative proposal. According to this point of view, needs are multiply relative: to an understanding of the needing being's identity, to culture and individual outlook, and to what is practically feasible. As stated by Alkire (2005), this relativity means that Wiggins' approach can only be specified very locally, with reference to a particular time. Regarding the complementarity between the needs and capabilities approaches, Sen (1987) himself stated that the BNA approach failed to provide a philosophical account of the ends towards which needs-meeting actions must be directed,

providing no philosophical fundamental of conceptions of 'the good life', human utility or well-being.

These criticisms, however, have been contested by other authors. As stated by Reader (2006), a well-being approach based on needs "is not commodity focused and need not be paternalistic, foster passivity or be insensitive to the importance of freedom and choice, is no more or less prone to under- or over-specifying what is to be done than capabilities, and far from being useful only when thinking about how to help those in occurrent, persistent dire need ('the poor'), is useful for ensuring the right political priorities wherever people with needs are to be found". In practice, some authors have tried to combine both approaches to frame goals to increase people's capabilities to meet their basic needs, a framework in which meeting needs does indeed have a central role within a 'capability' approach (Alkire, 2005).

This is the main aim of this paper, in which we propose a set of dimensions and indicators to measure the incidence and trends of poverty-related social needs and aggregate them in a composite index for a selected sample of European countries. The key question is, in general, whether the multifaceted character of social needs can be measured and whether it is possible to define comparable indicators in space and time. Therefore, the main aim is not to use completely alternative concepts and indicators to the traditional ones, but to improve the measurement of social needs through broader and more systematic indicators than income poverty or other strictly distributional outcomes.

We are aware that choosing indicators involves ethical and statistical judgements. The European Commission offered a catalogue of "good practices" when selecting social indicators (Atkinson et al., 2002). The key proposals were the following: a) any indicator should capture the essence of the problem; b) a second desirable characteristic is sufficient normative content; c) indicators should be statistically robust; d) they should reflect the effect of social intervention; e) they should allow comparability across countries; and f) they should have sufficient periodicity. A common problem with these indicators is the gap that usually exists between the time at which the observed reality takes place and the date of publication of the data. The changing nature of the processes determining the generation of social needs −e.g., immigration or other demographic changes− may render results obsolete before they are disseminated.

In practice, there may be several indicators that fit most of the above criteria. However, although a wide range of variables adds richness and nuance to the analysis, an excessive number of indicators is not advisable, as it may hinder the agile and accurate monitoring of the coverage of social needs related to material living conditions. In this paper, we propose a broad set of social indicators grouped into six dimensions: economic well-being and material poverty, employment, education, health, housing, and social environment. Our aim is to provide alternative procedures for aggregating these social needs and to analyse their evolution in a selection of EU countries representative of different welfare regimes.

Our approach is therefore close to the proposals for objective social indicators, with the following advantages: can be relatively easily defined and quantified without relying heavily on individual perceptions, the dimension under study can be measured with great precision and with little measurement error, and they can reflect the normative ideals of a society (Diener and Suh, 1997). Nevertheless, this does not mean that the social indicators we propose are not fallible or that they do not respond to certain degree of subjectivity in their selection.

The advantage of our proposal over previous studies is the number of indicators and the availability of homogeneous information for a large number of countries at different moments in time so that we can most accurately identify the impact of the economic cycle on poverty-related social needs. For this purpose, we will use different microdata sources such as European Union Statistics on Income and Living Conditions (EU-SILC), Labour Force Survey (LFS), European Working Conditions Survey (EWCS), Structure of Earnings Survey (SES), Programme for International Student Assessment (PISA), European Health Interview Survey (EHIS) or European Social Survey (ESS). Furthermore, we will use diverse aggregation and weighting strategies to construct a composite indicator of social needs that will allow us to study which countries are failing in covering up individuals' basic needs.

3. DIMENSIONS AND INDICATORS

As stated previously, the design of a composite index of social needs requires several normative judgements, being the first the selection of the dimensions in which these social

needs are developed as well as the indicators within each dimension. We expand the HDI proposal of dimensions and include six components of social needs: material and economic well-being, labour market, education, health, housing, and environment. The selected dimensions and indicators regarding poverty-related social needs are reported in Figure 1. Subsequently, in order to select possible indicators within each dimension we have defined a series of challenges related to what we interpret to be the most relevant social needs. These challenges are faced by any household in each of the dimensions.

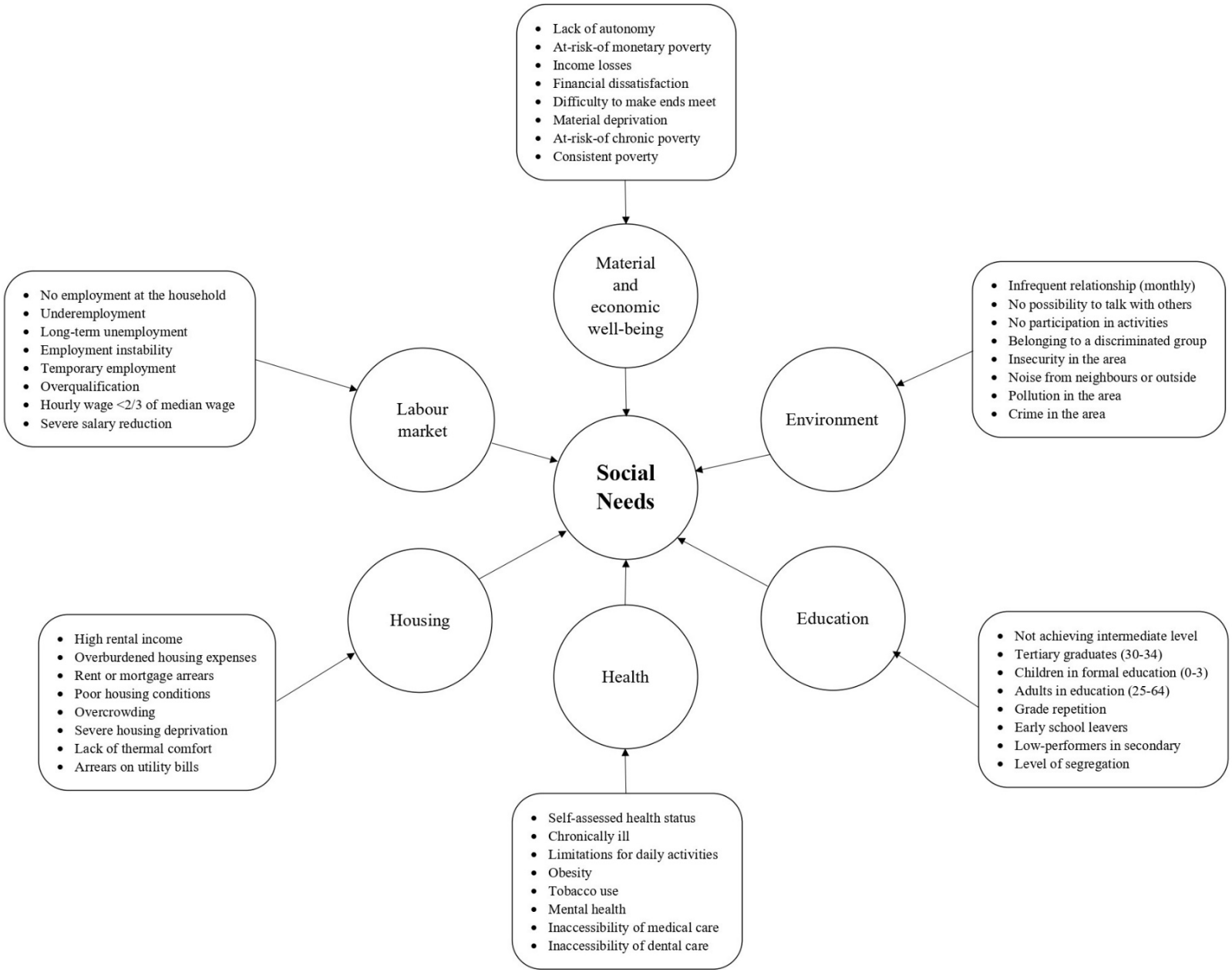
2.1. Material and economic well-being

For the first dimension, material and economic well-being, we consider that any household or individual must be able to cope with three fundamental challenges: to have sufficient and stable income, to maintain an economic-financial balance and avoid over-indebtedness and, finally, to avoid severe poverty. Only when sufficient income is achieved to reach a decent standard of living in the society of reference will it be possible to ensure that personal and family needs are covered. To measure the social needs linked to the first challenge, we use three indicators: being *at-risk-of monetary poverty*, *income losses* and *lack of autonomy* (see Table A1 in the Appendix to find the exact definition of each indicator).

On the other hand, if households fail to maintain an adequate balance between income and expenditure, they will inevitably reduce their wealth or incur in debt which will imply increasing difficulties to maintain their financial situation in the future. This second challenge is summarised in two indicators: *financial dissatisfaction* and *difficulty to make ends meet*.

Preventing situations of poverty is one of the main social challenges in developed countries in order to improve material living conditions of the population. In developed countries, where most of the basic necessities of life are widely covered, there are different possible ways of measuring social needs associated with poverty. The indicators chosen to measure social needs in this area go beyond the traditional definition based on relative low income: *material deprivation*, *consistent poverty* and *risk of chronic poverty*. Regarding the latter, people with low incomes over long periods of time often experience more severe deprivation than those in transitory poverty, so the larger the duration of a poverty spell the lower the capability of leaving poverty (Hick, 2014).

Figure 1. Dimensions and indicators of social needs.



2.2. Labour market

With respect to the labour market dimension, as the main channel of social participation in contemporary societies, we consider that any person or household must face three fundamental challenges: to have access to employment, to have adequate working conditions and to have a sufficient salary.

Having access to employment is the most basic need related to the labour market, since only if having access to employment individuals achieve an adequate social and personal development in the labour market throughout one's life. This challenge is analysed through five indicators: *jobless households*, *underemployment*, *long-term unemployment*, *employment instability*, and *temporary employment*.

To analyse the second challenge in terms of social needs related to the labour market —having adequate working conditions— we focus on the job quality of those who are employed through an indicator of *overqualified workers*. The third challenge is providing a sufficient wage to achieve a decent standard of living and to avoid poverty and income instability, for which we include *low earnings* and *severe salary reduction*.

2.3. Housing

Housing is also a fundamental dimension for the coverage of social needs. It has been traditionally considered as an essential basis for achieving a decent life, as well as an asset that may act as a protection against falling incomes. The first challenge in the area of housing is access to housing. Housing prices, economic recessions, and the lack of specific protection policies are the reasons why many families usually cannot afford to pay mortgages and rents. On the other hand, when the cost of housing for a family exceeds a high percentage of household income could jeopardise other family expenses and lead to default on mortgage or rent payments and, even, its loss. The indicators considered are *high rental income*, *overburdened housing expenses*, and *rent or mortgage arrears*.

Another challenge in this area is to live in decent housing. A minimum standard of housing is a social need that is not met if housing lacks basic facilities and amenities, it is in poor condition, or their members live in overcrowded accommodation. Three different indicators have been considered: *poor housing conditions*, *overcrowding*, and *severe housing deprivation*.

A third housing challenge is to ensure that households' energy consumption needs are met, reducing the risk of energy poverty. Although there is no single definition of this concept, it encompasses situations where households lack sufficient resources to meet basic domestic energy needs (heating, lighting and use of appliances). Living in houses that are too cold worsens various illnesses and contributes to higher mortality in the winter months (Tirado et al., 2016). In addition, it can reinforce social exclusion processes if household members avoid inviting friends or relatives over due to the lack of environmental comfort. To measure the needs associated with energy poverty, the following indicators were considered: *lack of thermal comfort* and *arrears on utility bills*.

2.4. Health

In the health dimension, the protection of health, defined not only as the absence of disease, but also as a state of physical, mental and social well-being (WHO, 1948), presents multiple facets and challenges. The first challenge for the population is being as healthy as possible. To measure the social needs associated with this first challenge, we use as the following indicators: *self-assessed health status*[1], *chronically ill*, *limitations for daily activities*, and *mental health problems*.

Promoting healthy lifestyles and reducing avoidable risk factors is a second health challenge related to social needs. Given the multiplicity of controllable factors that influence health, it is difficult to summarise the social needs in this area in a few indicators. We focus on obesity and the consumption of harmful substances as these are elements on which there is sufficient information and consensus: *obesity* and *tobacco consumption*.

Thirdly, having a public health service with virtually universal coverage implies some guarantee of adequate access to the health system. The measurement of these needs requires, as far as possible, the removal of barriers that create inequalities in the care received or that reduce the chances of cure for certain individuals or groups. Waiting times, cost, distance or the scarcity of specialists and appropriate services in certain areas can undermine equity of access. Both the EU-SILC, the latest waves of the Health Barometer (BS) and national and European health surveys (ENS/EESE) directly investigate the existence of different types of unmet medical needs through questions to

[1] This variable is also the one used to calculate the indicator known as healthy life expectancy (HALE), which is sometimes used to make comparisons of health-adjusted life expectancy.

the adults interviewed. The indicators representing this challenge are the *inaccessibility to medical care* and *inaccessibility to dental care*.

2.5. Education

For the education dimension, we consider that any person or household must face three fundamental challenges: having access to quality education, having the possibility of obtaining adequate knowledge that contributes to economic and social development, and being part of an inclusive educational system. The first challenge is analysed through five indicators: *not achieving intermediate level*, *tertiary graduates*, *children in formal education*, *adults in education (25-64)* and *early school leavers*.

The second challenge —having the possibility of obtaining adequate academic results to live in a developed society— is studied based on an indicator of knowledge and skills in secondary education. We include as main indicator the percentage of *low performers in secondary education*.

The third challenge is having and inclusive educational system and not being segregated by social origin. An inclusive system will promote equality of life opportunities for people coming from families with different socio-economic backgrounds and investments in human capital will allow them to develop their skills and acquire the necessary knowledge to achieve their full social development. The indicators are *grade repetition* and *level of segregation*.

2.6. Environment

Finally, social, family and friendship relations, together with social participation, form part of a crucial dimension in the analysis of social needs which can be grouped into what we call social environment. Particularly in situations of economic need, these relationships provide the backbone of society and make up what is often called 'social and relational capital'. This capital allows for better resistance to the consequences of crises and is central to the regeneration of public institutions. The fundamental challenges we consider that any person or household should face are having sufficient relational capital, to participate actively in society, and to live in a safe and clean environment. To measure the social needs associated with this first challenge we use two indicators: *infrequent relationship* and *no possibility to talk with others*.

Regarding the second challenge —actively participating in society—, only those people who participate in social activities through associations and organisations can increase their social capital. In democratic societies, associationism and social participation make it possible to have networks of representation of public opinion beyond the vote that can both control and regenerate public institutions. The indicators we use to measure the social needs associated with this challenge are *no participation in activities* and *belonging to a discriminated group*.

Finally, only by living in a safe space of environmental quality can adequate levels of coverage of needs be achieved. To measure the social needs related to this third challenge, four indicators are used: *insecurity in the area*, *noise from neighbours or outside*, *pollution in the area*, and *crime in the area*.

3. EMPIRICAL APPROACH

In this paper, we propose to construct a new composite social needs index for a selection of European Union (EU) countries considering six social needs dimensions: health, education, economic well-being and material poverty, employment conditions, housing, and social environment. We believe that, in comparison to world-wide HDI measurement, when focussing on developed countries it is important to add these other three dimensions of well-being to construct a broader Europe-wide social needs index. Our proposal considers six dimensions and a very broad number of underlying indicators: 48 (8 per dimension). Thus, our approach has the advantage over previous studies of extending the number of dimensions and enriching the information that contributes to each of them. Despite this, we are still able to gather EU-wide homogeneous information from a large variety of surveys that covers a large period with adequate measures at four moments in time: 2005,2010, 2015, 2019. This allows for the analysis of social needs from 2005 up to 2019 so that we have information on different phases of the economic cycle, boom (2005-2008), recession (2008-2015) and subsequent recovery (2015-2019).

Two are the crucial methodological decisions when calculating a composite indicator. First, the choice of weighting schemes (both regarding the weights of the dimensions within society's global index and the weights of the indicators within a given dimension) and second, the choice of a dimension aggregation method. In general, we may classify weighting strategies in three groups: data-driven, normative and hybrid. Within data-

driven weights we have frequency-based weights, statistical weights, and most-favourable weights (OECD, 2008).

Frequency-based weights use the actual distribution of dimensions in each population to decide how to consider each dimension in the global societal index. Therefore, weights depend on either the frequency or the inverse frequency of each deprivation dimension in the society considered. These weights have the advantage of being robust against the inclusion of dimensions that are only relevant for a small part of the population while their main disadvantage is that the importance of dimensions crucially depends on the relative levels of the deprivation phenomenon across dimensions. Another option is to use statistical weights which are obtained using multivariate statistical methods to summarize the data such as Principal Components Analysis (PCA) or Factor Analysis and also multiple causes models that study the effect of latent variables. These avoid a double counting problem when there is overlapping information in indicators/dimensions, but are hard to interpret, lack transparency, and are sensitive to the definition of original data and to the presence of outliers and small samples. Moreover, the obtained linear combination of indicators or dimensions and their correlations do not necessarily represent their real influence.

Another data-driven weighting method is the so-called "most favourable weights" which essentially aims to weight individuals in the population differently in line with information about policy priorities or in relation to "incentive generating" issues. These tend to reward the current status quo while the best performers may not see progress reflected in the composite index. Finally, other data-driven weighting methods can be classified as "most favourable weights" based on Data Envelope Analysis (DEA) or Unobserved Components Model (UCM). DEA estimates an efficiency frontier used as a benchmark so that weights are endogenously determined to maximize individual well-being. UCM assume that individual indicators depend on an observed variable plus an error term so that weights are set to minimize this error component. Problems may arise using DEA leading to an unreasonable trade-off between dimensions/indicators while using UCM may have identification problems if dimensions/indicators are highly correlated.

Normative weighting methods are equal or arbitrary weights, price-based weights and expert-opinion weights. The latter may consider weighting using either experts' opinions reflecting the urgency of policy interventions or citizen's opinions that should be closely

related to population concerns. Finally, there are some hybrid methods such as hedonic weights that are derived from a regression of life satisfaction on a set of variables representing the different dimensions of well-being, underlying the importance of the implicit individual valuation of well-being in the information about self-reported life-satisfaction.

Regarding the choice of indicators/dimensions aggregation method into a societal index, two are the main options: using an additive or a geometric approach. Additive aggregation can imply full compensation between indicators (dimensions) so that a poor performance in some of them can be compensated by good performances in others. Geometric aggregation aims to avoid full compensation and indicates the central tendency or the typical value by using the product instead of the addition. The pre-2010 HDI used an additive structure and was criticized for its substitutability between dimensions and its dependence on the normalization method used in the different indicators.

However, as Ravallion (2012) most clearly notes, the decision to change the aggregation of the HDI in the twentieth anniversary of the Human Development Report using the geometric mean instead of the arithmetic mean and following a product formula had good intentions but does not assure good measurement of development. In fact, this author unveils a variety of flaws of this new measurement proposal and suggests considering the generalized form of the old HDI proposed by Chakravarty (2003). This generalized index proposes a parametric special case where one can maintain an additive aggregation of dimensions constructing a smoothly increasing and strictly concave function within each dimension by adding a parameter r. In fact, the old HDI is a limiting case of this family of indicators when the parameter r is equal to 1 and considering smaller values between 0 and 1 easily allows for imperfect substitutability between dimensions, avoiding other unintended properties that geometric aggregation implies such as a tendency to lower the value of a marginal increase in life expectancy when the income dimension is small compared to when it is large.

Our new composite social needs index S_{ct} for each of the nine European Union (EU) countries considers six social needs dimensions (D_{ict}) based on 8 social needs deprivation indicators each (48 indicators in total, I_{jct}). Initially we propose a benchmark where we use an additive aggregation in both levels of aggregation (indicators to dimensions, w_{ict}, and from dimensions to the societal index, δ_{jct}) and use an arithmetic mean at both

aggregation levels. Regarding weights we use equal weights at both aggregation levels: from indicators to dimension and aggregating dimensions, even if we also provide a robustness check of all our results using citizen's opinions weights for dimensions (not indicators), where w_{ict} values are based on the country-specific subjective information provided by the OECD Better Life Index (OECD, 2020).

Each indicator within every dimension *i* for country *c*, at moment *t* is normalized using the information on its maximum and minimum value so that for each indicator I_{jct}, contributing to the value of one of the six dimensions of social needs in a particular year, D_{ict}, we have that normalization implies converting indicators into a comparable range of values so that indicator I is converted into I_{jct} :

$$I_{jct} = \frac{I - I_{min}}{I_{max} - I_{min}} \quad (1)$$

That is, indicators are transformed into relative gains so that all I_{jct} indicators within a dimension are in a [0,1] interval. This avoids considering the impact of measurement unit differences in indicators within a dimension. Dimensions values are then constructed using the information on the eight normalized indicators calculating an arithmetic mean and using equal weights. Once the relative deprivation level on each social needs dimension is obtained, we can construct society's social needs deprivation index S_{ct} using a geometric mean, so avoiding full substitutability between social needs dimensions.

Analytically, we calculate the value of social needs in every dimension *i* for country *c*, at moment *t* so that:

$$D_{ict} = \sum_{j=1}^{8} \delta_{jct} I_{jct}$$

In this first aggregation step we consider equal weights to aggregate from indicators to dimensions so that $\delta_{jct} = 1/8$. Subsequently, we calculate each country's *c* unmet social needs index at moment *t* by summing up dimensions using an arithmetic mean:

$$S_{ct} = \sum_{i=1}^{6} (w_{ict} D_{ict})^r$$

To aggregate from dimensions to a societal index we consider two weighting strategies: equal weights (so that $w_{ict} = 1/6$) and a normative weighting method based

on country-specific subjective information on the relevance of each dimension on global social needs deprivation.[2] Following Chakravarty (2003) and Ravallion (2012) we consider different values of the parameter *r*: 1, 0.75, 0.5 and 0.25. A value of 1, the limiting case, imposes perfect substitutability between dimensions, while smaller values allow us to relax this assumption.

Finally, we also undertake the analysis considering a geometric aggregation approach, so that a poor performance in some dimensions cannot be compensated by good performances in others. This implies using a geometric mean to calculate a country's *c* unmet social needs index in year *t*:

$$S_{ct} = \prod_{i=1}^{6} (w_{ict} D_{ict})^{1/6}$$

4. RESULTS

4.1. Dimensions of social needs

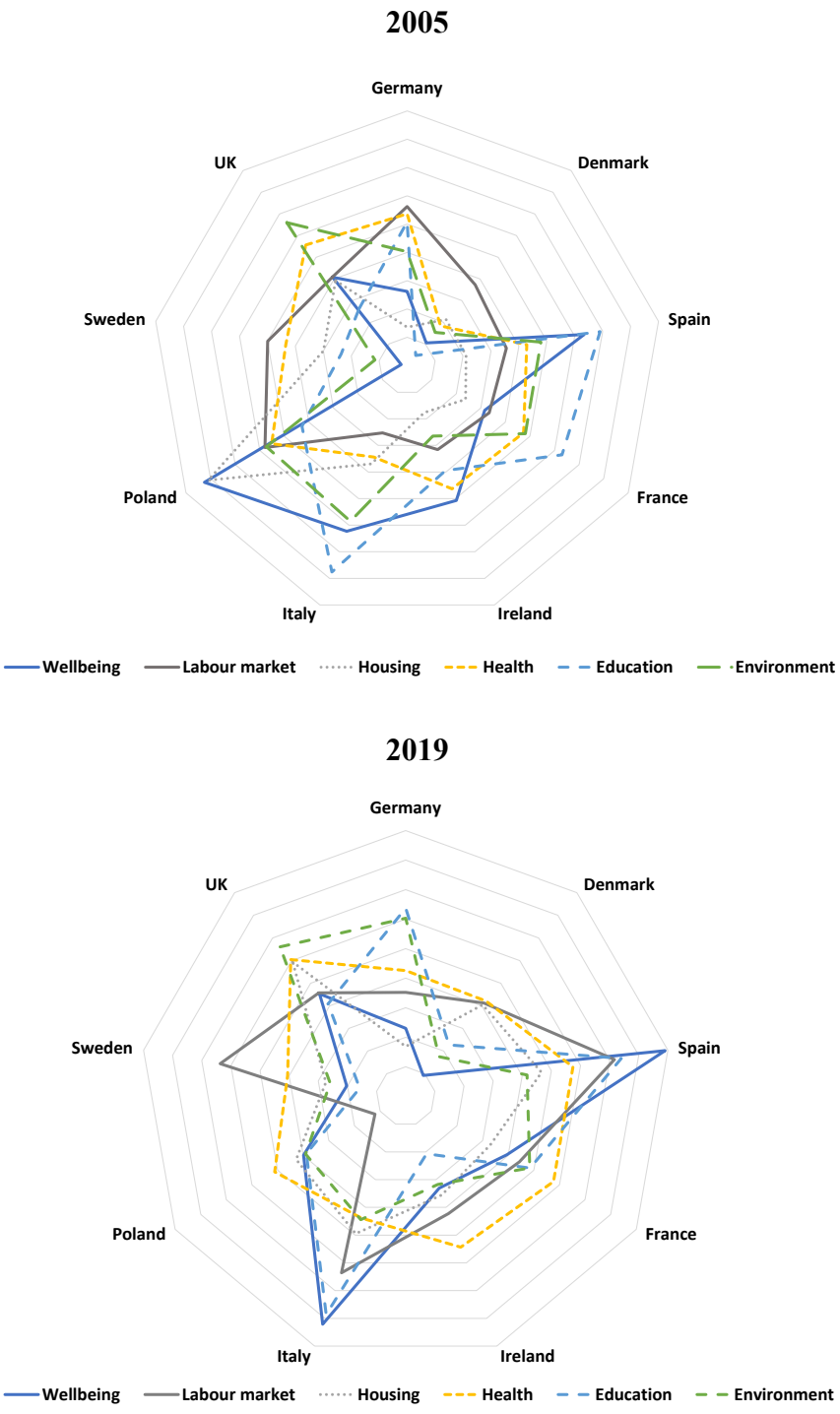
A key perspective for assessing unmet social needs in the European countries considered is the analysis of their extent in the different dimensions would shape a global index. As Figure 1 shows, no dimension dominates over all the others. Generally speaking, the dimension where unmet needs seem to be lowest is economic and material well-being. At one extreme, the experience of the Nordic countries stands out, with very low levels of the index corresponding to this dimension. In the case of Denmark, it is below 10%, which is the lowest value of all the indicators and countries considered. At the other side are the countries of Southern Europe, with similar and very high indicators. These differences are related, above all, to the inadequacy of income guarantee schemes in these countries. In this dimension, the Anglo-Saxon countries, where these systems are also less extensive —especially the United Kingdom— still have a high percentage of households with unmet needs.

These deficiencies in needs related to economic and material well-being have a natural cause in the degree to which households manage to satisfy their needs in the labour market. Low levels of unemployment and sufficient wages should a priori be associated with fewer problems in the first of these areas. As the results show, it is also the

[2] Note however that our calculations using subjective weights r is assumed to be equal to 1.

Mediterranean countries that perform worst in the indicators related to the labour market. In general, there is a certain correlation between the two types of needs. Even so, several countries manage to prevent situations of unemployment, low wages and reduced quality of work from translating into a major deterioration in the indicators of lack of economic resources. In this dimension, the case of Poland stands out, where the strength of the labour market makes it the country with the greatest achievements.

Figure 1. Unmet Social Needs by Dimensions



In the case of housing, considering the problems of access and poor conditions of this asset, the difference in results by typology of welfare regimes continues being present. The countries that most deviate from this characterization are, on the positive side, Germany, with a very low value in the aggregate indicator for this dimension, and, on the negative side, Denmark and, especially, the United Kingdom. In the case of the Nordic countries, this dimension presents a high value compared to other dimensions, and the United Kingdom it is by far the country where the needs in this dimension are covered to a lesser degree.

Of all the dimensions, it is in health where we find the most homogeneous results. In general terms, the level of the synthetic indicator for all countries is high, but the range of variation is the narrowest of all. Even so, the previous results of higher achievements in the Nordic countries are repeated, there are worse results in the Southern European countries, and the highest levels, once again, are found in the United Kingdom, where large deficits in housing and health outstand in the comparative analysis.

It is worrying that in almost all countries the unmet needs in terms of access, skills and segregation in the education system are high. Only the two Nordic countries escape this situation. At the other extreme, Italy and Spain again have very high indicators. Broadly speaking, an inclusive system will promote equality of life opportunities for people coming from families with different socio-economic backgrounds and will allow that, whatever a person's social origin, investment in human capital will allow her to develop her skills and acquire the necessary knowledge to achieve her full social development. The reality in several European countries is far from this objective.

Finally, the range of variation in the coverage of social needs is also high in the case of the environment. The better position of the Nordic countries is also observable in this dimension, while Central European countries together with the United Kingdom show the worst results. In these countries, both the intensity of social relations is lower, social participation also, and the quality of the environment is also lower than in other countries.

The availability of data at different points in time makes it possible to compare these results with those of 2005, prior to the onset of the Great Recession. The crisis seems to have affected all countries, albeit with unequal intensity and with different effects on each dimension. Poland is the only country in which all the synthetic indicators by dimension decreased. The opposite cases are the United Kingdom, where all indicators increased,

and the Mediterranean countries, where the same was true except for the environment dimension. The worst performance in the dynamics of social needs coverage is found in the labour market and housing dimensions, where most countries recorded significant increases. A relatively positive development is the reduction in educational needs in some countries, such as France, Ireland, Poland, and Sweden.

Table 1. Synthetic Index of Social Needs by Dimensions (ranking of needs)

	2005					
	Wellbeing	**Labour market**	**Housing**	**Health**	**Education**	**Environment**
Germany	5	1	6	2	3	4
Denmark	5	1	2	3	6	4
Spain	2	5	6	3	1	4
France	5	4	6	3	1	2
Ireland	1	4	6	2	3	5
Italy	2	6	4	5	1	3
Poland	1	3	2	5	6	4
Sweden	6	1	3	2	4	5
UK	4	3	5	2	6	1

	2019					
	Wellbeing	**Labour market**	**Housing**	**Health**	**Education**	**Environment**
Germany	5	4	6	3	1	2
Denmark	6	2	3	1	4	5
Spain	1	3	5	4	2	6
France	5	4	6	1	2	3
Ireland	4	2	3	1	6	5
Italy	1	3	4	6	2	5
Poland	3	6	2	1	5	4
Sweden	5	1	3	2	6	4
UK	5	4	3	2	6	1

A final analysis has to do with the hierarchy of needs in each country and the possibility of different results by welfare models. As Table 1 shows, there is also a clear differentiation of models in this area. In Nordic countries, the dimensions where the problems in reducing social needs are greatest, although lower than in other countries, are the labour market and health. In Central European countries, the worst results are in education, health and the environment. Anglo-Saxon countries share the difficulty in reducing needs in the area of health, while the opposite is true for education. Southern European countries, in addition to generally presenting a lower coverage of social needs,

show as their main singularity a higher incidence in economic and material well-being and the labour market. Finally, Poland also presents a differential experience, with greater relative difficulties in health and housing.

This hierarchy of needs allows us to state that in relative terms European countries present in general the greatest problems in the dimensions of health and the labour market, and the least, except for the United Kingdom and Germany, in needs related to the environment and housing. This pattern is relatively similar to that observed before the Great Recession, when the best-covered needs were the same as in 2019. The main change is that while in many countries the main problems had to do with the labour market, such as the Nordic and some Central European countries, the opposite was true for Mediterranean countries, with labour markets with a remarkable strength before that crisis. Our results seem to show that the shock of the crisis left significant after-effects in these last countries in employment and the generation of stable incomes.

4.2. Synthetic index of unmet social needs

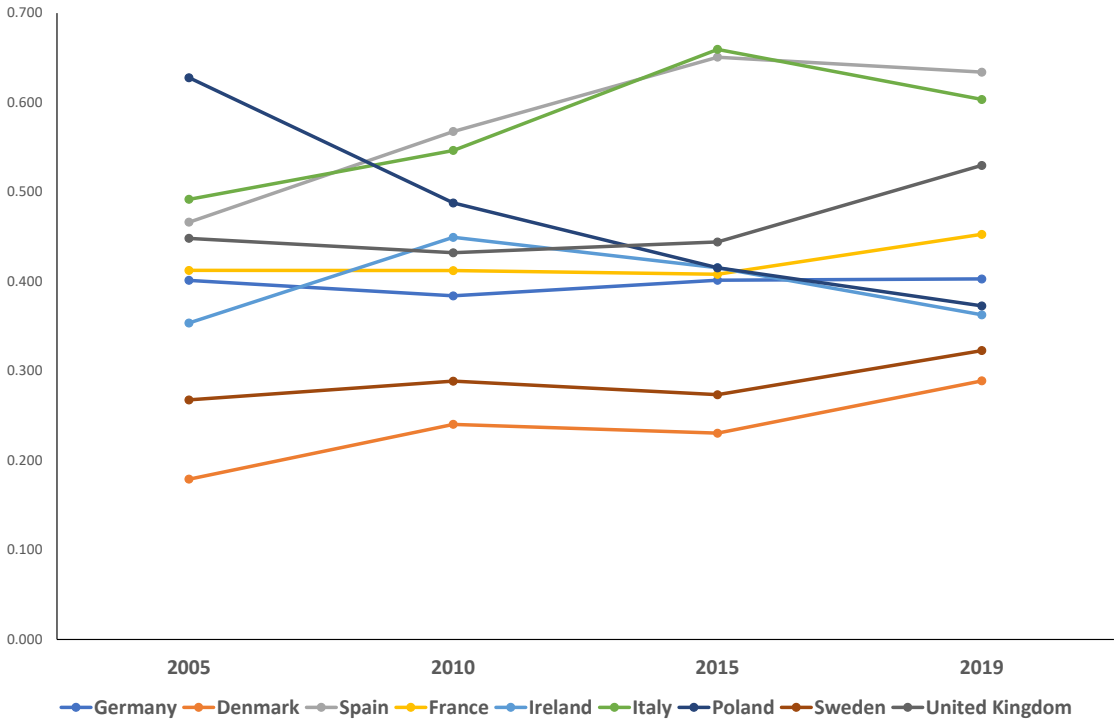
The possibility of contrasting the extent of the incidence of social needs in different countries allows us to analyse differences and similarities by welfare regime. As shown in Figure 2 and Table 2, the results for the synthetic index of unmet social needs reveal a relationship between the degree of unmet needs and welfare regimes. The two Nordic countries under consideration, Denmark and Sweden, are relatively similar in terms of the index, with the lowest levels in the group of countries considered and have become more equal during the observed period. This similarity is also observable in Southern European countries, and the incidence of unmet needs is also similar in Ireland and the United Kingdom, although in the most recent period the latter is characterised by an upward trend in the synthetic indicator, while the opposite happened in Ireland. Central European countries also have somewhat similar values for most of the period analysed.

Of all the countries considered, the most unique experience is that of Poland, which in little more than a decade went from being the country with the worst indicators to levels that are very similar to those of Central European countries such as France or Germany. This evolution is fundamentally related to the strength of its labour market, shifting towards higher-skilled employment (OECD, 2020), and well targeted spending programs in support of low-income families (World Bank, 2015). A stable economic growth rate

has translated into a well-functioning labour market. The unemployment rate is at record low levels, less than half that of the European Union.

There is also some homogeneity in the changes over time regarding the incidence of unmet needs (Figure 2). Although the pattern is not entirely common, the increase in social needs in the first phase of the 2008 crisis in most countries stands out, although in the case of the Mediterranean countries the prolongation of the crisis meant that the increase took place mainly in the first part of the last decade. Economic recovery has generally implied a decrease in the combined rate of unmet social needs. However, in some countries, not only did this not occur, but, on the contrary, the incidence of the problem steadily increased. This is the case in Nordic countries and, most outstandingly, in the UK.

Figure 2. Synthetic Index of Social Needs, arithmetic mean



As noted earlier, an arithmetic mean imposes perfect substitutability between dimensions. We can relax this assumption by considering different values of the parameter r below 1. Following Ravallion (2012) we choose values of 0.75, 0.5 and 0.25. Considering these smaller values of r we allow for imperfect substitutability between dimensions without the unintended properties that geometric aggregation implies such as

a tendency to lower the value of a marginal increase in one of them when another is small compared to when it is large.

Table 2. Synthetic Index of Social Needs, arithmetic mean

	2005	2010	2015	2019
Germany	0.401	0.384	0.401	0.403
Denmark	0.179	0.240	0.231	0.289
Spain	0.466	0.568	0.651	0.634
France	0.412	0.412	0.408	0.453
Ireland	0.354	0.449	0.415	0.363
Italy	0.492	0.546	0.659	0.603
Poland	0.628	0.488	0.415	0.373
Sweden	0.268	0.289	0.273	0.323
United Kingdom	0.448	0.432	0.444	0.530

Table 3. Synthetic Index of Social Needs, geometric mean

	2005	2010	2015	2019
Germany	0.361	0.360	0.384	0.362
Denmark	0.149	0.223	0.209	0.253
Spain	0.435	0.543	0.621	0.612
France	0.392	0.386	0.388	0.446
Ireland	0.333	0.432	0.397	0.348
Italy	0.457	0.506	0.645	0.584
Poland	0.612	0.460	0.386	0.341
Sweden	0.183	0.248	0.236	0.289
United Kingdom	0.430	0.419	0.440	0.521

In Table 4 we can see that, by construction, higher values of r reduce the absolute value of the synthetic indicator. Results also show that, reducing the substitutability assumption (comparing $r = 1$, arithmetic mean, with $r = 0.25$) has implications on the comparative levels of unmet social needs and their trends: as r reduces both the levels of unmet needs are more similar between countries and they are also more stable in time. In general, however, country rankings remain very similar, for all values of r.

These results are not very sensitive to the use of other weighting schemes (given $r = 1$). When the geometric mean of the dimensions is used instead of the arithmetic mean, the two previous results are broadly confirmed: a clear correspondence between the synthetic indicator of unmet needs and the welfare typology or regime, and a similar evolution over time (Table 3). The first of these results confirms the poorer position in

the comparative table of the Mediterranean countries, the intermediate position of the Central European and Anglo-Saxon countries, although not in the case of the United Kingdom, the better results of the Nordic countries, and further confirms the improvement over time of Poland. Poland's results are only inferior to those of the Nordic countries.

Table 4. Synthetic Index of Social Needs, Ravallion's proposal (based on Chakravarty, 2003)

	r = 0.25			
	2005	**2010**	**2015**	**2019**
Germany	0.781	0.778	0.789	0.781
Denmark	0.629	0.691	0.681	0.716
Spain	0.816	0.861	0.890	0.887
France	0.794	0.792	0.792	0.818
Ireland	0.763	0.813	0.796	0.770
Italy	0.826	0.848	0.897	0.876
Poland	0.886	0.827	0.793	0.770
Sweden	0.675	0.712	0.703	0.738
United Kingdom	0.812	0.806	0.815	0.851

	r = 0.5			
	2005	**2010**	**2015**	**2019**
Germany	0.618	0.610	0.627	0.619
Denmark	0.405	0.482	0.469	0.521
Spain	0.672	0.745	0.797	0.789
France	0.634	0.632	0.631	0.670
Ireland	0.586	0.664	0.638	0.596
Italy	0.689	0.726	0.808	0.770
Poland	0.787	0.688	0.634	0.599
Sweden	0.481	0.517	0.504	0.553
United Kingdom	0.663	0.652	0.665	0.725

	r = 0.75			
	2005	**2010**	**2015**	**2019**
Germany	0.496	0.482	0.500	0.496
Denmark	0.267	0.339	0.327	0.385
Spain	0.557	0.649	0.718	0.706
France	0.510	0.508	0.506	0.550
Ireland	0.454	0.545	0.513	0.464
Italy	0.579	0.627	0.729	0.680
Poland	0.702	0.577	0.511	0.471
Sweden	0.354	0.383	0.368	0.419
United Kingdom	0.544	0.530	0.543	0.619

Figure 3. Sensitivity analysis by country

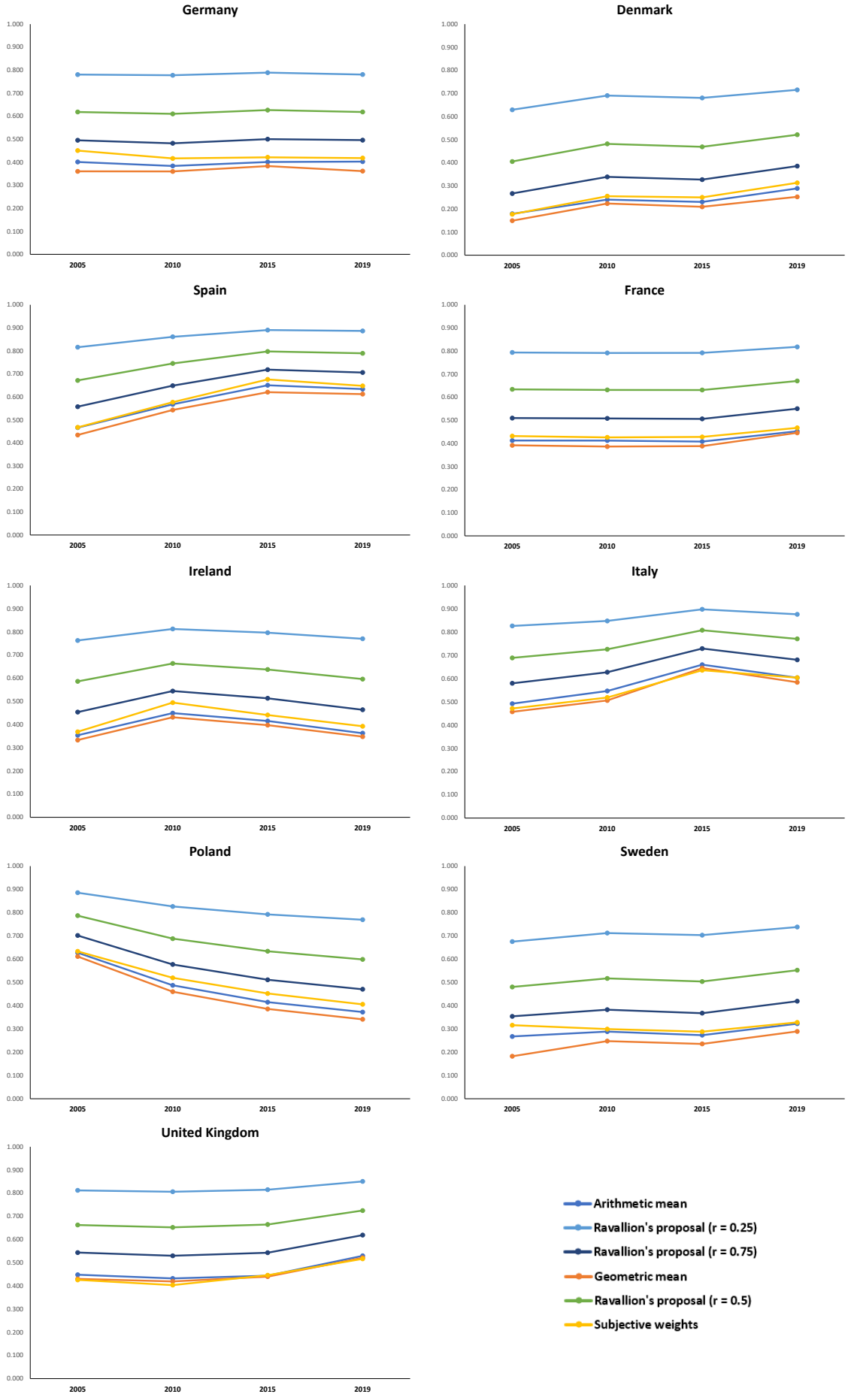


Table 5. Synthetic Index of Social Needs, arithmetic mean, subjective weights

	2005	2010	2015	2019
Germany	0.451	0.417	0.422	0.418
Denmark	0.177	0.255	0.250	0.313
Spain	0.468	0.577	0.676	0.648
France	0.432	0.426	0.428	0.467
Ireland	0.369	0.495	0.441	0.393
Italy	0.471	0.518	0.636	0.604
Poland	0.634	0.520	0.452	0.406
Sweden	0.316	0.300	0.288	0.328
United Kingdom	0.426	0.403	0.446	0.517

Something similar happens when a subjective scheme is used as a weighting system. What we have done is to try to transfer to our list of dimensions the subjective weightings used in the OECD Better Life Index for the different dimensions. As Table 5 and Figure 3 shows, the correspondence between unmet needs and welfare typology does not change, nor does the evolution of the index over time. It is important to highlight that in almost all countries the use of these subjective weightings raises the synthetic indicator of social needs, the two exceptions being Italy and the United Kingdom.

5. SOME PRELIMINARY CONCLUSIONS

There is a widely recognised collective demand to develop unmet social needs measures for developed countries that incorporate indicators that go beyond monetary poverty. Over the last decades, several social researchers have investigated poverty through a broader lens incorporating different aspects related to the quality of living conditions into its measurement.

In this paper we propose a set of dimensions and indicators to measure the incidence and trends of poverty-related social needs and aggregate them in a synthetic index of unmet social needs for a selected sample of European countries. The main aim is not to use completely alternative concepts and indicators to the traditional ones, but to improve the measurement of social needs through broader and more systematic indicators than income poverty or other strictly distributional outcomes. The main advantage of our proposal over previous studies is the number of indicators and the availability of homogeneous information for a large number of countries at different moments in time

so that we can most accurately identify the impact of the economic cycle on poverty-related social needs.

We construct a composite social needs indicator for nine European Union (EU) countries including six social needs dimensions each of which is based on eight social needs deprivation indicators. We add dimensions using two alternative aggregation methods that allow for full or limited compensation between them. Regarding weights we use equal weights at both aggregation levels, but we also provide a robustness check of all our results using citizen's opinions weights using the country-specific subjective information provided by the OECD Better Life Index (OECD, 2020).

Our results show that the synthetic index of unmet social needs reveals a relationship between the degree of unmet needs and welfare regimes. Nevertheless, Poland shows an unique experience in little more than a decade going from a country with the worst indicators to levels that are very similar to those of Central European countries. The results by dimensions are very interesting and show that, both before and after the Great Recession, the greatest problems of European countries in relative terms are related to health and the labour market, and the least, except for the United Kingdom and Germany, are related to the environment and housing. The main change in the last decade has been the loss of strength of the labour market in Southern European countries which have increased their difficulties in providing employment and the generating stable incomes.

In general, results are not very sensitive to the use of other weighting schemes or aggregation method (arithmetic versus geometric mean). Nevertheless, relaxing the assumption of perfect substitutability of dimensions implies, by construction, a higher absolute value of the synthetic indicator. We find that this also has some relevant implications for comparisons and time trends: as a lower perfect substitutability is assumed the levels of unmet needs are more similar between countries and they are also more stable in time, while country rankings remain very similar.

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Appendix

Table A1. Definition of social needs indicators

Dimension	Indicator	Definition
Material and economic well-being	Lack of autonomy	Percentage of people over 25 years old with no income or less than the minimum income.
	At-risk-of monetary poverty	Percentage of people living in households whose adjusted disposable income is below 60% of the national median income
	Income losses	Percentage of individuals who experience a drop of at least 25% in their household disposable income (financial wealth is taken account)
	Financial dissatisfaction	Percentage of people whose income is at least 10 per cent lower than that indicated by the household itself as necessary to make ends meet
	Difficulty to make ends meet	Percentage of people living in households reporting that it is difficult or very difficult for them to make ends meet
	Material deprivation	Percentage of the people living in households that cannot afford at least three of the following nine items: 1) unexpected expenses; 2) afford a one-week annual holiday away from home; 3) a meal involving meat, chicken or fish every second day; 4) the adequate heating of a dwelling; 5) durable goods like a washing machine, 6) colour television, 7) telephone or 8) car; 9) being confronted with payment arrears (mortgage or rent, utility bills, hire purchase instalments or other loan payments.
	At-risk-of chronic poverty	Percentage of people living in households at risk of poverty for 3 consecutive years or more.
	Consistent poverty	Percentage of people whose households are simultaneously at risk of monetary poverty and material deprivation
Labour market	No employment at the household	Percentage of people living in households where all members are unemployed
	Underemployment	Percentage of people living in households whose employed members aged 16-59 years that work less than 20% of the hours they would be employed if they had a full-time contract
	Long-term unemployment	Percentage of people living in households where half or more of the active unemployed have been looking for a job for more than one year
	Employment instability	Percentage of people living in households where all employees are on temporary contract
	Temporary employment	Percentage of people who are on temporary contract
	Overqualification	Percentage of people whose job requires less qualification than the person qualification possesses
	Hourly wage <2/3 of median wage	Percentage of active employed people whose gross hourly wage is below 2/3 of median wage
	Severe salary reduction	Percentage of persons employed for two consecutive years who have experienced a reduction of at least 20% of their net monthly pay in the last year

Table A2. Definition of social needs indicators (continued)

Dimension	Indicator	Definition
Housing	High rental income	Percentage of people living in households that spend more than 40% of their disposable income on rent
	Overburdened housing expenses	Percentage of people living in a household where the total housing costs (rent, mortgage loan repayments and interest, bills, etc.) net of housing allowances represent more than 40% of the total disposable household income (net of housing allowances)
	Rent or mortgage arrears	Percentage of people living in households that have paid their rent or mortgage late over the last year
	Poor housing conditions	Percentage of people whose dwellings have any of the following problems: a) leaking roof, damp walls or rot; b) insufficient natural light; c) no toilet with running water inside the dwelling; d) no bath or shower inside the dwelling
	Overcrowding	Percentage of people whose dwellings do not have enough space, according to the Eurostat criteria, i.e. they do not have at least: 1) one room for the household, 2) one room for each couple, 3) one room for each single person aged 18 and over, 4) one room for each pair of children of the same sex aged 12 to 17, 5) one room for each single person of different sex aged 12 to 17, and 6) one room for each pair of children under the age of 12
	Severe housing deprivation	Percentage of people whose households have a problem of overcrowding and at least one problem of poor housing conditions: 1) leaking, damp or rotting, 2) lack of natural light or 3) no bath/shower and toilet inside the dwelling
	Lack of thermal comfort	Percentage of people living in households that state that they cannot afford to keep their homes adequately warm in the winter months
	Arrears on utility bills	Percentage of people living in the household has been in arrears in the past 12 months, that is, unable to pay on time utility bills (heating, electricity, gas, water, etc..)
Health	Self-assessed poor health	Percentage of adults (16 years and older) who report that their health status has been bad or very bad in the last 12 months
	Chronically ill	Percentage of adults (16 years and older) who suffer from any chronic (long-standing) illness or condition of a duration of at least six months
	Limitations for daily activities	Percentage of adults (16 years and older) reporting limitations (moderate or severe) in activities people usually do because of health problems for at least the past six months
	Obesity	Percentage of adults (15 years and older) suffering from obesity defined as body mass index of 30 or more.
	Tobacco use	Prevalence of current tobacco use among persons aged 15 years and older
	Mental health	Prevalence of mental disorders such as depression, chronic anxiety or other mental illness among the adult population (15 years and older).
	Inaccessibility of medical care	Percentage of adults (aged 16 and over) who have ever, in the last 12 months, unmet need for medical examination or treatment (except dentists) for financial reasons, excessive distance or because there was too long a wait
	Inaccessibility of dental care	Percentage of adults (aged 16 and over) who have ever, in the last 12 months, unmet need for dental examination or treatment for financial reasons, excessive distance or because there was too long a wait

Table A3. Definition of social needs indicators (continued)

Dimension	Indicator	Definition
Education	Not achieving intermediate level	Percentage of people who have not graduated from intermediate or upper secondary education or university or equivalent studies
	Tertiary graduates (30-34)	Percentage of people aged 30-34 who have not graduated from tertiary education
	Children in formal education (0-3)	Percentage of children under 3 years old who are not in school, out of the total of that age range
	Adults in education (25-64)	Percentage of persons aged 25-64 who participated in education or training during the last four weeks
	Grade repetition	Percentage of 15-year-old students who have repeated a grade
	Early school leavers	Percentage of 18-24-year-old individuals who have dropped out of school early
	Low-performers in secondary education	Percentage of people who do not achieve sufficient knowledge in secondary school
	Level of segregation	Percentage of students from a socio-economic group who would have to change school for that group to experience no segregation in the education system
Environment	Infrequent relationship (monthly)	Percentage of people who do not have relationships in their free time with friends or family on a weekly basis
	No possibility to talk with others	Percentage of people who do not have any relationship that allows them to talk about personal issues
	No participation in activities	Percentage of people who participate much less than the majority of the population of their age in social activities
	Belonging to a discriminated group	Percentage of people who consider that they belong to a discriminated group in this society
	Insecurity in the area	Percentage of people who feel insecure or very insecure walking at night
	Noise from neighbours or outside	Percentage of people exposed to street and neighbour noise in their area of residence
	Pollution in the area	Percentage of people exposed to pollution and environmental problems in their area of residence
	Crime in the area	Percentage of people who have been victims of robbery or assault in the last 5 years