Europe 2020 Strategy and Citizens' Life Satisfaction

1. Introduction

The recent economic crisis has inflicted a huge shock on millions of citizens, revealing some fundamental weaknesses of the European Union (EU). Moreover, inequality concerns have increased because socio-economic inequalities are high and have been rising within the majority of Member States in the last three decades, similar to trends elsewhere in the world (Eurostat, 2010; Galbraith, 2012; IMF, 2007; OECD, 2008; Piketty and Saez, 2013). As discussed below, inequality in income distribution makes economic growth unsustainable as it generates instability and economic inefficiencies that reduce economic growth (Brown, 2004; Jayadev, 2013; Stiglitz, 2012) and impacts negatively on individuals' well-being (Alesina, Di Tella and MacCullloch, 2004; Delhey and Dragalov, 2014; Graham and Felton, 2006; Schwarze and Härpfer, 2007; Verme, 2011; Wilkinson and Picket, 2009). Hence, combating socio-economic inequalities is essential not only to achieve an inclusive EU, but also for growth (Perrons and Plomien, 2010). In June 2010, the European Council approved the Europe 2020 Strategy (Europe 2020 hereafter) to coordinate all of the Member States' efforts to collectively exit stronger from the crisis and turn the EU into a smart, sustainable and inclusive economy characterised by high levels of employment, productivity and social cohesion (European Commission, 2010, preface). To accomplish these priorities, the Member States have undertaken to achieve eight targets by 2020. The main aim of this paper is to analyse whether the Europe 2020 targets meet EU citizens' subjective well-being.

The Europe 2020 is an initiative developed under the movement "GDP and beyond. Measuring progress in a changing world", which aims to identify indicators that could complement gross domestic product (GDP) in policymaking and includes social and environmental achievements and losses (Commission of the European Communities, 2009). That is, Europe 2020 opts for the increasingly accepted conception of the social indicators movement (Andrews and Withey, 1976) and the capabilities approach (Nussbaum, 2011; Sen, 1985, 1999), which argue in favour of measuring social performance on the basis of a large list of indicators rather than relying on a single one: GDP per capita or national income.

Targets are important in public policy to express ambitions in concrete terms and to make progress measurable (Andor, 2014), but they are also key in analysing public policies in terms of people's well-being and progress. In this line, there has been increasing interest in the measurement and use of subjective well-being for policy purposes. Subjective well-being refers to an inividual's evaluation of the intensity that people experience in terms of positive and negative affect, happiness, or satisfaction with life (Diener, 1984, 2006). Evidence indicates that the answers to subjective questions can be used as a proxy to measure subjective well-being (Van Praag and Ferrer-i-Carbonell, 2008). Henceforth, we will refer to subjective well-being as life satisfaction. Specifically, indicators of life satisfaction provide new and complementary information about subjective well-being, which may become relevant in the monitoring progress, informing policy design and policy appraisal (e.g. Diener, 2006; Dolan and Metcalfe, 2012; Dolan and Peasgood, 2008; Kahneman and Sugden, 2005; Layard, 2005; Stutzer and Frey, 2010). Thus, we wonder to what extent the Europe 2020 approach might guide policymaking toward citizens'

life satisfaction. To answer this question, we empirically contrast the association between compliance with the Europe 2020 targets and an indicator of life satisfaction. To do this, we first evaluate Member States' degree of overall accomplishment of Europe 2020 targets. With that purpose, we construct a composite index that synthesises the position of each country in 2013 with respect to the eight Europe 2020 targets established by the European Commission (2010) that we call the Europe 2020 Target Distance Index (TDI).

Secondly, given the current context of rising economic and social inequalities in the EU, we question if the absence of specific targets for the reduction of social and economic inequalities, except for poverty, is a major deficiency of Europe 2020. To address this question, we include additional inequality indicators in the model and evaluate Member States' degree of overall accomplishment with respect to the new "inequality-extended Europe 2020". We develop a second composite index called the Extended Europe 2020 Target Distance Index (ETDI).

Both the TDI and the ETDI composite indexes are calculated by applying the DP2 methodology or P2 Distance method. The DP2 indexes synthesise the distance of each Member State to the combination of Europe 2020 targets in a single value, thus they permit spatial comparisons (benchmarking) and comparing distances between Member States. The association among indexes built from objective indicators (TDI and ETDI) and life satisfaction in the EU can then be analysed and their correlations calculated. Specifically, we can study two questions. The first question is whether Member States closer to attaining the Europe 2020 targets report higher levels of life satisfaction. A positive answer might mean that Europe 2020 contributes to improving people's well-being or that higher levels of life satisfaction contribute to more easily achieving the Europe 2020 targets (by, for instance, improving performance at education and employment). The second is whether the ranking of Member States resulting from the life satisfaction indicator is more correlated with the ranking of Member States resulting from the ETDI than from the TDI. If so, our study would be in line with those that have found a negative association between inequality and life satisfaction in European countries (Alesina et al. 2004; Delhey and Dragalov, 2014; Schwarze and Härpfer, 2007). That is, inequalities matter to European citizens, so that countries that are closer to reaching the targets of the inequality-extended Europe 2020 report higher levels of life satisfaction.

The results show that the Member States closer to attaining the Europe 2020 targets report higher levels of satisfaction. That is, Europe 2020, as a set of public policies, is aligned with people's life satisfaction. We also find a greater association between ETDI and life satisfaction than between TDI and life satisfaction. That is, a inequality-extended Europe 2020 would better guide policymaking toward citizens' life satisfaction, thus revising the Europe 2020 to focus more on social targets could enhance the effectiveness of its programs.

The remainder of this paper is organised as follows. In section 2 we study Europe 2020 and discuss why the selected targets are insufficient to achieve its goals and we also justify the addition of new inequality targets in Europe 2020 to explicitly strengthen the social cohesion goal. In section 3 we justify the relevance of linking Europe 2020 –as a set of public policies– with citizen's life satisfaction. In section 4 we analyse the statistical information used to construct the composite indexes and measure life satisfaction. Section 5 describes the methodology applied to develop the composite indexes. In section 6 we report the empirical results. Finally, the principal conclusions of the paper are discussed in section 7.

2. A Review of Europe 2020 Strategy

Europe 2020 is conceived to turn the EU into a smart, sustainable and inclusive economy that delivers high levels of employment, productivity and social cohesion. Smart growth refers to economic development based on knowledge and innovation; sustainable growth pursues a more resource efficient, greener and more competitive economy; and inclusive growth requires fostering a high-employment economy that delivers social and territorial cohesion (European

Commission, 2010, p. 3). The underlying assumption is that these three priorities are mutually reinforcing: improving education levels and increasing investment in R&D will reduce unemployment and poverty. A greater capacity for research and development, combined with increased resource efficiency, will improve competitiveness and foster job creation (European Commission, 2010, p. 9). To achieve these goals, the Europe 2020 has established eight targets that Member States should meet by 2020 (Table 1). At the same time, the Commission put forward the flagship initiatives or thematic approaches that should guide the design and implementation of public policies in the Member State concerned (see European Commission, 2010, Section 2 and Annexes 1 and 2).

Table 1. Indicators and targets for building the Europe 2020 Target Distance Index

	Indicator	Description	Target
1	Employment rate	The employment rate is calculated by dividing the number of people aged 20 to 64 in employment by the total population of the same age group (in %).	Minimum 75
2	Research and development	Gross domestic expenditure on research and development as a percentage of GDP.	Minimum 3
3	Greenhouse gas emissions	Greenhouse gas emissions (index 1990 = 100). This index shows trends in total man-made emissions of the 'Kyoto basket' of greenhouse gases.	Maximum 80
4	Renewable energy consumption	Renewable energy (in %). Share of renewable energy in gross final energy consumption.	Minimum 20
5	Primary energy consumption	Primary energy consumption is the gross inland energy consumption, excluding all non-energy use of energy carriers (index 2005=100).	Maximum 87
6	Early leavers from education	Early leavers from education and training (in %). This indicator shows the percentage of students aged 18-24 who have dropped out of primary, lower or upper secondary education and who therefore declared that they had not received any education or training in the four weeks preceding the survey.	Maximum 10
7	Tertiary educational attainment	Tertiary educational attainment (in %). The share of the population aged 30-34 who have successfully completed university or university-like (tertiary-level) education with an ISCED 1997 (International Standard Classification of Education) educational level of 5-6.	Minimum 40
8	People at risk of poverty or social exclusion	People at risk of poverty or social exclusion (AROPE). This indicator corresponds to the sum of people who are at risk of poverty or severely materially deprived or living in households with very low work intensity (% of total population).	Maximum 18.72

Note. Indicators 1 to 8 and their corresponding targets have been set by the EU in the Europe 2020 Strategy. Source: European Commission (2010), Eurostat, Europe 2020 indicators and the authors (calculus of People at risk of poverty or social exclusion).

With respect to the Lisbon Strategy (see Council of the European Union, 2000), Europe 2020 represents a step forward as it includes three targets to promote a more environmentally sound economy (through indicators *Greenhouse gas emissions, Renewable energy consumption and Primary energy consumption*, Table 1), and social targets for education and the fight against poverty (through indicators *Early leavers from education, Tertiary educational attainment* and *People at risk of poverty or social exclusion*, Table 1). However, we hypothesise that a major mistake of Europe 2020 is the assumption that social cohesion follows from economic growth. This is, the growth paradigm of the Europe 2020 hinges to a great extent on the idea that the creation of employment will be the key variable to attain social cohesion in the EU. Nevertheless, empirical evidence reveals that employment policies should go hand in hand with other social policies, since the last decades have witnessed a growing imbalance between pay increases and productivity increases (workers' productivity has increased more than their salaries), which has resulted in a decline in labour's share of value added (IMF, 2007). This shift in the distribution of value added is a source of income inequality and constitutes a major problem in Europe because although people of working age in employment are less likely to be at risk of poverty than those who are unemployed, employment does not provide a guarantee against poverty and exclusion (Perrons and Plomien, 2010). In fact, the poor workers category –measured by Eurostat (Statistics on Income and Living Conditions) as in-work at-risk-of-poverty rate from 18 to 64 years– has risen over the last years in the majority of Member States and reached unacceptable levels in some of them in 2013 (i.e. 17.7% in Romania, 13% in Greece, 11.2% in Italy and Luxemburg, 10.8% in Poland, 10.6% in Spain and 10.4% in Portugal).

A further aspect is that, in Europe 2020, economic restructuring, innovation and a highly educated and well-trained workforce are critical to the development of a competitive, smart and knowledge economy. However, during the last years, employment and educational changes in EU are associated with wage polarisation. Moreover, the European educational system often participates actively in various forms of social segregation (Perrons and Plomien, 2010). Thus, the knowledge economy paradigm should not focus only on economic growth, but should include social cohesion goals.

These imbalances are exerting enormous pressure on EU economic, social and territorial cohesion, which have been core EU objectives since its foundation. Therefore, if in general any development or progress programme should consider its distributive effects (Anand and Sen, 1994; Hicks, 1997; Pickett, 2013; Piketty, 2014; Seth, 2009; Stiglitz, Sen and Fitoussi, 2009), in the particular case of Europe 2020 that is a key aspect. Besides the imbalances just discussed, inequality affects negatively on the economy pace and on people's well-being. If as some studies reveal Europeans dislike inequality (Alesina et al. 2004; Delhey and Dragalov, 2014; Schwarze and Härpfer, 2007), guiding the selection of EU 2020 targets by a major sensibility towards distributive concerns could enhance the effectiveness of its programs. All of these reasons justify our proposal to extend the distance analysis of Member States to Europe 2020 by incorporating additional targets on inequality. These additional inequality targets take into account sensitive groups of European citizens. Moreover, since the crisis effects were not known when the Europe 2020 targets were approved, the addition of targets could help to deal with unexpected developments.

We present below our proposal of introducing new targets into the Europe 2020 focusing on the goal of reducing inequality and fostering social cohesion, namely income inequality distribution, child poverty, gender inequality in employment, long-term unemployment and youth employment. More specifically, we express the theoretical and empirical reasons that justify the choice.

Income inequality distribution

Eurostat data (Statistics on Income and Living Conditions) show the substantial level of inequality in income distribution reached in the EU28: since 2010, 20% of the population with the

highest income has earned an income equivalent to five times that of 20% of the population with the lowest income. Inequality in income distribution impacts negatively on the economy and a wide variety of crucial areas for individuals' well-being.

Regarding the first point, and despite standard macroeconomics disregards the relation between inequality and economic growth, several studies have shown that inequality in income distribution causes economic instability and inefficiency. The increasing inequality reduces aggregate demand and generates unemployment and low economic growth (Brown, 2004; Jayadev, 2013; Stiglitz, 2012). Moreover the more divided a society becomes in terms of income, the more reluctant the wealthy are to invest in programmes of public expenditures on merit goods (education, health and housing) because they can buy the majority of these by themselves (Stiglitz, 2012, pp. 92-94). Simultaneously, insufficient investment in such goods contributes to the decline of economic mobility (the poor cannot stop being poor because they cannot access education) and this has negative consequences on the country's economic growth because the country is not making use of its most valuable resource, "its people" (Stiglitz, 2012, p. 94).

Regarding the second point, income inequality is related to indicators of health and well-being. More equal societies have a longer life expectancy and lower rates of mortality, infant mortality, mental illness and drug abuse (Babones, 2008; Elgar and Aitken, 2011; Wilkinson and Picket, 2009). Furthermore, despite the fact that research findings on the consequences of income inequality for life satisfaction have produced mixed results (see Scheneider, 2016), the empirical evidence shows that income inequality has a negative effect on life satisfaction in European societies. Several factors may explain this effect. Firstly, income comparisons are important by the majority of Europeans and the more people consider income comparisons to be important, the more they are in favour of (additional) income redistribution by the State (Clark and Senik, 2010). In addition and in contrast to the United States, the life satisfaction of the European poor is strongly and negatively affected by inequality. This result might be explained by the Europeans' perception of a more immobile society so that the poor find more difficult to climb up the social ladder (Alesina et al., 2004). Also, with upward social comparisons, inequality means discrepancies between aspirations and actual incomes of poorer people and imposes a psychological cost on them (Frank, 2007; Wilkinson and Pickett, 2009). Secondly, individuals' dislike for inequality could be explained by self-interest motives derived from associating income inequality with worse or riskier future own outcomes in the income distribution in case of shock, or some societal features that can be detrimental to life satisfaction (e.g., criminal activity) but not through an authentic dislike for inequality (Ferrer-i-Carbonell and Ramos, 2014). Finally, individual's dislike for inequality may be due to inequality aversion or to empathy for the poor; that is, people may care about the fate of the people that are in a worse economic situation, which reduces their own well-being (Stutzer and Frey, 2010).

Child poverty

Although Europe 2020 includes a target for poverty, it would be necessary to include an additional indicator of child poverty for various reasons.

Firstly, the economic crisis has impacted strongly on children. In 2013, 27.4% of the population under the age of 16 in the EU28 was considered at-risk-of-poverty or social exclusion (Eurostat, Statistics on Income and Living Conditions).

Secondly, as several studies have shown, to grow up in poverty can have a lasting impact on a child. Compared with other children, low-income children are disproportionately exposed to greater family turmoil, violence, more chaotic households and greater instability (Evans, 2004). Poor children are more likely to suffer infant mortality, less likely to do well at school, less likely to stay on at school after 16 and more likely to grow up to be poor themselves (Field, 2010, p. 28). Hence, child poverty can be considered a source of economic inefficiency because it

implies that society's potential resources are not taken advantage of and diminishes productivity and competitiveness (Stiglitz, 2012, pp. 102-104).

And thirdly, although higher employment and longer weekly hours of work tend to reduce child poverty rates, as reported in the United Kingdom by Reed and Portes (2014), this is not enough by itself to reduce child poverty to the levels required to meet the 2020 targets. Other anti-poverty measures, such as increased net expenditure on transfer payments, tax cuts or childcare support, are necessary to prevent poor children from becoming poor adults.

Gender inequality in employment

Gender inequalities in employment persist despite the fact that the Lisbon Strategy also required the EU to promote equality between men and women in pay, labour market segregation and decision-making jobs. In 2013, only 62.6% of women work compared to 74.3% of men (Eurostat, Labour Force Survey). In all Member States, the male employment rate is higher, though not always significantly, than the female employment rate. In some cases the differences in percentage points are very high (32.6 in Malta, 21.1 in Italy and 19.8 in Greece), and in some other countries differences are low (2.1 in Finland and 3.8 in Sweden). The overall difference is statistically significant (Wilcoxon test: $Z = 4.662$, $p < .001$).

But furthermore, employment inequalities together with women's lower pay (in 2013 the gender pay gap in the EU28, as estimated by Eurostat from Structure of Earnings Survey, was 16.3%) and higher concentration in part-time jobs contribute to women's lower pension entitlements. In the EU, the average gender gap in pension entitlements stands at 39% and in many countries women's pensions primarily rest on rights derived from those of their husbands (European Commission, 2013). These circumstances, in conjunction with the higher longevity of women, are closely related to the fact that women are much more exposed to the risk of poverty in old age than men in all Member States except Malta. Particularly, in 2013, 23.9% of women aged 55 years or over were at risk of poverty or social exclusion in the EU28 compared to 19.2% of men and the overall difference is statistically significant (Wilcoxon test: $Z = -2.106$, $p = 0.0352$). (Eurostat, Statistics on Income and Living Conditions).

Long-term unemployment

Based upon Eurostat data (Labour Force Survey), nine Member States recorded long-term unemployment rates well above the EU average (5.1%) in 2013. In some cases, these rates reach levels that can be described as unsustainable (i.e. 18.5% in Greece, 13% in Spain and 9.3% in Portugal). According to standard economic reasoning, unemployment is a cause of economic inefficiency because it means that there are idle resources. But also, happiness research has shown that unemployment reduces life satisfaction of the wider population (Chadi, 2014; Clark, 2003; Di Tella, MacCulloch and Oswald, 2001; Helliwell and Huang, 2014).

Distinguishing by labour market status, aggregate unemployment has a great effect on employed workers' life satisfaction through two channels. The first channel includes direct effects of unemployment on social problems (i.e. crime), public finance and the general increase in income inequality within society that may trigger worker's empathy with unemployed (Stutzer and Frey, 2010). The second channel is the perceived job security, because the anticipation of future unemployment reduces their life satisfaction (Helliwell and Huang, 2014). From the point of view of the unemployed person, the unemployment has long-lasting negative effects on life satisfaction even after an unemployed person has re-entered employment (Clark, Georgellis and Sanfey, 2001). The mental and physical health of the unemployed deteriorates, distress, depression and anxiety increase (Paul and Moser, 2009), as well as health-damaging actions (Schunck and Rogge, 2010), so that unemployment is associated with a significant all-cause mortality risk (Clemens, Popham and Boyle, 2015). Although some studies argue that the duration

of unemployment does not affect life satisfaction (Winkelmann and Wilkelmann, 1998) and others are inconclusive about it (Clark, 2006), a large number of studies show that the duration of unemployment is also a factor in determining the severity of effects of being jobless since the prerequisites for good health worsen (see McKee-Ryan, Song, Wanberg and Kinicki, 2005; Paul and Moser, 2009; Pharr, Moonie and Bungum, 2012). In short, long-term unemployment can have a large negative effect on life satisfaction and self-worth and result in a loss of skills, further reducing employability (Gielen and van Ours, 2014). The longer people are unemployed, the more difficult it is to re-employ them, at least at wages comparable with what they received in the past, which, in turn, increases income inequalities (Stiglitz, 2012).

Youth employment

In 2013, the employment rate of youth from 15 to 24 years (32.1%) in the EU28 was significantly lower than the total employment rate (64.1%), having experienced an uninterrupted diminishing from 37.3% in 2008 (Eurostat, Labour Force Survey). In all Member States, the youth employment rate is lower than the total employment rate and the overall difference is statistically significant (Wilcoxon test: $Z = 6.219$, $p < .001$). Stiglitz (2012) identified the lack of youth employment together with long-term unemployment as the two key long-term effects that are likely to make a quick return to full employment particularly difficult. The low youth employment rates negatively affect life satisfaction because young people who see a society without good prospects will become alienated from the rest of society. Moreover, in the EU, and taking into account their educational level, young people are certainly the best human resource Europe possesses in order to increase its productivity (Rodrigues, 2014). So a new target should be included in Europe 2020, because it would also contribute to increasing the efficacy of the education targets encompassed in the strategy.

3. Europe 2020 and Life Satisfaction

From the point of view of public policy, three main accounts of well-being may be considered: national income or production (welfare conception), objective well-being (social indicators movement and capability approach), and subjective well-being (life satisfaction research) (Dolan and Metcalfe, 2012). Focusing on the latter, as defined in the Introduction Section, life satisfaction deals with the individual's evaluation of the extent to which he or she experiences positive and negative affect, happiness or satisfaction with life (Diener 1984, 2006). It is measured as an evaluation when people are asked to provide global assessments of their life or domains of life, such as satisfaction with life overall, income, health, job, leisure time, social relations, etc. (Bruni and Porta, 2007; Di Tella and MacCulloc, 2006; Dolan, Peasgood and White, 2008; Helliwell and Huang, 2014; Layard, 2005; Van Praag and Ferrer-i-Carbonell, 2008).

Although life satisfaction is a relative newcomer in terms of its policy relevance and its empirical robustness, recent decades have witnessed a growing interest in the measurement and use of life satisfaction for policy purposes (see, for example, Dolan and Metcalfe, 2012; Dolan and Peasgood, 2008; Guven, 2012; Kahneman and Sugden, 2005; Layard, 2005). As Stutzer and Frey (2010) showed, the insights gained from life satisfaction research mainly affect public policy in two areas: as a complement to traditional measures of welfare and for evaluating the social benefits of government programmes.

First, although economic growth is a key political objective, it might not increase people's life satisfaction. Economy activity is not an end in itself but only has value in so far as it contributes to human life satisfaction (Frey and Stutzer, 2002). Public policies should not only focus on economic growth, but also on economic and social development. As Stutzer and Frey (2010, p. 702) stated: "There are also hopes that a complementary indicator of aggregate happiness might guide policymaking more toward citizens' preferences than indicators of aggregate national income alone". In contrast to traditional measures of welfare (i.e. national

income or GDP and the United Nations Human Development Index, among others), indicators of life satisfaction have several interesting qualities because they are related to the nonmaterial aspects of human well-being, such as the influence of social relations, autonomy and self determination (Bárcena-Martín et al., 2016; Bartolini and Sarracino, 2014; Dolan and Metcalfe, 2012; Frey and Stutzer, 2002; Stutzer and Frey, 2010). In practice, this new approach is now being taken into account, with several international initiatives stressing the importance of including data on life satisfaction as well as objective well-being in larger-scale surveys undertaken by official statistical offices because all of them contribute to measuring well-being (see Eurofound, 2012; Eurostat, 2008; OECD, 2013; Stiglitz et al., 2009).

Second, the life satisfaction approach is an emerging method for estimating social benefits and costs in the design and implementation of government spending programmes and the evaluation of their results. With reported life satisfaction, goods which have no market price (e.g. environmental protection, lives saved in healthcare programs or programs to improve car safety) can be directly evaluated in utility terms. This approach has been used, among others, to value the welfare cost of forest fires (Kountouris and Remoundou, 2011) and airport noise nuisance (Van Praag and Baarsma, 2005).

Considering the relevance of life satisfaction for public policy, we study the extent to which Europe 2020 is aligned with EU citizens' life satisfaction. That is, do the citizens of Member States closer to attaining the Europe 2020 targets report higher levels of life satisfaction? If that were the case, one could claim that Europe 2020 mirrors to some extent EU citizens' life satisfaction. We further investigate the association between life satisfaction and a new extended Europe 2020 that takes into account additional indicators of inequality. If the ranking of Member States resulting from the life satisfaction indicator were more negatively correlated with the ranking resulting from the ETDI than with the ranking resulting from the TDI, we could deduce that inequalities affect to EU citizens' satisfaction and therefore Europe 2020 should be revised to focus more on social targets.

4. Data

4.1. Indicators for the Europe 2020 Target Distance Index

With indicators 1 to 8 (Table 1), we calculate the TDI composite index that allows us to analyse the Member States' degree of achievement of the Europe 2020 targets in 2013 (the last year with statistical information for all variables), taking the EU headline target on employment, innovation, education, social inclusion and climate/energy as a reference point[1].

Specifically, the targets of indicators 1 (*Employment rate*), 2 (*Research and development*), 4 (*Renewable energy consumption*), 6 (*Early leavers from education*) and 7 (*Tertiary educational attainment*) were established by the European Commission (2010). For indicators 3 (Greenhouse gas emissions) and 5 (*Primary energy consumption*), Eurostat has estimated the targets by using the methodologies that permit comparisons across countries. We have estimated the target for indicator 8 (*People at risk of poverty or social exclusion*). The EU headline target sets out to reduce the total number of people at risk of poverty or social exclusion by 20 million (European Commission, 2010, p. 3). Based upon Eurostat data, we have estimated the percentage of the population that should be at risk of poverty or social exclusion by 2020 as illustrated below. In 2010, 116.3 million people were at risk of poverty or social exclusion and the target is to reduce this number by 20 million people in 2020; thus, the target is that only 96.3 million people should be at risk of poverty or social exclusion by 2020. Next, dividing 96.3 million people over the estimated population for 2020, we get 514.365 million people, that is, the targeted percentage of

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[1] Member States have been allowed to set their own national targets in each of these areas according to their particular circumstances.

population at risk of poverty or social exclusion for 2020 is 18.72%. Table 1 shows the description of indicators and targets.

4.2. Indicators for the Extended Europe 2020 Target Distance Index

Next, we analyse the Member States' degree of achievement of the targets when incorporating six inequality targets (see Table 2) in addition to seven out of the eight targets of Europe 2020 (indicators from 2 to 8, Table 1). We then calculate the ETDI that measures the distance of each Member State from the inequality-extended Europe 2020. Table 3 shows the descriptive statistics of all the indicators. We now explain the data source and the six targets chosen for the additional indicators (Table 2).

Table 2. Additional indicators and targets for building the Extended Europe 2020 Target Distance Index

	Indicator	Description	Target
9	Inequality of income distribution	Inequality of income distribution (income quintile share ratio) is the ratio of total income received by 20% of the population with the highest income (top quintile) to that received by 20% of the population with the lowest income (lowest quintile).	Maximum 3.61
10	Children at risk of poverty or social exclusion	People under the age of 16 at risk of poverty or social exclusion (% of total population).	Maximum 18.72
11	Female employment rate	The female employment rate is calculated by dividing the number of females aged 20 to 64 in employment by the total females of the same age group (in %).	Minimum 75
12	Male employment rate	The male employment rate is calculated by dividing the number of males aged 20 to 64 in employment by the total males of the same age group (in %).	Minimum 75
13	Long-term unemployed rate	The long-term unemployed rate is calculated by dividing the persons aged at least 15 unemployed 12 months and more by the total active population.	Maximum 1.86
14	Youth unemployment rate	The youth employment rate is calculated by dividing the number of people aged 15 to 24 in employment by the total population of the same age group (in %).	Minimum 49.69

Note. Indicators 9 to 14 and their corresponding targets are proposed in this paper.
Source: Eurostat, Labour Force Survey and Statistics on Income and Living Condition.

Table 3. Descriptive statistics of indicators for the EU28, 2013 (n = 28)

Indicator	Mean	Standard deviation	Minimum	Maximum
Employment rate	68.00	6.48	52.90	79.80
Research and development	1.62	0.90	0.39	3.30
Greenhouse gas emissions	83.20	26.36	41.81	143.77
Renewable energy consumption	17.87	11.71	3.60	52.10
Primary energy consumption	91.31	9.17	71.80	121.30
Early leavers from education	10.39	4.94	3.90	23.60
Tertiary educational attainment	37.91	9.53	22.50	52.60
People at risk of poverty or social exclusion	25.38	8.09	14.60	48.00
Inequality of income distribution	4.84	1.08	3.40	6.60
Children at risk of poverty or social exclusion	27.89	9.98	12.80	51.50
Female employment rate	62.59	8.13	43.30	77.20
Male employment rate	73.43	5.86	61.60	82.20
Long-term unemployed rate	5.44	4.00	1.30	18.50
Youth employment rate	30.19	13.11	11.80	60.10

Source: Eurostat, Europe 2020 indicators. Eurostat, Labour Force Survey and Statistics on Income and Living Condition.

Inequality in income distribution

The information on the indicator of *Inequality in income distribution* (indicator 9, Table 2) has been adapted from Eurostat, Statistics on Income and Living Conditions. Contrastingly to inequality indexes such as Gini or Theil, our chosen indicator provides complete information on income distribution as it compares the richest with the poorest population income (see Piketty, 2014, cap. VII). As a target, we take the mean value of first quartile countries (3.61), that is, the mean of the seven more egalitarian countries or those that report the lowest income inequality in the EU28 (from lowest to highest income inequality in 2013: the Czech Republic, the Netherlands, Slovenia, Slovakia, Finland, Sweden and Belgium).

Child poverty

As indicator of child poverty (indicator 10, Table 2) we take the *Children at risk of poverty or social exclusion* provided by Eurostat (Statistics on Income and Living Conditions). In line with Europe 2020, for child poverty we set the same target as the target for total population poverty (18.72%).

Female employment and male employment

Data on *Female employment rate* (indicator 11, Table 2) and *Male employment rate* (indicator 12, Table 2) are provided by Eurostat, Labour Force Survey. Based upon an optimal situation of no differences between men and women in employment rates, we have set the same target of 75% for both men and women as already set in the Lisbon Strategy and which Europe 2020 has set for total employment.

Long-term unemployment

Eurostat (Labour Force Survey) provides the *Long-term unemployment rate* (indicator 13, Table 2). We have taken into account the complete empirical distribution in the EU28 and take the mean value of the seven Member States that report the lowest long-term unemployment rates (1.86), that is, the first quartile (from lowest to highest in 2013: Austria, Sweden, Finland, Denmark, Luxembourg, Germany and the Netherlands).

Youth employment

Based on the information provided by Eurostat (Labour Force Survey), we calculate the *Youth employment rate* (indicator 14, Table 2) for people aged 15 to 24. As a target for youth employment, we take the mean of those Member States that form the fourth quartile in this variable distribution (49.69), that is, the average of the seven Member States with the highest rates of youth employment of the EU28 (from highest to lowest in 2013: the Netherlands, Denmark, Austria, Germany, the United Kingdom, Malta and Finland).

4.3. Life Satisfaction

Among the several indicators of life satisfaction, we work with the "Overall life satisfaction" indicator (hereafter referred to as *Life satisfaction*) provided by Eurostat (Statistics on Income and Living Conditions, Personal well-being indicators) for 2013. In order to determine the degree to which people are satisfied with their life in general, individuals living in private households aged 16 and older were surveyed. The unit of measure of *Life satisfaction* is the average of all individuals' ratings on a scale from 0 to 10, where 0 is "*not satisfied at all*" and 10 is " *fully satisfied*". Column seven in Table 4 reports the *Life satisfaction* levels of the Member States.

We select life satisfaction rather than, for instance, happiness for theoretical and empirical reasons. The life satisfaction concept is in consonance with an economic perspective on well-being and represents the possibility to satisfy own preferences (Diener, 1984). Life satisfaction can be regarded as an aggregate of the different domains of satisfaction (Van Praag and Ferrer-i-Carbonell, 2008). Empirically, the life satisfaction indicator is more commonly found in data sets. In any case, using happiness or life satisfaction yields very similar results in terms of the impact of key variables (Dolan and Metcalfe, 2012).

5. The P2 Distance Method for Building Distance-to-Target Composite Indexes

The estimation of each Member State's distance in 2013 to the Europe 2020 targets may be approached through two methods. One of the methods involves calculating the distance of each of the indicators separately. This is the method followed on the European Commission's Europe 2020 website, where it is possible to see each Member State's progress towards the 2020 targets. The other method provides an integrated measure of the distance in the eight indicators by generating a synthetic value or composite index for the distance of each Member State, which facilitates communication with the general public. However, using composite indexes has disadvantages, such as the treatment of measurement units (how to aggregate variables expressed in different units) and the allocation of weights among variables in the composite index (Nardo et al., 2005; Permanyer, 2011). These methodological disadvantages can be resolved by selecting the appropriate method to construct the composite index.

Specifically, we use the P2 Distance method for measuring the Member States distance to the Europe 2020 targets, because it solves the above methodological disadvantages and has several interesting characteristics. According to Zarzosa Espina and Somarriba Arechavala (2013), the P2 calculated index verifies the mathematical properties required to provide an

acceptable measure: existence and determination, monotony, uniqueness, quantification, invariance, homogeneity, transitivity, exhaustiveness, additivity and invariance compared to the base of reference. The P2 index is a cardinal measure, and on the basis of the additive property it is also capable of analysing disparities between Member States.

P2 Distance Formula

The P2 Distance method or DP2 was initially proposed by Pena Trapero (1977). The method permits constructing a composite index to measure how far countries are from the Europe 2020 targets in an integrate manner instead of a separate measure of the distance for each indicator; and likewise for the inequality-extended Europe 2020 case. Thus, DP2 allows studying the distance both of each Member State to the Europe 2020 targets and between Member States.

Consider

o   n the number of Member States (with i from 1 to n),

o   m the number of indicators (with j from 1 to m),

o $d_j = d_j(i,*) = |x_{ij} - x_{*j}|$ the difference between the value taken by the j-th indicator in the i-th Member State and the vector of reference $X_* = \{x_{*1}, x_{*2}, ..., x_{*m}\}$,

o SD_j the standard deviation of the indicator j,

o $R^2_{j,j-1,...1}$ the adjusted coefficient of determination in the multiple linear regression (ordinary least squares, OLS) of x_j over $x_{j-1}, x_{j-2}, ... x_1$, and expresses the variance or variation of x_j linearly explained by the variables $x_{j-1}, x_{j-2}, ... x_1$,

then the composite index P2 Distance for a Member State i is defined as follows:

$$DP2_i = \sum_{j=1}^{m} (d_j / SD_j)\left(1 - R^2_{j,j-1,...1}\right) \qquad (1)$$

where $R_1^2 = 0$ and $SD_j \neq 0$.

Application of P2 Distance to Europe 2020

In this application, the P2 Distance is worked out by taking as the reference vector the Europe 2020 targets for indicators 1 to 8 for the TDI (Table 1) and the targets for indicators 2 to 8 (Table 1) plus indicators 9 to 14 (Table 2) for the ETDI. Hence, had a Member State reached all of the targets it would get a zero value in the composite index (TDI or ETDI), that is, its distance from the Europe 2020 targets or Inequalities-sensitive Europe 2020 would be zero. As we aim to quantify the distance of each Member State in 2013 from the eight Europe 2020 targets (or thirteen inequalities-sensitive Europe 2020 targets), we need to establish some restrictions on the original data matrix.

1. We assign the value of target j to indicator j in the Member State i that has already met the target. For instance, in 2013 Finland has invested 3.3% of GDP in *Research and Development*, which surpasses the 3% target for Europe 2020. Without any restriction, the distance $d_j = |x_{ij} - x_{*j}|$ = |3.3 - 3| would be 0.3. Since the DP2 index is calculated as the sum of the distances weighted by the correction factor and divided by the standard deviation, this result would be misleading. Specifically, Finland would obtain in the TDI a larger distance from the Europe 2020 targets than it should. To overcome this problem, we set its indicator value as the target value (i.e. x_{ij}=3%) so that d_j is zero (the target is met).

2. After adjusting countries' values in the targets and before the aggregation stage, indicators are normalised to be in the same scale. In this way, we solve the problem of aggregating different dimensions measured in distinct scales. The normalisation formula is:

$$I_{ij} = \frac{x_{ij} - \text{worse}(x_j)}{\text{target}_j - \text{worse}(x_j)} \tag{2}$$

where I_{ij} is the normalised indicator j of Member State i.

This is the re-scaling normalisation method (see Nardo et al., 2005, pp. 47-48). We take the corresponding target as the maximum value (best value) of the indicator and the worst value of the indicator across Member States as the minimum value. I_{ij} has values ranging from 0 (laggard, x_{ij} = worse (x_j), the country furthest away from this target) to 1 (leader, x_{ij} = target$_j$, the country has reached the target). As the indicators are normalised, the reference base for calculating the distance is the unit vector.

Given these two transformations, a $DP2_i$ = 0 means that Member State "i" has met all of the targets, while a $DP2_i$ > 0 means that it has not met all of them. The higher the DP2 value of a Member State, the further it will be from achieving all the Europe 2020 targets.

Hierarchy of indicators

Once the indicators are normalised, equation (1) is written as:

$$DP2_i = \sum_{j=1}^{m} [(I_{ij} - 1)/SD_j)](1 - R_{j,j-1,\ldots 1}^2) \tag{3}$$

where SD_j is the standard deviation of the normalised indicator I_j, and $R^2_{j,j-1,\ldots 1}$ is the adjusted coefficient of determination in the OLS multiple linear regression of I_j over I_{j-1}, I_{j-2}, … I_1.

As the distance is divided by SD_j, it is guaranteed that the distances of those indicators with a higher dispersion to the mean are less important for determining the composite index. The adjusted coefficient of determination, $R^2_{j,j-1,\ldots 1}$, measures the percentage of the variance of each indicator explained by the linear regression estimated using the preceding indicators (I_{j-1}, I_{j-2}, … I_1). As a result, the correction factor (1-$R^2_{j,j-1,\ldots 1}$) avoids the duplication of information by eliminating indicators whose information was provided by the preceding indicators and solves the problem of correlation among indicators. The model will not have redundant information.

As regards the adjusted coefficients of determination, the entry order of the indicators in the composite index formula determines different values for R^2 and therefore affects the weight of the indicators and the values of the composite index. An iterative method is required to determine the order. We start from the Fréchet Distance (DF) where all the coefficients of determination R^2 are set to zero:

$$DF = \sum_{j=1}^{m} (d_j/SD_j) = \sum_{j=1}^{m} (|\, I_{ij} - 1 \,|/SD_j) ; \qquad i = 1, 2, \ldots, n \tag{4}$$

DF is the maximum value DP2 may reach. We then estimate the linear correlation coefficients r between each indicator and the DF and sort the indicators from highest to lowest according to the absolute values of the linear correlation coefficients. Next, we calculate the first P2 Distance for each Member State, incorporating the indicators in the resulting order. Hence, the indicators are ranked from the highest to lowest absolute value of the linear correlation coefficient between each indicator and the DP2. The process continues iteratively until the difference between two adjacent DP2s is zero.

Weight of the distances

From (3) we can deduce that the weight of the distance in each indicator with respect to the target (I_{ij} - 1) is the ratio of the correction factor to the standard deviation of that indicator. For example, in the case of eight indicators (m = 8), Member State i's TDI is calculated as follows:

$$TDI_i = (1/SD_1)(I_{i1}-1) + [(1-R^2_{2,1})/SD_2](I_{i2}-1) + [(1-R^2_{3,2,1})/SD_3](I_{i3}-1) +...+ [(1-R^2_{8,7,6,5,4,3,2,1})/SD_8](I_{i8}-1)$$

Recall that $R_1^2 = 0$ and the reference vector or target vector is the unit vector.

The first component in each addend $[(1-R^2)/SD_j]$ captures the weight that the DP2 method assigns to each of the distances that each Member State has from the targets. These weights are the same across all Member States, but as each Member State is in a different relative position with respect to the targets (I_{ij} - 1), the TDI will result in a distinct value for each Member State.

6. Results

6.1. Europe 2020 Target Distance Index (TDI)

Based on the statistical information provided by the eight indicators of Europe 2020, and applying the DP2 methodology, we calculate the TDI composite index in 2013 for the 28 Member States. This index allows identifying those Member States that are closer to attaining the Europe 2020 targets and also to benchmark Member States. Table 4 shows the results of the TDI and the ranking of Member States according to the degree to which the Europe 2020 targets have been met.

First, none of the Member States met all of the Europe 2020 targets in 2013 as all of them have a positive TDI value. Denmark shows the best situation as it has the smallest distance (TDI = 0.53). In contrast, Malta is the furthest away from meeting the Europe 2020 targets with a TDI = 12.01. The DP2 property of additivity allows us to deduce that there are large disparities between Member States concerning the degree of achievement of the Europe 2020 targets (approx. 23 times larger, 12.01/0.53), and, for instance, that Portugal is twice as far from the United Kingdom in meeting the Europe 2020 targets.

Table 5 shows the eight indicators ranked by entry order in the DP2 according to their absolute linear correlation with the TDI, the correction factor (1-R^2) and the weights of the distances. Since R^2 captures the information of each indicator that has already been explained by the preceding indicators, an indicator's correction factor (1-R^2) represents the new information explained by this indicator. For example, *Research and development* is the most closely correlated with the TDI composite index and contributes all of its information to the TDI; and the correction factor of the indicator *Employment rate* is 0.59 because approximately 41% of this indicator's information has already been explained by *Research and development*. Note that *Renewable energy consumption*, despite being the least correlated indicator with the TDI (and hence the last one to be entered), provides 57% of the new information to the TDI.

As concerns the weights of the distances, the results show that the indicators *Primary energy consumption*, *Research and development* and *Early leavers from education* have the uppermost weights in determining the TDI. That is, *ceteris paribus*, the further away a Member State is from the targets on these concepts, the more likely that this Member State will be further away from attaining the Europe 2020 targets (and the less likely that its TDI will be zero).

In 2013, eight Member States met the *Primary energy consumption* target: Bulgaria, Lithuania, Hungary, Romania, Greece, Italy, Portugal and Spain. Denmark, Sweden and Finland surpassed the target of 3% GDP expenditure in *Research and development*, whereas 10 Member States still did not reach the 1%. Eight Member States met the target of a rate of early leavers from education and training of at most 10% compared to countries with very high rates such as Spain (26.6%) and Malta (20.5%).

Table 4. Comparison of EU28 rankings, 2013

Member States	Rank	TDI	Rank	ETDI	Rank	LS	Difference TDI-ETDI	TDI-LS	ETDI-LS
Denmark	1	0.53	1	0.87	1	8	0	0	0
Sweden	2	0.89	2	1.00	2	8	0	0	0
Finland	3	1.62	3	1.82	3	8	0	0	0
Germany	4	2.72	4	2.61	9	7.3	0	5	5
Slovenia	5	2.92	9	4.40	15	7	-4	10	6
France	6	3.14	8	4.14	13	7.1	-2	7	5
Belgium	7	3.56	10	4.68	6	7.6	-3	-1	-4
Austria	8	3.59	7	3.76	4	7.8	1	-4	-3
Lithuania	9	3.68	11	5.07	19	6.7	-2	10	8
United Kingdom	10	3.95	6	3.71	10	7.3	4	0	4
Netherlands	11	4.10	5	3.16	5	7.8	6	-6	0
Czech Republic	12	4.60	12	5.25	17	6.9	0	5	5
Luxembourg	13	4.80	13	5.39	7	7.5	0	-6	-6
Estonia	14	5.15	14	5.39	21	6.5	0	7	7
Latvia	15	5.31	15	6.13	22	6.5	0	7	7
Ireland	16	5.75	16	6.81	8	7.4	0	-8	-8
Hungary	17	6.39	20	8.01	24	6.2	-3	7	4
Slovakia	18	6.67	17	7.80	16	7	1	-2	-1
Poland	19	6.76	18	7.80	11	7.3	1	-8	-7
Croatia	20	7.22	24	10.34	23	6.3	-4	3	-1
Bulgaria	21	7.73	22	9.55	28	4.8	-1	7	6
Greece	22	7.81	28	12.27	25	6.2	-6	3	-3
Portugal	23	7.88	21	8.98	26	6.2	2	3	5
Cyprus	24	8.10	19	7.89	27	6.2	5	3	8
Italy	25	8.37	25	10.49	20	6.7	0	-5	-5
Spain	26	9.03	27	11.20	18	6.9	-1	-8	-9
Romania	27	9.23	23	10.14	12	7.2	4	-15	-11
Malta	28	12.01	26	10.83	14	7.1	2	-14	-12

Notes. TDI: Europe 2020 Target Distance Index; ETDI: Extended Europe 2020 Target Distance Index LS: Overall life satisfaction. LS responses are measured from 0 to 10, where 0 is "*not satisfied at all*" and 10 is "fully *satisfied*". Adapted from Eurostat, Statistics on Income and Living Condition, Personal wellbeing indicators.

Table 5. Europe 2020 Target Distance Index Structure in the EU28 Member States, 2013

Position	Indicator	$|r|$	Correction factor (1-R^2)	Distances Weights[a]

		|r|		
1	Research and development	0.82	1	3.03
2	Employment rate	0.73	0.59	2.16
3	Early leavers from education	0.67	0.82	2.97
4	People at risk of poverty or social exclusion	0.57	0.46	1.79
5	Tertiary educational attainment	0.53	0.80	2.16
6	Greenhouse gas emissions	0.49	0.68	2.48
7	Primary energy consumption	0.37	0.68	3.14
8	Renewable energy consumption	0.22	0.57	1.59

Note. |r| is the absolute linear correlation between the normalised indicators and the Europe 2020 Target Distance Index. [a] From the DP2 formula, it is the ratio of the corrector factor to the standard deviation of the normalised indicator.

6.2. Extended Europe 2020 Target Distance Index (ETDI)

With the purpose of incorporating dimensions explicitly related to inequalities, we apply the DP2 methodology to the corresponding 13 indicators (indicators 2 to 8, Table 1, plus indicators 9 to 14, Table 2) and calculate the ETDI (Table 4). None of the Member States met all of the targets in 2013. Moreover, the majority of Member States increased their distance, except Germany, the United Kingdom, the Netherlands, Cyprus and Malta. The rankings of Member States resulting from both the TDI and the ETDI are fairly similar, as shown by the Spearman's correlation coefficient (rho = 0.95, p < .001). However, when moving from the TDI to the ETDI, nine countries worsen their ranking whereas nine improve their relative position and 10 remain constant. The maximum change is on the negative side, with Greece slipping six places, followed by four places for Slovenia and Croatia. As regards the group affected positively, the Netherlands recovered six places and the United Kingdom and Romania four (see the difference in the TDI-ETDI relative ranking in column eight of Table 4).

Table 6 displays the thirteen indicators ranked by entry order in the DP2 according to their absolute linear correlation with the ETDI, the correction factor $(1-R^2)$ and the weights of the distances. Now, *Female employment rate, Research and development* and *Male employment rate* are the indicators that show the strongest correlation with the ETDI. The six inequality indicators are among the eight indicators most correlated with the ETDI. With regard to the *People at risk of poverty or social exclusion* indicator, it is worth noting that provides only 7% of its information to the ETDI (Table 6) in contrast with the 46% in the case of the TDI (Table 5). The explanation could be that one of its components (people at risk of poverty) is associated with the Gini coefficient of income inequality (see Darvas, 2017). Thus, since the correction factor of P2 Distance avoids the duplication of information, our results point out that the remaining 93% of *People at risk of poverty or social exclusion* has already been added by the six preceding indicators, of which five have been added to reflect more explicitly the social cohesion objective (specifically, *Female employment rate, Male employment rate, Long-term unemployed rate, Youth employment rate, and Children at risk of poverty or social exclusion*). Moreover, our proposal to include the indicator *Inequality of income distribution*, distinct from the Gini index, seems justified by the fact that *Inequality of income distribution* enters into the calculation formula of the ETDI after *People at risk of poverty or social exclusion* adding 29% of new information.

Table 6. Extended Europe 2020 Target Distance Index Structure in the EU28 Member States, 2013.

Position	Indicators	|r|	Correction factor (1-R²)	Distances weights[a]
1	Female employment rate	0.92	1	3.96
2	Research and development	0.82	0.57	1.73
3	Male employment rate	0.73	0.53	1.78
4	Long-term unemployed rate	0.72	0.20	0.84
5	Youth employment rate	0.71	0.35	1.13
6	Children at risk of poverty or social exclusion	0.69	0.35	1.26
7	People at risk of poverty or social exclusion	0.66	0.07	0.27
8	Inequality of income distribution	0.64	0.29	0.80
9	Early leavers from education	0.58	0.46	1.65
10	Tertiary educational attainment	0.52	0.65	1.76
11	Primary energy consumption	0.42	0.56	2.56
12	Greenhouse gas emissions	0.34	0.47	1.72
13	Renewable energy consumption	0.06	0.31	0.86

Note. |r| is the absolute linear correlation between the normalised indicators and the Extended Europe 2020 Target Distance Index. [a] From the DP2 formula, it is the ratio of the corrector factor to the standard deviation of the normalised indicator.

6.3. Association between TDI, ETDI and Life Satisfaction

As shown in the last three columns of Table 4, the Member States that are closer to accomplishing the Europe 2020 targets (first positions in the TDI, namely Denmark, Sweden and Finland) are also at a shorter distance to achieving the inequality-extended Europe 2020 targets. Moreover, the citizens of these Member States reported the highest levels of *Life satisfaction*. In contrast, the Member States that are furthest from achieving the Europe 2020 targets, and therefore occupy the lowest positions according to the objective indicators in the TDI and ETDI (namely Malta, Romania and Spain), rank much higher in *Life satisfaction* as perceived by their inhabitants.

Considering all 28 Member States, the Spearman's rank correlation (rho) coefficient is -0.62 (p < .001) between the TDI and *Life satisfaction* and -0.71 (p < .001) between the ETDI and *Life satisfaction*. The negative sign of the rho coefficients indicates that the farther a country is from complying with the Europe 2020 targets (and the inequality-extended Europe 2020 targets), the worse it ranks in terms of *Life satisfaction*. That is, the lower the TDI (or ETDI), the greater the *Life satisfaction*. Thus, the results show a moderate to strong and significant (at 1% level) relationship between the *Life satisfaction* of Member States' citizens and their distance from the Europe 2020 targets (TDI), and an almost strong and 1% significant relationship between Member States' *Life satisfaction* and the inequality-extended Europe 2020 (ETDI). In order to test whether the correlations differ from each other statistically significantly, we have performed the corcori test. The result indicate that the difference in the correlation coefficients is statistically significant (corcori test: Z = 1.836, one-tail p = 0.0332)[2]. That is, there is a greater association between

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[2] Similar results are obtained using the web utility Lee and Preacher (2013, September). In this case, z-score = 1.89, one-tail p = 0.0294.

inequality-extended Europe 2020 and life satisfaction than between Europe 2020 and life satisfaction. This result could be interpreted as inequalities do matter to EU citizens.

7. Discussion and Conclusions

The main objective of this paper is to analyse whether the targets of the Europe 2020 match EU citizens' life satisfaction. Europe 2020 aims to transform the EU into a smart, sustainable and inclusive economy with high levels of employment, productivity and social cohesion. To make these priorities a reality, the Member States have undertaken to achieve eight targets on employment, R&D investment, CO_2 emissions, renewable energy, energy consumption, early school leaving, tertiary education and poverty by 2020. The multidimensionality of these targets constitutes a positive step in the search for complementary indicators to the GDP that allow making socio-economic progress measurable (Andor, 2014; Commission of the European Communities, 2009; Stiglitz et al., 2009; Van den Bergh, 2007). However, because all the indicators of Europe 2020 are objective indicators, they cannot provide information on nonmaterial aspects of human well-being. Given that life satisfaction indicators provide new and complementary information about subjective well-being, which may become relevant in the monitoring progress, informing policy design and policy appraisal, the growing interest in the measurement and use of this kind of measures for policy purposes is noteworthy (e.g. Diener, 2006; Dolan and Metcalfe, 2012; Dolan and Peasgood, 2008; Kahneman and Sugden, 2005; Layard, 2005; Stutzer and Frey, 2010).

In this framework, we have analysed whether the Europe 2020 targets meet EU citizens' life satisfaction. To do so, we have first evaluated Member States' degree of overall accomplishment of the Europe 2020 targets by building the TDI composite index. The results show first that none of the Member States met all the Europe 2020 targets in 2013, although the Northern Member States (Denmark, Sweden and Finland) are closer to achieving the targets. In contrast, Malta, Romania and Spain are furthest from meeting the Europe 2020 targets. Secondly, we have calculated the Spearman's correlation between the TDI (built from objective indicators of Europe 2020) and *Life satisfaction* in the EU. We have found that the TDI is negatively associated with *Life satisfaction*. That is, Member States closer to attaining the Europe 2020 targets report higher levels of life satisfaction. This result suggests that EU citizens positively value the compliance with the 2020 targets. Therefore, from a conceptual point of view, we could say that Europe 2020, as a set of public policies, is guided towards Europe citizens' life satisfaction.

After revising the choice of targets and their flagship initiatives, and given the current context of rising economic and social inequalities in the EU, we argue that the major deficiency of Europe 2020 is the lack of more specific targets for reducing these inequalities. It seems a great mistake for Europe 2020 to assume that economic, social and territorial cohesion follow from economic growth and, consequently, that the creation of employment (without drawing a distinction between female and male employment) will be the key variable. Indeed, several studies argue that employment policies must be accompanied by other social policies to foster inclusive growth (e.g. European Commission, 2013; IMF, 2007; Perrons and Plomien, 2010; Reed and Portes, 2014).

We then incorporated six additional targets in the model that might improve the well-being of certain groups of European citizens (females, children, poor families, long-term unemployed and young people), as well as the well-being of the whole population. To do so, we built the ETDI composite index which has allowed us to analyse the Member States' overall degree of accomplishment with respect to the new inequality-extended Europe 2020. The results indicate that the majority of Member States increase their distance with respect to the inequality-extended Europe 2020, and variations in the ranking of countries are observed. A remarkable result of our work is that the ranking of Member States resulting from *Life satisfaction* is more correlated with the ETDI ranking than with the TDI ranking. Thus, inequalities in income seem to

matter to EU citizens. These results are in line with several country-level studies which point to a negative association between inequality in income and life satisfaction in European countries (e.g. Alesina et al., 2004; Delhey and Dragalov, 2014; Schwarze and Härpfer, 2007). These findings could mean that in a context of rising income inequality, people feel less satisfied with their lives, e.g. with more mental and physical health problems, and consequently they would function poorly (Diener, 2006; Stutzer and Frey, 2010), so that the effectiveness of public programs to accomplish the Europe 2020 targets would be affected.

In addition, the results show that the consideration of the targets of inequality could be crucial to have a more complete view of the real situation of people from different European countries. Moreover, taking into account the weights of the distances, the implications for public policies depend on whether we consider Europe 2020 or inequality-extended Europe 2020. In the case of the TDI, the results show that in order to achieve the Europe 2020 targets, public resources should focus on reducing *Primary energy consumption* and *Early leavers from education,* and increasing *Research and development* as a matter of priority (Table 5). In the case of ETDI, the priorities would be to raise *Female employment rate* and *Male employment rate*, and reduce *Primary energy consumption* (Table 6).

To sum up, given all the damaging effects of inequality in income distribution not only on economic aspects (see Brown, 2004; Fitoussi and Saraceno, 2014; Jayadev, 2013; Piketty, 2014; Piketty and Saez, 2013; Stiglitz, 2012), but also regarding a great deal of issues that affect individual well-being (see Alesina et al. 2004; Babones, 2008; Delhey and Dragalov, 2014; Elgar and Aitken, 2011; Schwarze and Härpfer, 2007; Wilkinson and Pickett, 2009), and considering the results of our work that show that inequality matters to Europeans' life satisfaction, EU policymakers should both monitor inequality and commit to realistic but courageous targets and policies to reduce it. As Darvas (2017), we advocate that EU should focus more and more on social targets in the context of Europe 2020, and we propose the introduction of new targets focusing on the inequality of income distribution, female employment, youth employment, long-term unemployment and child poverty. Our proposal, and any revision of Europe 2020 which seeks to achieve a smart, sustainable and inclusive economy, requires an ambitious European investment plan (Andor, 2014; Rodrigues, 2014) that should contribute to fostering life satisfaction.

Regarding methodological aspects, both the TDI and ETDI composite indexes have been calculated by applying the P2 Distance method. Our application of the P2 Distance method provides a weighting scheme based on an explicit and transparent statistical model that solves the aggregation problem of different dimensions measured on different scales. However, this method only eliminates linear correlations among indicators and does not eliminate redundant information of quadratic or multiplicative nature.

Finally, an additional limitation of the present study is that the absence of regional level data on the majority of indicators precludes any kind of econometric analysis to study causality and the significance of the coefficients.

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