

Composite Indicator of Social Inclusion for European Countries

Francesca Giambona · Erasmo Vassallo

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Abstract Social inclusion is one of the key challenges of the European Union (EU) Sustainable Development Strategy. We use four indicators from EU policies to measure social inclusion for the 27 member countries of Europe. In particular, we aggregate the four indicators in a multiplicative composite indicator via a DEA-BoD approach with weights determined endogenously with proportion constraints. We obtain a score of social inclusion that allows us to grade the 27 EU countries from 2006 to 2010. In this way, we highlight the specific role played by the four indicators in determining improvements and deteriorations of social inclusion during the European phase of the financial and economic crisis.

Keywords Social inclusion · Composite indicator · Benefit-of-doubt

1 Introduction

The European Union has adopted the “Europe 2020” strategy, aimed at a smart, sustainable and inclusive growth in the 27 member countries, in order to achieve high levels of employment, productivity and social cohesion through five objectives to be reached by 2020 (European Council 2010): (1) employment (75 % of people aged 20–64 to be employed); (2) research and development (3 % of EU GDP to be invested in public and private R&D/innovation); (3) climate change/energy (20 % greenhouse gas emissions lower than 1990, 20 % of energy from renewables, 20 % increase in energy efficiency); (4) education (reducing school drop-out rates below 10 %, at least 40 % of 30–34 years old completing level education); (5) poverty/social cohesion (at least 20 million fewer people in or at risk of poverty and social exclusion). The five objectives are not mutually

F. Giambona · E. Vassallo (✉)
Dipartimento di Scienze Statistiche e Matematiche “Silvio Vianelli”,
Università degli Studi di Palermo, Viale delle Scienze, Edificio 13, Palermo, Italy
e-mail: erasmo.vassallo@unipa.it

F. Giambona
e-mail: francesca.giambona@unipa.it

independent, and the achievement of one is somehow linked to the achievement of the others. In particular, in this paper, we focus on the 5-th target. In fact, reducing social exclusion is a key factor for a sustainable development that takes care of resources and aims to increase benefits reducing costs of economic development. Specifically, the European Commission defines social exclusion as “a process whereby certain individuals are pushed to the edge of society and prevented from participating fully by virtue of their poverty, or lack of basic competencies and life long learning opportunities, or as a result of discrimination. This distances them from job, income and education and training opportunities, as well as social and community networks and activities. They have little access to power and decision making bodies and thus feel powerless and unable to take control over the decisions that affect their day to day lives” (European Commission 2004, p. 10). Social inclusion is intended as complementary concept to social exclusion, that is “a process which ensures that those at risk of poverty and social exclusion gain the opportunities and resources necessary to participate fully in economic, social and cultural life and to enjoy a standard of living and well-being that is considered normal in the society in which they live. It ensures that they have a greater participation in decision making which affects their lives and access to their fundamental rights” (European Commission 2004, p. 10). Multidimensionality of the social inclusion/exclusion definition is evident. This complexity is manifested in the use of multiple measures. For example, the Lisbon European Council already in 2000 has suggested the use of a set of indicators to measure progress in relation to poverty and social exclusion (European Council 2000). Today, the theme (and its measures) is highly topical; it represents one of the key challenges of the European Union Sustainable Development Strategy (SDS) in order to achieve a socially inclusive society, to increase the quality of life of citizens and individual well-being (European Commission 2010a).

Consistent with this interpretative framework, the recent European debate has focused on four main pillars from which derive four specific policy actions for a higher social inclusion of individuals: (a) reduction of monetary poverty; (b) improvement of living conditions; (c) greater access to labour markets; (d) better education (Atkinson et al. 2002, 2004; Marlier 2003; Eurostat 2011a). It is interesting to note the presence of employment and education, that Europe 2020 considers separate objectives although interconnected.

In order to monitor levels, deteriorations and improvements of social inclusion in Europe, it appears useful to identify a single measure that can summarize the four pillars to determine a ranking of countries and, consequently, to compare levels of social inclusion among countries.

For this purpose, we construct a composite indicator of social inclusion at macro level for the 27 member countries of the European Union aggregating the four pillars represented, each, by one specific basic indicator (Eurostat 2011b): (1) people at-risk-of-poverty after social transfers (percentage of total population); (2) severely materially deprived people (percentage of total population); (3) people living in households with very low work intensity (percentage of total population); (4) early leavers from education and training (per cent). These four indicators represent the four main dimensions of social inclusion/exclusion as measured by Eurostat (2011a), namely the operational objectives of the European policies on the issue in line with the recommendations from the specific literature.

Anyhow, aggregation of indicators is not a trivial issue and, still, the best choice of the weights is a topic of interest. Literature proposes two main type of aggregation, additive and multiplicative, and several weighting methods such as equal weights, weights based on statistical models and weights based on public/expert opinion (OECD 2008). For our goals,

a multiplicative model similar to Data Envelopment Analysis (DEA) in a benefit-of-doubt (BoD) approach seems the most appropriate alternative, as the weights are determined endogenously with an automatic mechanism based on an optimization method that uses techniques of the simplex (Coelli et al. 2005). In effect, this method allows varying weights determined endogenously according to an optimal solution looking for the best possible outcome for the country under analysis (Cherchye et al. 2008). In our case, this implies that the composite indicator of social inclusion combines the four sub-indicators in the best interest of the country.

The paper is divided into sections. Section 2 explains the choice of the social inclusion indicators in relation to the development strategy of the European Union in the context of the targets of Europe 2020. Section 3 shows the multiplicative DEA-BoD method for the construction of a specific composite indicator of social inclusion. Section 4 presents the main results. Section 5 concludes and Appendix contains some data of interest.

2 Social Inclusion and Its Measurement

2.1 Social Inclusion

Europe 2020 is the strategy proposed by the European Commission to obtain a smart, sustainable and inclusive growth, with greater coordination of national and European policy following the Lisbon Strategy for the period 2000–2010 (Selman Çolak and Ege 2011; Pasimeni 2011). The Europe 2020 strategy focuses on five main targets: employment, innovation, climate/energy, education and social inclusion (European Commission 2010a). In particular, the European Commission emphasizes the key role of social inclusion also relating to the current crisis: “balanced active inclusion strategies, combining adequate income support, access to the labour market and to social services, can reconcile the goals of fighting poverty, increasing labour market participation, and enhancing efficiency of social spending [...]. Integrated strategies to address housing exclusion and homelessness have an important role to play in post-crisis policies, with a view to build cohesive and environmentally sustainable societies” (European Commission 2010b, p. 6).

In this paper, we focus on social inclusion and, in fact, social inclusion has gained a primary role in official documents and in the political debate, and it has received a considerable attention among social scientists as well as policy-makers: i.e. Duffy (1995), Room (1995), Klasen (1998), Sen (1998), Mejer (2000), Berger-Schmitt and Noll (2000), Atkinson et al. (2002), Tsakoglou and Papadopoulos (2002).

There is no univocal definition of social inclusion, but various interpretations that highlight some specific aspects. For example, Sen (1998) defines social inclusion in wide terms covering a wide range of social and economic problems. So, under social inclusion we could include different phenomena as poverty, deprivation, low educational attainment, unemployment or other labour market disadvantages, poor housing and lack of access to social and political institutions. In a more recent meaning, social inclusion could be broadly interpreted as the ability of an individual to participate in the basic political, economic and social activities of the society in which he lives (Chakravarty and D’Ambrosio 2006; Bellani and D’Ambrosio 2011). Similarly, the European Commission defines social inclusion as: “a process which ensures that those at risk of poverty and social exclusion gain the opportunities and resources necessary to participate fully in economic, social and cultural life and to enjoy a standard of living and well-being that is considered normal in the society in which they live. It ensures that they have a greater participation

in decision making which affects their lives and access to their fundamental rights” (European Commission 2004, p. 10).

Although an univocal definition of social inclusion seems far to be achieved, academic and institutional discussions are agreed to treat the social inclusion concept in a relative, dynamic and multidimensional perspective (Berghman 1995; Room 1995; Jordan 1996; Atkinson 1998; Peace 2001). “Relativity” means that an individual is socially included only with respect to other members of his society, and an absolute social inclusion condition does not exist. “Dynamism” refers to persistence or change over time, which makes social inclusion a process rather than a status. “Multidimensionality” implies to take into account a number of different factors, the selection of which is not always obvious. In general terms, economical and political factors are conventionally considered the major causes of social exclusion, but in many cases, social exclusion is also viewed as a problem determined by the links among low income position, bad labour market position and disadvantages concerning non-monetary aspects of life (i.e., Eurostat 2010; UN 2010).

In brief, social inclusion appears to be more connected to three macro-dimensions (Commins 1993; Berghman 1995; Burchardt et al. 1999; Bhalla and Lapeyre 2004; Pirani 2011): (1) the “economic” dimension (refers principally to monetary and financial issues, i.e. income or saving capability); (2) the “social” dimension (is about social relationships with family, friends, neighbours, local community, social participation, etc.); (3) the “institutional” dimension (concerns the relationships between people and the State). Anyhow, economic status is regarded the main cause of social exclusion.

Unfortunately, with the advance of the globalization, inequality and exclusion are not only persisted but also increased in many parts of the world and, therefore, the promotion of social inclusion is even more necessary in creating a society safer, more stable and more just (Noll 2011). This, beyond the undoubted relevance of the economic factor, has provided a further opportunity to explore social marginalization related to social exclusion (Atkinson et al. 2004; Scutella et al. 2009). In effect, in order to promote social inclusion, the Lisbon European Council in 2000, and the subsequent Laeken European Council in 2001, have establish a higher coordination among national social policies on the basis of shared programmes and indicators (European Commission 2003).

Of course, the absence of a clear and unambiguous definition of social inclusion, makes difficult to construct robust measures that have a significant applied impact. However, many good attempts have been made in literature (i.e., Berman and Phillips 2000; Tsakloglou and Papadopoulos 2002; Chakravarty and D’Ambrosio 2006; Robila 2006; Wilson 2006; Pirani 2011; Whelan et al. 2012). Furthermore, the empirical applications are necessarily limited to a few dimensions as some categories of social inclusion are impossible to measure using current available data (Burchardt et al. 2002; Böhnke 2008) or, in other cases, the empirical applications are limited to a particular context (Burchardt et al. 1999; Lin et al. 2012; Vrooman and Hoff 2012), or to a particular aspect (Whelan and Maître 2005).

In this paper, we prefer to follow an approach that allows a clear definition of some, limited, dimensions, but correctly and easily detectable in the European countries and consistent with the policies expressed by the European Union. In particular, this identifies four indicators primarily (but not exclusively) linked to economic status (European Commission 2012). In brief, following the EU approach, we include only the aspects related to economic and material deprivation, access to labour market and education; this is a simplification useful to our goal and, doubtless, other aspects related to social and institutional factors should be part of future research.

2.2 Measurement of Social Inclusion

The basic principles in construction of a set of social inclusion indicators are contained in Atkinson et al. (2002), a significant book published in the context of the Lisbon process during the Belgian Presidency. In particular, to represent the level of social inclusion in Europe, a number of different elements need to be taken into account, as: (i) to provide a widespread definition; (ii) to identify the dimensions that compose it; (iii) to recognize a theoretical framework for the indicators to be used; (iv) to have a number of indicators for which data are available for most countries and able to represent relevant aspects of the different dimensions of social inclusion (Social Protection Committee 2003; Saltelli et al. 2011). In effect, the adoption of a common set of indicators can contribute to the development of a more coherent policy by looking at the evolution of the European countries in relation to some benchmarks. However, although a large number of indicators are needed to assess properly the multidimensional nature of social inclusion, the empirical difficulties associated with the availability of data suggests a classification between primary indicators and secondary indicators. In the first category, there are a restricted number of lead indicators which cover the broad fields that have been considered the most important elements in arriving at social inclusion. In the second category, there are indicators that supporting primary indicators and describe other dimensions of social inclusion (Atkinson 2002, 2004; Marlier 2003).

Following these principles, Eurostat publishes three level of social inclusion indicators. Level 1, or headline indicator, is “people at risk of poverty or social exclusion”, that is an overall picture of the phenomenon that sums up the number of persons who are at risk of poverty, or severely materially deprived or living in households with very low work intensity. Persons present in several sub-indicators are counted only once. This indicator has a high communicative value, it is robust and available for most EU member countries generally for a minimum period of 5 years. Level 2 includes the operational indicators related to the operational objectives of the Sustainable Development Strategy (SDS). They are lead indicators in their subthemes. They are robust and available for most EU member countries for a minimum period of 3 years. Level 3 consists of explanatory indicators related to actions described in SDS, or to other issues which are useful for analyzing progress towards the strategy’s objectives. Breakdown of higher level indicators, e.g. by gender or by income group, are also found at this level (Eurostat 2010). Although the multidimensional nature of social inclusion is widely shared, some dimensions are neglected in the time of measurement. In effect, the EU indicators are much better developed for poverty, material deprivation, labor market and level of education than for political or cultural dimensions (Berger-Schmitt and Noll 2000).

Therefore, in order to construct a composite indicator of social inclusion for European countries, level 2 appears the most effective and consistent option, also because the indicators in this level represent the operational objectives of the European strategy. Furthermore, they do not overlap (unlike level 3 where information is sometimes classified by age, or gender, or household type), and they have a good coverage both temporal and territorial. In detail, level 2 identifies four pillars linked to four specific indicators.

1. People at risk-of-poverty after social transfers (percentage of total population). This indicator is the most widely used in poverty. It measures the share of persons at risk of monetary poverty. Persons are at risk of poverty if their equivalised disposable income is below the risk-of-poverty threshold, which is set at 60 % of the national median after social transfers.

2. Severely materially deprived people (percentage of total population). This non-monetary indicator provides additional information compared to that based on income, which, instead, does not provide information about resources or living standards of households. This second indicator covers issues relating to economic strain and durables. Severely materially deprived persons have living conditions greatly constrained by a lack of resources and cannot afford at least four of the following: to pay rent or utility bills; to keep their home adequately warm; to pay unexpected expenses; to eat meat, fish or a protein equivalent every second day; a week holiday away from home; a car; a washing machine; a colour TV; or a telephone.
3. People living in households with very low work intensity (percentage of total population). The EU policy agenda places a strong emphasis on increasing employment and on good-quality jobs as the best way to tackle social exclusion. Persons are defined as living in households with very low work intensity if they are aged 0–59 and the working age members in the household worked less than 20 % of their potential during the past year. The lack of employment determines a social costs: it entails a loss of income both for individuals and for society, and more, it involves a break in the productive role of individuals, determining a loss of social legitimacy and social status as regards other people (Atkinson 1998); in general terms, participation in the labour market is a way to develop social contacts and social interaction.
4. Early school leavers (percentage of total). Low levels of educational attainment is often a barrier to employment and it is a condition of social exclusion. This indicator is defined as the percentage of the population aged 18–24 with at most lower secondary education and not in further education or training. We note that the agenda of Europe 2020 devotes a specific target to employment and education which, however, are some of the major factors related to social exclusion of individuals.

These four indicators have different importance depending on the context of each territory or country. For example, in poorer countries, the material and primary commodities have a greater importance than in richer countries. Distributional equity may be particularly important specially for low-income countries with very unequal income distributions and an inadequate presence of the social security system. Furthermore, also the different welfare state plays an important role. In fact, economic difficulties, limitation in the access to goods and services market, situations of disease or disabilities, could be mitigated by the effect of social protection policies through social transfers and measures of social assistance (Atkinson 1998; Mayes et al. 2001; Bhalla and Lapeyre 2004).

In this paper, we consider all the 27 EU member countries.¹ They are very different, both for cultural, institutional and historical reasons, but they are united by belonging to common European infrastructure and the common policies of economic and social development. The four indicators are recognized at the macro level. This ensures a more robust comparability and to overcome some limitations associated with different modes (micro or macro) of data collection within each country or different interpretations of the same data. The indicators are take over from 2006 to 2010, that is in the longest period at the time of writing without missing data or data breaks for all the countries. Interestingly, this period covers the severe phase of the financial and economic crisis in Europe.

¹ The 27 member countries of the European Union are: Austria (AT), Belgium (BE), Bulgaria (BG), Cyprus (CY), Czech Republic (CZ), Germany (DE), Denmark (DK), Estonia (EE), Greece (EL), Spain (ES), Finland (FI), France (FR), Hungary (HU), Ireland (IE), Italy (IT), Lithuania (LT), Luxembourg (LU), Latvia (LV), Malta (MT), Netherlands (NL), Poland (PL), Portugal (PT), Romania (RO), Sweden (SE), Slovenia (SI), Slovakia (SK) and United Kingdom (UK).

It should be noted that so defined, higher values of the four indicators express a higher social exclusion and, therefore, a lower social inclusion. In fact, in the first instance, the use of the indicators exactly as promoted by the European Commission allows us to maintain a strong connection with the objectives set by the European strategies and allows us an easy comparability with data from Eurostat and with the corresponding headline indicator.²

With regard to these four indicators, Fig. 1 places the countries compared to the values 2006 and 2010. We remember that higher values indicate worse conditions, while the bisector allows to highlight improvements or deteriorations occurred between the first and the last year.³

For the first indicator, people at risk-of-poverty after social transfers, countries as Czech Republic or Netherlands achieve low levels in all years. Conversely, Greece, Lithuania, Bulgaria, Spain, Latvia and Romania have high percentage of population at risk-of-poverty. From 2006 to 2010, poverty is reduced in only 13 countries out of 27. For the second indicator, population materially deprived varies considerably among the EU member countries, with high values in Bulgaria, Romania or Latvia and low values in Luxembourg, Sweden or the Netherlands. Here, the distinction between core European countries, economically stronger, and ones of the most recent entry is clear. From 2006 to 2010, only 16 countries improve their condition. The third indicator, people living in households with very low work intensity, reports an improvement in just 13 countries. It is interesting to note the sharp deterioration of Ireland and the improvement, in particular, of Bulgaria and Poland. Finally, the last indicator, early school leavers, shows the best dynamics with improvements in 21 countries. However, Spain, Portugal and Malta remain at very high levels.

Undeniably, the financial and economic crisis has had an impact on the values of these indicators contributing to increase in recent years differences and variability among countries. It is not uncommon to find a country in a good position for an indicator and, at the same time, in a bad position for another indicator. Thus, synthesis of the four indicators in a single measurement of social inclusion appears of great relevance to provide an unique information about the status of the country and to identify directions for improvement in the light of the European policies.

In conclusion, it should be noted that the choice of indicators is dictated by the current European policies and by data availability, but it is undeniable the interest to include within the composite indicator, in future research, a wider range of economic, social and institutional factors regarding, for example, health, political participation, integration of specific disadvantage categories of people as immigrant, disabled, ethnic minorities, etc. (Micklewright 2002).

² Because in the paper we refer to social inclusion, positive concept specular and contrary to the negative concept of exclusion, it would be more intuitive to change the direction of the indicators, though this transformation is irrelevant from the point of view of substance. However, for maximum comparability, at this stage we prefer to maintain the data as made available by Eurostat without changing direction and interpretation of the raw data.

³ We see immediately that correlations among the four indicators are moderate; in fact, there is no risk of double-counting: ideal condition in the construction of a composite indicator. In 2010, the highest correlation is between “severely materially deprived people” and “people at risk-of-poverty after social transfers”: 0.59. It follows 0.44 between “people at risk-of-poverty after social transfers” and “early school leavers”. The value is 0.12 between “people living in households with very low work intensity” and “people at risk-of-poverty after social transfers”, and it is 0.08 between “people living in households with very low work intensity” and “early school leavers”. Finally, the correlation between “severely materially deprived people” and “early school leavers” is 0.02. Values are similar in other years.

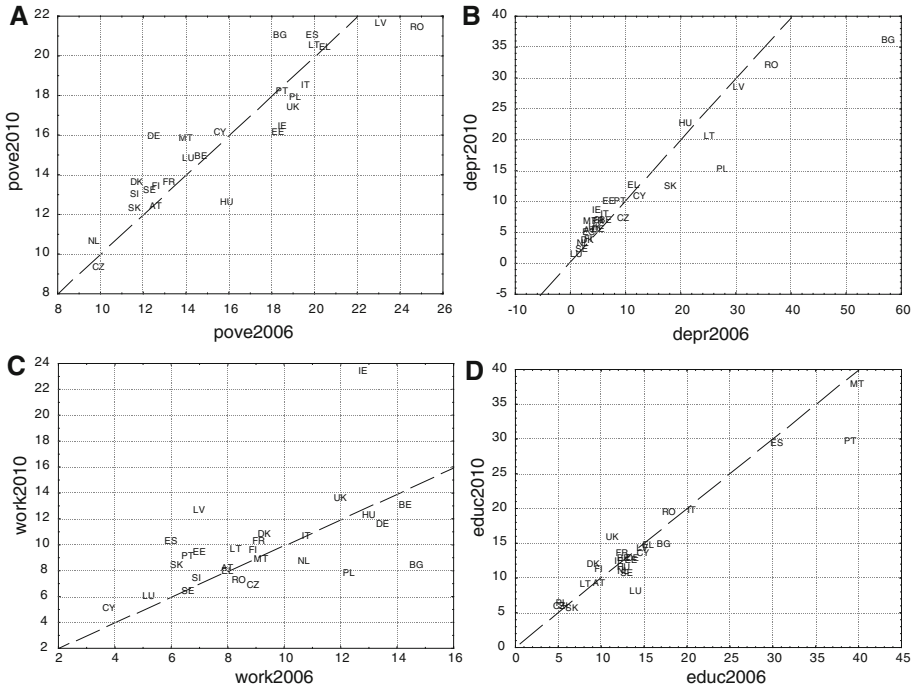


Fig. 1 Positioning of the EU countries in 2006 and 2010 for the four indicators. **a** pove: people at risk-of-poverty after social transfers (percentage of total population). **b** depr: severely materially deprived people (percentage of total population). **c** work: people living in households with very low work intensity (percentage of total population). **d** educ: early school leavers (percentage of total)

3 Composite Indicator of Social Inclusion

The construction of a composite indicator is not a trivial argument. The advantage of an immediate synthesis presents also some disadvantages and risks. Synthesis, inevitably, reduces information and, often, uses subjective options open to criticism. However, in many cases, it may represent a very useful tool to provide a clear view of analysis for defining appropriate policies.⁴

The weighted arithmetic mean $\sum_{j=1}^n w_j I_{ij}$ is the easiest way to create a composite indicator, though the traditional additive approach shows some important limitations. An undesirable feature of additive aggregations is the full compensability they imply. On the contrary, the geometric aggregation is a less compensatory approach, and it offers better incentives to countries to improve underperforming dimensions. In fact, marginal utility on the multiplicative composite indicator is higher if the indicator value is low (OECD 2008).⁵

⁴ Many composite indicators exist in literature with varying degrees of methodological complexity. For example, the “Corruption Perceptions Index” by Transparency International (2011), the “Human Development Index” by UN (2011), the “Composite Leading Indicators” by OECD (2012) and so on. A good starting point on the issue is OECD (2008).

⁵ Geometric aggregation is a good compromise between methods with full compensability and non-compensatory approaches, for example MCDA (Munda and Nardo 2003). In addition, in many cases, geometric aggregation is preferable to approaches MCDA because it can lead to the minimum information loss (Zhou and Ang 2009). Furthermore, using the social choice theory, Ebert and Welsch (2004) found that geometric aggregation is particularly relevant in composite indicator construction when the ordinal information is involved.

With this primary motivation, we use a weighted product method in construction of the composite indicator of social inclusion (SI), formulated as

$$SI_i = \prod_{j=1}^n I_{ij}^{w_j} \quad (1)$$

where I_{ij} is the j -th basic indicator of social inclusion ($j = 1, \dots, n$) for the i -th country ($i = 1, \dots, m$) with weight w_j . Here, $n = 4$ and $m = 27$. SI_i looks like a geometric mean.⁶

Anyhow, results can depend strongly on the selected weights. To avoid subjective choices easily criticized, in this paper the weights w_j are determined endogenously with an automatic mechanism based on a multiplicative optimization model similar to a DEA-BoD model written as follows:

$$SI_i = \max_w \prod_{j=1}^n I_{ij}^{w_j} \quad (2)$$

s.t.

$$\prod_{j=1}^n I_{ij}^{w_j} \leq e$$

$$w_j \geq 0$$

where e is the Napier's constant (Zhou et al. 2007, 2010; Cherchye et al. 2008).⁷

In this way, the composite indicator is obtained by multiplying the four basic indicators of social inclusion with weights calculated in the best possible conditions, i.e. increasing as much as possible the composite score of social inclusion for a given country.⁸ In short, a low value of the composite indicator SI_i then low social inclusion for the i -th country, is due to low values of the indicators that compose it and not attributable to specific weights,

⁶ Obviously, with multiplicative aggregation, basic indicators must always be larger than 1, and this forces us to normalize and to shift the scale of the data used in this paper. Of course, data must be processed without altering the relationship between them and without that this may affect the final results of the composite indicators. In particular, we use a min-max transformation in a continuous scale from 2 (minimum) to 10 (maximum) where higher values correspond to better social inclusion. In other words, we apply the transformation: $(\max(y)-y)/(\max(y)-\min(y)) \cdot 8 + 2$. In this way, the direction of the indicators is changed allowing a direct reading of the values in more intuitive terms of social inclusion rather than social exclusion. Furthermore, the values move from a scale 0–1 to a scale 2–10. Given the techniques used in this paper, as it will be clear later, these data transformations do not distort the final results.

⁷ Here, the Benefit-of-the-Doubt (BoD) logic assumes a favourable judgement in the absence of full evidence using a model similar to Data Envelopment Analysis (DEA) (Coelli et al. 2005). In fact, we are not sure about the appropriate weights, rather we look for BoD weights such that the country's performance of social inclusion is as high as possible (Melyn and Moesen 1991; Despotis 2005; Zhou et al. 2007; Cherchye et al. 2007a, b, 2008; Mohamad 2007; Murias et al. 2008; Zhou and Ang 2008; Zhou et al. 2008). In brief, model (2) is like an output-oriented DEA model where indicators y are outputs whereas a variable always equal to one is the only input: it is the Koopmans "helmsman", by which countries have an apparatus responsible for the conduct of their social policies (Koopmans 1951). Therefore, the social inclusion performance is evaluated in terms of the ability of the helmsman in each country to maximize the levels of the four basic indicators (Knox Lovell et al. 1995).

⁸ It should be noted that DEA typically does not require normalization of the data, made here for the unique needs of presentation and analysis of the four indicators; it is not even mandatory that the unit of measurement is identical: in fact, the weights will be determined accordingly and their sum is not necessarily equal to 1 (Knox Lovell et al. 1995).

always calculated to obtain the best, i.e. maximum, possible result for the i -th country compared to the benchmark country. In fact, the composite indicator is defined as the ratio of a country's actual performance to its benchmark performance and its maximum score is at most equal to $e = 2,718281828$.⁹

Searching for the best values, the optimization problem could give zero weight to some indicators and attribute too much weight to other indicators: this is not desirable if all the four dimensions are theoretically relevant. Also, this involves no unique ranking and, in some special cases, no feasible solution. For these reasons, we add specific constraints on the weights; in particular, we add proportion constraints to the model (2):

$$\left(\prod_{j=1}^n I_{ij}^{w_j} \right)^L \leq I_{ij}^{w_j} \leq \left(\prod_{j=1}^n I_{ij}^{w_j} \right)^U \quad (3)$$

L and U ranging between 0 and 1 and represent the lower and the upper bounds (in percentage terms) for the contribution of the j -th indicator (Cherchye et al. 2008).¹⁰ To avoid zero weights, we impose $L = 20\%$ with U determined accordingly for all the 27 countries and the four basic indicators. Different limits do not give solution to the mathematical problem or lead to an excessive number of benchmark countries or, also, to an unjustifiable imbalance of the indicators' role.

We note that the multiplicative optimization problem (2) and (3) is nonlinear, then we solve the equivalent linear problem by taking logarithms with base e ; at the end, it is easy to obtain the original multiplicative indicator SI . If social inclusion is higher, SI value is higher, where $SI = e$ indicates the benchmark country.

We note that the maximum score is always e , but the empirical minimum can change; so, for easy and accurate comparison, the scores are normalized to the relative range of variation. In this way, the new rating is scaled from 0 (the worst social inclusion among the 27 countries) and 1 (the best score of social inclusion, or benchmark country).

In addition, the availability of information from 2006 to 2010 is used to calculate a simple index of mobility of the countries (MI) based on the annual changes in rank (ΔR) appropriately weighed with the annual differences of the score (ΔS)

$$MI_i = \sum_{t=2007}^{2010} (-\Delta R_{t,i}) \cdot |\Delta S_{t,i}| / \sum_{i=1}^m |\Delta S_{t,i}| \quad (4)$$

This mobility index has positive/negative values if, over time, the i -th country has a net improvement/deterioration of its position in terms of social inclusion.

4 Results

Table 1 shows the social inclusion score SI for the 27 EU countries over the years 2006–2010. For reasons of comparability, SI is normalized by its range; therefore, the

⁹ This means a preference for an internal benchmark as the best practice country, rather than an external benchmark that could not be realistically achievable in the specific local context.

¹⁰ Without constraints on the weights, the DEA model could cancel the contribution of the under-performing dimensions to find the best solution. Thus, results could depend even on a single indicator and, consequently, we could have a large number of insignificant benchmarks. This event occurs more likely when the sample is not large as in our case. Specific constraints on the weights and use of a few indicators avoid this "curse of dimensionality" (Coelli et al. 2005). Here, in particular, we use proportion constraints which offer a very intuitive interpretation that we consider preferable to the available alternatives.

Table 1 Social inclusion score and ranking for the EU countries (2006–2010)

	2006	2007	2008	2009	2010	diff	±	2006	2007	2008	2009	2010	pos	
1	AT:Austria	0.944	0.941	0.890	0.921	0.928	-0.015	-	7	7	10	7	5	2
2	BE:Belgium	0.423	0.632	0.577	0.739	0.750	0.327	+	23	21	18	14	13	10
3	BG:Bulgaria	0.000	0.000	0.000	0.000	0.000	0.000	=	27	27	27	27	27	0
4	CY:Cyprus	0.955	0.943	0.913	0.874	0.791	-0.164	-	6	6	8	10	11	-5
5	CZ:Czech Republic	0.970	0.991	1.000	1.000	1.000	0.030	+	5	3	1	1	1	4
6	DE:Germany	0.586	0.772	0.584	0.759	0.756	0.170	+	19	14	17	13	12	7
7	DK:Denmark	0.921	0.880	0.897	0.883	0.862	-0.059	-	8	10	9	8	9	-1
8	EE:Estonia	0.809	0.782	0.775	0.694	0.731	-0.078	-	12	13	12	15	14	-2
9	EL:Greece	0.671	0.686	0.622	0.645	0.423	-0.248	-	14	18	15	18	20	-6
10	ES:Spain	0.617	0.590	0.466	0.412	0.242	-0.374	-	17	22	21	22	22	-5
11	FI:Finland	0.919	0.921	0.919	0.883	0.889	-0.030	-	9	9	7	9	8	1
12	FR:France	0.877	0.868	0.838	0.850	0.825	-0.052	-	11	11	11	11	10	1
13	HU:Hungary	0.548	0.766	0.493	0.662	0.662	0.115	+	21	15	20	16	16	5
14	IE:Ireland	0.587	0.574	0.138	0.121	0.173	-0.413	-	18	23	24	24	24	-6
15	IT:Italy	0.620	0.651	0.571	0.636	0.570	-0.050	-	16	19	19	19	18	-2
16	LT:Lithuania	0.677	0.799	0.755	0.611	0.371	-0.305	-	13	12	13	20	21	-8
17	LU:Luxembourg	0.989	0.989	1.000	0.924	0.934	-0.055	-	2	4	4	6	4	-2
18	LV:Latvia	0.478	0.640	0.119	0.063	0.074	-0.404	-	22	20	25	26	26	-4
19	MT:Malta	0.269	0.291	0.110	0.096	0.178	-0.091	-	25	25	26	25	23	2
20	NL:Netherlands	0.878	0.927	0.944	0.932	0.970	0.092	+	10	8	6	4	2	8
21	PL:Poland	0.567	0.762	0.754	0.768	0.673	0.106	+	20	16	14	12	15	5
22	PT:Portugal	0.313	0.373	0.299	0.418	0.457	0.144	+	24	24	22	21	19	5
23	RO:Romania	0.208	0.227	0.207	0.291	0.082	-0.125	-	26	26	23	23	25	1
24	SE:Sweden	0.971	1.000	1.000	0.931	0.953	-0.018	-	3	1	1	5	3	0
25	SI:Slovenia	1.000	1.000	0.976	0.974	0.925	-0.075	-	1	1	5	2	6	-5
26	SK:Slovakia	0.971	0.987	1.000	0.948	0.890	-0.081	-	4	5	1	3	7	-3

Table 1 continued

	2006	2007	2008	2009	2010	diff	±	2006	2007	2008	2009	2010	pos	
27	UK:United Kingdom	0.638	0.716	0.584	0.651	0.639	0.001	+	15	17	16	17	17	-2
	Mean	0.682	0.730	0.646	0.655	0.620								
	Median	0.671	0.772	0.754	0.739	0.731								
	SD	0.269	0.254	0.315	0.301	0.312								
	Coeff.variation	0.395	0.348	0.487	0.460	0.503								

diff: absolute difference between (normalized) score 2010 and score 2006; pos: improvement/worsening of ranking between 2006 and 2010

scores is between 0 (the lowest level of social inclusion) and 1 (the maximum level of social inclusion), so the values are comparable to one another correctly.

In general terms, the ability of the 27 European countries to do social inclusion increases from 2006 to 2010. In fact, median of *SI* is 0.671 in 2006 and 0.731 in 2010. However, also variability (coefficient of variation) increases from 0.395 to 0.503, indicating a higher dispersion of the scores with a significant worsening in some countries (mean is reduced from 0.682 to 0.620).

Bulgaria occupies the last position in all the years due to poor performance of the basic indicators; for more detail, see Table 3 in appendix.¹¹ In 2006, we have Slovenia in the first position (low levels of poverty and school leavers) whereas, in 2007, the leadership is divided between Slovenia and Sweden (especially for its low levels of poverty). In 2008, the best countries are three: Czech Republic, Sweden and Slovakia (once again, the low levels of poverty and school leavers play an important role). From this moment on, Czech Republic will be the only benchmark in 2009 and 2010.

From 2006 to 2010, only eight countries are closer to the benchmark. In particular, Belgium (from 0.423 to 0.750 with a strong improvement of the materially deprived people; see again, Table 3). On the contrary, it is interesting to note a substantial comparative deterioration of social inclusion in Ireland (from 0.587 to 0.173), Latvia (from 0.478 to 0.074), Spain (from 0.617 to 0.242), Lithuania (from 0.677 to 0.371) and Greece (from 0.671 to 0.423); see, also, Fig. 2.

In terms of ranking the results are entirely similar.

The mobility index *MI* in Table 2 measures from year to year the changes occurred in rank and it weighs improvements or worsening of position with the absolute difference in scores to take into account the intensity of change. The sum of the annual values determines the index for the whole period, which does not necessarily coincide with the mobility only between the first and the last year. Positive values of *MI* indicate a positive dynamics with a relative improvement of social inclusion.

For example, Belgium, which we have already noticed, shows a positive mobility in all the years, especially in 2009 compared to 2008. Similar interpretation can be provided to the mobility of Germany. Lithuania and Latvia stand out among the countries with negative mobility, both characterized by repeated worsening in the years (see, Fig. 2). It is interesting to note that since 2008, in relation to the European contagion of the financial crisis, many countries worsen their levels of social inclusion with mobility values from positive to negative.

In any case, 2010 seems a better year with some reversals and a general increase of social inclusion.¹² In this regard, Fig. 3 crosses social inclusion score and GDP per capita (for simplicity, normalized too) in levels 2010 and in differences between 2006 and 2010. The relationship, as expected, is positive in both cases showing that better conditions of economic development are usually associated with better conditions for social inclusion, although some countries as Czech Republic, Slovakia or Slovenia achieve high social inclusion despite low economic development. On the contrary, it is interesting the position

¹¹ Table A1 lists the original estimates obtained from the multiplicative DEA model and it highlights the role of the four basic indicators in construction of the composite indicator. This table, in particular, shows the multiplication factors (or contributions) assigned to the four indicators that, in fact, multiplied together determine the composite indicator of social inclusion.

¹² Of course, these measures should be read in relative and not absolute way. Unfortunately, at the time of writing, we do not have complete data for 2011.

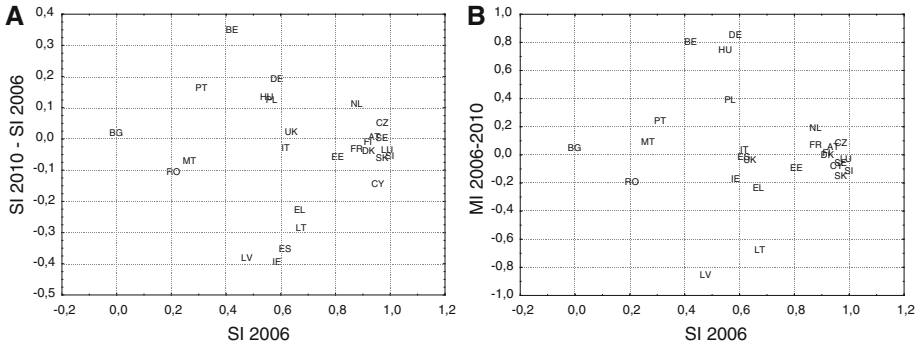


Fig. 2 Social inclusion and mobility. **a** Social inclusion score in 2006 and its variation between 2006 and 2010. **b** Social inclusion score in 2006 and mobility index in 2006–2010

Table 2 Mobility index of social inclusion in the EU countries (2006–2010)

		Annual mobility					Mobility index MI	
		2006	2007	2008	2009	2010	2006-2010	±
1	AT:Austria	–	0.000	–0.063	0.060	0.009	0.005	+
2	BE:Belgium	–	0.266	0.069	0.408	0.008	0.750	+
3	BG:Bulgaria	–	0.000	0.000	0.000	0.000	0.000	=
4	CY:Cyprus	–	0.000	–0.025	–0.049	–0.053	–0.127	–
5	CZ:Czech Republic	–	0.027	0.007	0.000	0.000	0.034	+
6	DE:Germany	–	0.594	–0.235	0.442	0.002	0.803	+
7	DK:Denmark	–	–0.053	0.007	0.009	–0.014	–0.050	–
8	EE:Estonia	–	–0.018	0.003	–0.153	0.023	–0.145	–
9	EL:Greece	–	–0.038	0.079	–0.044	–0.284	–0.287	–
10	ES:Spain	–	–0.084	0.051	–0.034	0.000	–0.067	–
11	FI:Finland	–	0.000	0.002	–0.045	0.004	–0.039	–
12	FR:France	–	0.000	0.000	0.000	0.016	0.016	+
13	HU:Hungary	–	0.835	–0.567	0.427	0.000	0.695	+
14	IE:Ireland	–	–0.042	–0.180	0.000	0.000	–0.223	–
15	IT:Italy	–	–0.060	0.000	0.000	0.042	–0.018	–
16	LT:Lithuania	–	0.078	–0.018	–0.636	–0.153	–0.729	–
17	LU:Luxembourg	–	0.000	0.000	–0.095	0.013	–0.083	–
18	LV:Latvia	–	0.207	–1.080	–0.036	0.000	–0.909	–
19	MT:Malta	–	0.000	–0.075	0.009	0.105	0.038	+
20	NL:Netherlands	–	0.063	0.014	0.015	0.047	0.139	+
21	PL:Poland	–	0.496	0.006	0.017	–0.182	0.338	+
22	PT:Portugal	–	0.000	0.062	0.075	0.050	0.186	+
23	RO:Romania	–	0.000	0.024	0.000	–0.267	–0.243	–
24	SE:Sweden	–	0.037	0.000	–0.173	0.027	–0.108	–
25	SI:Slovenia	–	0.000	–0.040	0.003	–0.127	–0.164	–
26	SK:Slovakia	–	–0.011	0.021	–0.065	–0.148	–0.203	–
27	UK:United Kingdom	–	–0.099	0.055	–0.042	0.000	–0.087	–

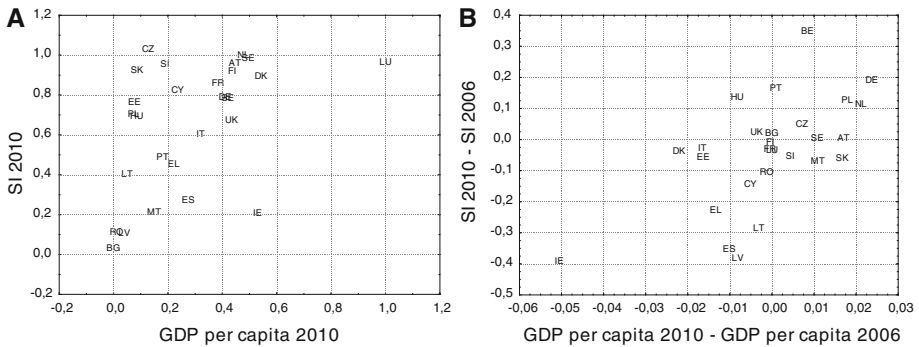


Fig. 3 GDP per capita and social inclusion. **a** GDP per capita and social inclusion score in 2010. **b** Variation of GDP per capita and social inclusion score between 2006 and 2010

of Ireland, which, with good level of economic development, has low social inclusion level.

Further consideration should be made on the consistency of the composite indicator with respect to the information provided in the main indicator, or headline indicator (*HI*), used by Eurostat, that is “people at risk of poverty or social exclusion”.¹³ As shown in Fig. 4, the values are consistent but sufficiently different. Anyhow, the headline indicator is not a composite indicator, and also *SI* includes some aspects of education. In fact, *HI* considers people who are at risk of poverty *or* severely materially deprived *or* living in households with very low work intensity and, in case of intersections, a person is counted only once; so, one can say that *SI* is a more broad measure and, at the same time, more fitting for a given country than the headline indicator.¹⁴ In this regard, Table 4 in appendix

¹³ This indicator *HI*, usually expressed in percentage of total population, corresponds to the sum of persons who are: at risk of poverty or severely materially deprived or living in households with very low work intensity. Persons are only counted once even if they are present in several sub-indicators. We remember that at risk-of-poverty are persons with an equivalised disposable income below the risk-of-poverty threshold, which is set at 60 % of the national median equivalised disposable income (after social transfers). Material deprivation covers indicators relating to economic strain and durables. Severely materially deprived persons have living conditions severely constrained by a lack of resources, they experience at least 4 out of 9 following deprivations items: cannot afford (i) to pay rent or utility bills, (ii) keep home adequately warm, (iii) face unexpected expenses, (iv) eat meat, fish or a protein equivalent every second day, (v) a week holiday away from home, (vi) a car, (vii) a washing machine, (viii) a colour TV, or (ix) a telephone. Finally, people living in households with very low work intensity are those aged 0–59 living in households where the adults (aged 18–59) work less than 20 % of their total work potential during the past year. We note that early leavers from education and training are not included. Also in this case, to simplify comparisons, the headline indicator is normalized by its range.

¹⁴ We remember that *SI* combines four dimensions differentiating the weights according to the best possible combination for each country with the constraint that the contribution of each pillar, that is the indicator’s value to the power of the corresponding weight, is between a minimum and a maximum defined a priori.

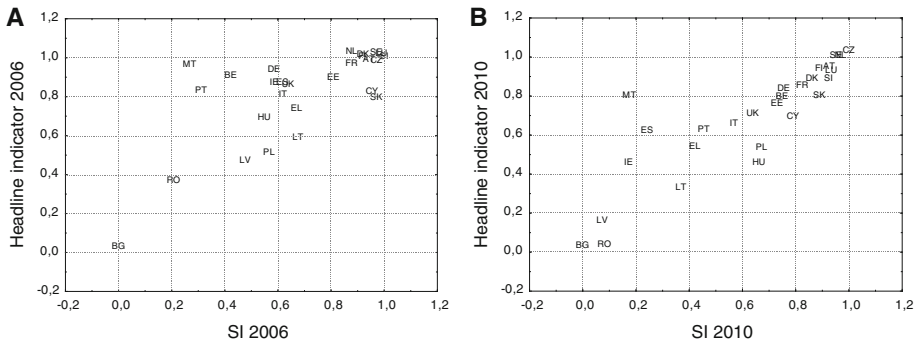


Fig. 4 Social inclusion and headline indicator. **a** Social inclusion score and headline indicator in 2006. **b** Social inclusion score and headline indicator in 2010

shows the average contribution over time of the four indicators.¹⁵ At a glance, the combination of the four pillars is not trivial but it denotes specificities and characteristics of each country that *SI* considers properly through differentiated weights among indicators and countries without applying external information.¹⁶

5 Conclusion

Social inclusion is an important factor in European development policies and it is an objective of Europe 2020. In this paper, we propose a composite indicator of social inclusion able to represent the position of each country and to identify directions for improvement with respect to some benchmarks, paying specific attention to some economic dimensions of social inclusion and a measure of education/drop-out strongly consistent with the provisions of the EU. To stay close enough to the strategy of the EU and their translation into indicators by Eurostat, also to promote greater comparability, we prefer to use the data available for the four main pillars, basically corresponding to the four main operational objectives of social inclusion related to poverty, material deprivation, labour market and education, although other political or cultural dimensions remain neglected (European Commission 2010b).

¹⁵ For purposes of interpretation, the contributions are more interesting and useful than the weights, the sum of which, conversely, is not necessarily equal to one. Readers can easily calculate the values of the weights. It should be noted that the average contribution is quite stable over time (in general, the variability is low) and, thus, it represents a good summary for all years.

¹⁶ Some specific features of certain countries could determine outliers able to strongly influence the score of *SI*. To verify this vulnerability of the results, we have repeated $m = 27$ times the calculation of *SI* removing each time a different country. The impact of the j -th missing country was measured through sum of $m-1$ squared differences between the score of the i -th countries ($i \neq j$) obtained with and without the j -th country. At the end, we obtain 27 values each attributable to the country from time to time excluded from the calculation of the composite indicator. Differences are very small in many cases and, sometimes, completely negligible, even when they involve the benchmark countries. In brief, the results are robust to outliers.

In fact, social inclusion has a multidimensional perspective that, for purposes of policy, makes useful the synthesis in a single measure. Our composite indicator of social inclusion (*SI*) is obtained by multiplying these four dimensions using appropriate weights determined with an automatic procedure based on a multiplicative DEA-BoD method with proportion constraints. This optimizes results for every country without resorting to external judgments of experts about the role of the pillars and, also, it emphasizes the improvements of the countries with worse conditions of social inclusion; in other words, the aggregation on the composite indicator implies a partial compensability of the pillars offering better motivations to improve underperforming dimensions. Data are collected from 2006 to 2010 for all the 27 EU member countries for the largest time interval available with no missing data at the time of writing. Finally, to monitor improvements or deteriorations of the countries' positioning, we use a mobility index (*MI*) based on annual changes in ranks.

In general terms, the results show that the ability of the European countries to do social inclusion increases from 2006 to 2010; an important role is played by lower levels of monetary poverty. However, also variability increases, indicating a higher dispersion of the scores with a significant worsening in some countries. In particular, some of these countries worsen their levels of social inclusion with mobility values from positive to negative since 2008 in relation to the European contagion of the financial and economic crisis. In any case, 2010 seems a better year with some reversals and a general increase of social inclusion despite the economic crisis is still present.

Of course, economic development and social development are correlated and, therefore, even higher levels of GDP per capita are associated with higher levels of social inclusion, although there are some exceptions also because the relationship is not necessarily contemporary but especially significant in the medium term. Nevertheless, the presence of high levels of social inclusion even with low levels of economic development deserves special attention because it highlights how a smart and sustainable growth can not be only economic growth. Rather, inclusive growth is an important condition for a future, stable and robust economic and social development according to the auspices of Europe 2020. In this framework, the construction of social indicators plays an essential role (European Commission 2009; Stiglitz et al. 2009).

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Appendix

See Tables 3 and 4.

Table 3 continued

	2006				2007				2008							
	1.pove	2.depr	3.work	4.educ	Score	1.pove	2.depr	3.work	4.educ	Score	1.pove	2.depr	3.work	4.educ	Score	
	25	SI:Slovenia	1.221	1.221	1.492	2.718	1.221	1.221	1.221	1.492	2.718	1.220	1.309	1.283	1.317	2.697
26	SK:Slovakia	1.222	1.219	1.480	2.687	1.423	1.220	1.220	1.277	2.705	1.221	1.221	1.265	1.440	2.718	
27	UK:United Kingdom	1.185	1.404	1.185	2.337	1.192	1.421	1.192	1.192	2.408	1.187	1.410	1.187	1.187	2.359	
		2009														
		2009				2010				2010						
		1.pove	2.depr	3.work	4.educ	Score	1.pove	2.depr	3.work	4.educ	Score	1.pove	2.depr	3.work	4.educ	Score
1	AT:Austria	1.215	1.477	1.215	1.215	2.651	1.215	1.476	1.215	1.215	2.649	1.215	1.476	1.215	1.215	2.649
2	BE:Belgium	1.200	1.441	1.200	1.200	2.493	1.199	1.437	1.199	1.199	2.476	1.199	1.437	1.199	1.199	2.476
3	BG:Bulgaria	1.132	1.132	1.281	1.132	1.858	1.118	1.118	1.118	1.118	1.748	1.118	1.118	1.250	1.118	1.748
4	CY:Cyprus	1.211	1.211	1.468	1.211	2.610	1.203	1.203	1.203	1.203	2.516	1.203	1.203	1.446	1.203	2.516
5	CZ:Czech Republic	1.492	1.221	1.221	1.221	2.718	1.221	1.221	1.221	1.221	2.718	1.221	1.221	1.492	1.492	2.718
6	DE:Germany	1.202	1.445	1.202	1.202	2.511	1.199	1.438	1.199	1.199	2.482	1.199	1.438	1.199	1.199	2.482
7	DK:Denmark	1.212	1.470	1.212	1.212	2.618	1.209	1.462	1.209	1.209	2.585	1.209	1.462	1.209	1.209	2.585
8	EE:Estonia	1.197	1.197	1.432	1.197	2.455	1.197	1.433	1.197	1.197	2.457	1.197	1.433	1.197	1.197	2.457
9	EL:Greece	1.193	1.193	1.422	1.193	2.413	1.166	1.166	1.166	1.166	2.158	1.166	1.166	1.360	1.166	2.158
10	ES:Spain	1.172	1.374	1.172	1.172	2.212	1.147	1.315	1.147	1.147	1.983	1.147	1.315	1.147	1.147	1.983
11	FI:Finland	1.212	1.469	1.212	1.212	2.617	1.212	1.468	1.212	1.212	2.610	1.212	1.468	1.212	1.212	2.610
12	FR:France	1.210	1.463	1.210	1.210	2.589	1.206	1.454	1.206	1.206	2.548	1.206	1.454	1.206	1.206	2.548
13	HU:Hungary	1.194	1.194	1.194	1.426	2.428	1.190	1.190	1.190	1.190	2.391	1.190	1.190	1.417	1.417	2.391
14	IE:Ireland	1.144	1.309	1.144	1.144	1.962	1.139	1.297	1.139	1.139	1.916	1.139	1.297	1.139	1.139	1.916
15	IT:Italy	1.192	1.420	1.192	1.192	2.405	1.181	1.396	1.181	1.181	2.301	1.181	1.396	1.181	1.181	2.301
16	LT:Lithuania	1.190	1.190	1.415	1.190	2.384	1.161	1.161	1.161	1.161	2.108	1.161	1.161	1.348	1.348	2.108
17	LU:Luxembourg	1.216	1.477	1.216	1.216	2.653	1.216	1.478	1.216	1.216	2.655	1.216	1.478	1.216	1.216	2.655
18	LV:Latvia	1.138	1.138	1.296	1.138	1.912	1.127	1.127	1.127	1.127	1.820	1.127	1.127	1.271	1.271	1.820

Table 3 continued

	2009				2010					
	1.pove	2.depr	3.work	4.educ	Score	1.pove	2.depr	3.work	4.educ	Score
19	MT:Malta	1.142	1.304	1.142	1.142	1.139	1.298	1.139	1.139	1.920
20	NL:Netherlands	1.216	1.479	1.216	1.216	1.219	1.485	1.219	1.219	2.689
21	PL:Poland	1.203	1.203	1.203	1.447	1.191	1.191	1.191	1.420	2.401
22	PT:Portugal	1.173	1.173	1.375	1.173	1.170	1.369	1.170	1.170	2.191
23	RO:Romania	1.161	1.161	1.348	1.161	1.128	1.128	1.273	1.128	1.828
24	SE:Sweden	1.216	1.479	1.216	1.216	1.217	1.482	1.217	1.217	2.673
25	SI:Slovenia	1.219	1.219	1.487	1.219	1.215	1.476	1.215	1.215	2.645
26	SK:Slovakia	1.217	1.217	1.482	1.217	1.212	1.212	1.212	1.468	2.612
27	UK:United Kingdom	1.193	1.424	1.193	1.193	1.188	1.412	1.188	1.188	2.368

pove: people at risk-of-poverty after social transfers; depr: severely materially deprived people; work: people living in households with very low work intensity; educ: early school leavers. The score is the product of the four contributions and ranges between an empirical minimum not known a priori and a maximum always equal to $e = 2.718$

Table 4 Average contribution over time (2006–2010) of the four pillars on the composite indicator

	Average contribution (%)										Variability of contribution (c.v.)			
	Average contribution (%)				Sum	Std.dev.	Variability of contribution (c.v.)							
	1.pove	2.depr	3.work	4.educ			1.pove	2.depr	3.work	4.educ				
1	AT:Austria	20.0	38.1	20.0	21.9	100.0	7.61	0.000	0.065	0.000	0.114			
2	BE:Belgium	20.0	34.9	20.0	25.1	100.0	6.07	0.000	0.121	0.000	0.167			
3	BG:Bulgaria	20.0	20.0	28.7	31.3	100.0	5.09	0.000	0.000	0.326	0.298			
4	CY:Cyprus	20.0	20.0	40.0	20.0	100.0	8.66	0.000	0.000	0.000	0.000			
5	CZ:Czech Republic	34.9	20.0	20.0	25.1	100.0	6.10	0.222	0.000	0.000	0.309			
6	DE:Germany	20.6	36.6	20.0	22.9	100.0	6.76	0.056	0.093	0.000	0.161			
7	DK:Denmark	21.2	38.8	20.0	20.0	100.0	7.97	0.115	0.063	0.000	0.000			
8	EE:Estonia	20.0	25.3	34.7	20.0	100.0	6.00	0.000	0.307	0.224	0.000			
9	EL:Greece	20.0	28.7	29.7	21.6	100.0	4.25	0.000	0.282	0.302	0.092			
10	ES:Spain	20.0	30.0	30.0	20.0	100.0	5.00	0.000	0.299	0.298	0.000			
11	FI:Finland	20.0	38.2	20.0	21.8	100.0	7.65	0.000	0.059	0.000	0.103			
12	FR:France	20.0	37.9	20.0	22.1	100.0	7.52	0.000	0.071	0.000	0.123			
13	HU:Hungary	26.7	20.0	20.0	33.3	100.0	5.51	0.317	0.000	0.000	0.255			
14	IE:Ireland	20.0	35.5	20.0	24.5	100.0	6.35	0.000	0.154	0.000	0.224			
15	IT:Italy	20.0	40.0	20.0	20.0	100.0	8.66	0.000	0.000	0.000	0.000			
16	LT:Lithuania	20.0	20.0	30.3	29.7	100.0	5.00	0.000	0.000	0.296	0.302			
17	LU:Luxembourg	20.0	28.9	31.1	20.0	100.0	5.07	0.000	0.320	0.296	0.000			
18	LV:Latvia	20.0	20.0	36.0	24.0	100.0	6.56	0.000	0.000	0.222	0.333			
19	MT:Malta	20.0	40.0	20.0	20.0	100.0	8.66	0.000	0.000	0.000	0.000			
20	NL:Netherlands	29.3	30.7	20.0	20.0	100.0	5.02	0.309	0.295	0.000	0.000			
21	PL:Poland	20.0	20.0	20.0	40.0	100.0	8.66	0.000	0.000	0.000	0.000			
22	PT:Portugal	20.0	25.9	34.1	20.0	100.0	5.79	0.000	0.307	0.233	0.000			
23	RO:Romania	20.0	20.0	36.5	23.5	100.0	6.78	0.000	0.000	0.127	0.196			
24	SE:Sweden	24.5	33.1	22.4	20.0	100.0	4.94	0.318	0.260	0.213	0.000			

Table 4 continued

	Average contribution (%)					Variability of contribution (c.v.)					
	1.pove	2.depr	3.work	4.educ	Sum	Std.dev.	1.pove	2.depr	3.work	4.educ	
25	SI:Slovenia	20.0	25.4	25.0	29.6	100.0	3.39	0.000	0.306	0.310	0.304
26	SK:Slovakia	23.2	20.0	28.6	28.2	100.0	3.60	0.266	0.000	0.322	0.299
27	UK:United Kingdom	20.0	40.0	20.0	20.0	100.0	8.66	0.000	0.000	0.000	0.000
	Mean	21.5	29.2	25.5	23.9	100.0	2.79	0.050	0.072	0.057	0.052
	Median	20.0	28.9	20.0	21.9						
	SD	3.48	7.76	6.52	5.00						
	Coeff.variation (c.v.)	0.162	0.266	0.256	0.210						

pove: people at risk-of-poverty after social transfers; depr: severely materially deprived people; work: people living in households with very low work intensity; educ: early school leavers

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