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A Quantitative summary of compliance with the 2030 Agenda in the European Union[1]. 2030 Agenda compliance in the EU

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Abstract. Successive to the Millennium Development Goals initiated in 2000, the 2030 Agenda for Sustainable Development approved in 2015 by the United Nations affects many of the political decisions currently being made. Through this Agenda, countries commit to taking actions aimed at 17 goals, 169 targets and 232 indicators created by the UN to measure them in terms of performance. Parallel to the creation of global objectives by the UN, Eurostat established 100 indicators (many equal or similar to those of the UN) focused on the countries of the European Union to monitor their development with respect to the 2030 Agenda. The main aim of this paper is to undertake an exhaustive analysis of the strengths and weaknesses of the European Union countries with respect to these set objectives, also analyzing the convergence or divergence among EU member states. To this end, we build partial synthetic indices for each goal, taking existing information on the indicators collected by Eurostat. Our aim is to combine them into a composite index that gives an overview of the (relative) situation of each country in the EU region.
Keywords: 2030 Agenda; Eurostat; synthetic indices; European Union; Sustainable Development Goals

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1. Introduction

Successive to the Millennium Development Goals, the 2030 Agenda for Sustainable Development approved in 2015 by the United Nations constitutes a successful example of how international political consensus around desirable achievements in the medium and long terms can be substantiated in a few concrete and quantifiable objectives (UN, 2015, 2017a, 2017b). Specifically, the UN has set 17 Sustainable Development Goals measured through 232 indicators, covering issues as relevant and diverse as gender equality, reduction of poverty and inequalities, and environmental sustainability. Parallel to the creation of these global objectives by the UN, Eurostat established 100 indicators (many equal or similar to those of the UN) focused on the characteristics of the countries of the European Union in order to monitor their development with respect to the 2030 Agenda.

These Eurostat indicators aims to reflect the situation for each country in each of the dimensions that comprise the 2030 Agenda: poverty indicators, health and hunger indicators, employment indicators, climate action indicators, and many others.

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In the present work, in line with United Nations (2022), synthetic indices (global and partial) are constructed in order to measure and provide an approximate idea of the compared performance of the countries within each objective, as well as generally. As many of the SDG goals may confronted or negatively correlated (see Miola et al, 2019), these constructed indicators undoubtedly shed light on the reality of each country and its relative position in terms of compliance with the 2030 Agenda. This allows us, for example, to highlight each country's strengths and weaknesses within the dimensions under study, thus permitting comparison between countries in order to assess the proximity (convergence) or distance (divergence) between them with respect to these dimensions.

Our results help to identify the areas that must be worked on around those objectives that show clear deficiency in the results of each country of the European Union, since most remain far from compliance with the 2030 Agenda. Likewise, in view of the results, the European Union should consider and focus its aid on those countries that are furthest behind and that have shown greater resistance to improvements in basic aspects such as education, health, or inequalities.

In terms of the availability (both temporal and geographical) of many Eurostat indicators, we find room for improving the current situation. Above all, we have verified certain limitations around two Eurostat indicators (goals 6 and 14) due to a lack of data coverage.

This research further finds that certain countries have individual profiles that may make it necessary to use differentiated approaches in order to favor improved joint performance in terms of the SDG objectives and, more specifically, to improve their performance in any of the 17 dimensions collected in the proposal designed by the UN.

Finally, we demonstrate the utility of analyzing differences between those European Union countries that obtain the highest total synthetic indices and those with the lowest outcomes (in order to undertake structural reform in the latter), as well as a need to identify the main determining factors at play. This would amount to a study of the inherent characteristics of each country: the quality of its institutions, its main policies in social, economic, and political matters, its historical antecedents, and any other aspect that helps to explain the differing results obtained in each country's synthetic index outcome and the reasons for those differences.

The rest of paper is organized as follows. Section 2 presents the recent policy developments related to the 2030 Agenda for Sustainable Development. Later on, section 3 describes our methodological approach to build synthetic indices within the Institutional framework proposed in the 2030 Agenda. After that, sections 4 and 5 presents the results obtained for partial and total synthetic indices, respectively. Finally, section 6 concludes.

2. On the 2030 Agenda policy developments

In this section, we explain the process of adoption of the 2030 Agenda by the United Nations and the rationale for this new set of goals, and we emphasize its importance at a global level. At the same time, we consider the process of adoption of collateral indicators by Eurostat in order to adapt them to the characteristics of European countries.

2.1. UN adoption of the 2030 Agenda for Sustainable Development

On September 25, 2015, the 2030 Agenda was approved at the UN Sustainable Development Summit. This Agenda would serve as successor to the Millennium Development Goals (MDGs), launched in 2000 and focused on meeting a series of human development goals by 2015. The obsolescence of the MDGs in 2015 required a new set of more ambitious goals with a greater scope and greater follow-up, and so the 2030 Agenda was approved by the UN General Assembly in that year. This Resolution approved by the UN stated: "The 17 Sustainable Development Goals and the 169 targets that we announce today demonstrate the magnitude of this ambitious new universal Agenda. They are intended to return to the Millennium Development Goals and achieve what they did not achieve" (UN, 2015: 1). Stiglitz et al (2009) highlighted some limitations of GDP as a composite measure of people's well-being. They argued the need of going beyond measuring economic production to measuring people's well-being. This universal policy also contributes to this regard.

These 17 goals for global application entered into force on January 1, 2016, thus determining the actions and efforts that countries must carry out in order to meet the 2030 Agenda objectives (UN, 2015: 7).

We must emphasize that these objectives are meant for universal application, for all countries, and we again cite the UN (2015: 3):[5]

[5] As Zeng et al. (2022) and other studies cited there pointed out, in a globalized world, not considering a joint view on the socioeconomic and environmental interactions between distant countries, for instance, may distort our estimates of potential tradeoffs and synergies between alternative SDGs.

> *"As we embark on this great journey together, we promise that no one will be left behind. We recognize that the dignity of the human person is fundamental, which is why we wish to see these objectives achieved for all nations and peoples, and for all sectors of society, and we will strive to reach those furthest behind first."*

The various goals focus on poverty, hunger, food security, education, employment, inequality, the environment, and peace, among many other issues. The UN also emphasizes that all the goals are equally important – none has greater weight than the others, and all must be met for the 2030 Agenda to be successful. However, there are also some warnings regarding the final implementation due to existence of interlinkages between them. Among others, Miola et al (2019), Nilsson et al, (2016) and Renaud et al, (2022) have identified not only synergies but also trade-offs when analysing recent evolution of official indicators included in the 2030 Agenda. Other concerns as the ones related to the successful implementation of special goals. For instance, Goal 5 (Gender equality) is analised by Ravazy (2016). She highlights how some SDGs -Goal 5, specifically– might be difficult to realise unless structural changes are introduced into the dominant economic model. Also, she pointed the necessity of stronger accountability mechanisms.

In order to monitor the fulfillment of these 17 goals, the UN in 2015 created the IAEG-SDG group (Report of the Inter-Institutional and Expert Group on the Indicators of the Sustainable Development Goals), which is made up of Member States. This group was placed in charge of creating a series of indicators for each goal and target of the 2030 Agenda (232 indicators in total). The global indicator framework was adopted on July 6, 2017, by the General Assembly:

> This approves the framework of global indicators for the Sustainable Development Goals and the objectives of the 2030 Agenda for Sustainable Development, as prepared by the Inter-institutional and Expert Group on the Indicators of the Sustainable Development Goals (…). This is a voluntary, country-driven instrument that includes the initial set of indicators to be refined annually and thoroughly reviewed by the Commission at its 51st session, to be held in 2020, and at its 56th session, which will be held in 2025, to be complemented with regional and national indicators formulated by the Member States (UN, 2017: 2).

These indicators, which serve to measure performance in each objective, are collected by different custodial agencies (UNICEF, World Bank, FAO, WHO, and UNESCO, among many other organizations).

Parallel to the creation of the IAGE-SDG group, the HLG-PCCB group was formed and placed in charge of supervising compliance with the objectives and preparing an annual report addressed to the UN Statistical Commission (2017: 8). It is also responsible for the implementation of the Cape Town Global Action Plan, focused on strengthening national statistical systems in order to comply with the 2030 Agenda (UN, 2017: 1).

Finally, before focusing on Europe, we again quote the UN (2015: 13): "*Our governments are primarily responsible for carrying out, at the national, regional and global levels, the follow-up and review of the progress achieved in the fulfillment of the targets and goals for the next 15 years*." Although the objectives are not legally mandatory, the countries are given the task of preparing their national indicators and providing this information to the United Nations, in order to pursue the monitoring and fulfillment of the 17 goals, as well as the possibility of making voluntary reports (voluntary national reviews) to be presented to the High-Level Political Forum on Sustainable Development (Eurostat, 2018: 18).

2.1. Implementation of sustainable agenda in Europe

Sustainable development has been among the most important areas of focus within the policies of the European Union since its creation (Eurostat, 2018: 9). Following the implementation of the 2030 Agenda by the United Nations, as one of the main institutions promoting its design and implementation (see Council of Europe, 2022 for a detailed thematic thread), the European Commission (2016) communicated the actions required to carry out the Agenda in Europe. The need was reflected to integrate sustainable development objectives into the framework of European policy, with indicators distinct from those implemented by the UN and yet as similar as possible, covering all the same designated objectives (European Commission, 2016: 3). Eurostat (2019a: 5) refers to this distinction, stating that "*not all the indicators selected by the United Nations at the global level are appropriate or relevant for the European Union*." For example, the indicators dedicated to developing countries are not applied in the European Union.

Eurostat's objective for the implementation of the 2030 Agenda was to use indicators that were already in its database, in order to avoid the creation of new indicators and thus to minimize the costs of the process. In May 2017, the indicators were established by the Committee of the European Statistical System (Eurostat, 2018: 9). Measurement of the progress toward fulfillment of the objectives in the European Union is carried out through 100 established indicators that are reviewed annually in order to incorporate new indicators considered relevant or to improve existing ones (to increase their statistical quality), further taking into account any European policies that are being implemented or prioritized (Eurostat, 2019: 2). This review adheres to the following principles:

- As mentioned, the structure of the Eurostat indicators should be as close to that of the United Nations indicators. These indicators are distributed along 17 goals, with a maximum of 6 indicators per goal and including some multipurpose indicators (42 in total) that measure more than one goal (Eurostat, 2019: 2). There are 3 exceptions in which 5 indicators are included instead of 6: in the objectives related to the environment (goal 13), to the oceans (goal 14), and to global partnership (goal 17). It is important to highlight that 55 of these 100 indicators provided by Eurostat are assigned to the United Nations Sustainable Development indicators (Eurostat, 2018: 25).
- 6 indicators have been assigned per goal, emphasizing that all objectives are equally important (Eurostat, 2019: 2).
- As a consequence of the above: "If there are new indicators, they will only be added by removing existing indicators within the same objective" (Eurostat, 2019: 2). Indicators will be replaced only if it is considered that replacement will lead to better measurement of the objectives, with higher statistical quality, all within a European context (Eurostat, 2019: 3).
- If new indicators are included, "they must meet the selection criteria of the relevant policy, the eligibility criteria, and minimum quality levels" (Eurostat, 2019: 3, 6).

Regarding this last point, the criteria of relevance refer to the fact that the indicators must form part of policies or initiatives of the European Union (such as the Europe 2020 Strategy, or the European Pillar of Social Rights) or else measure dimensions or specific policies and initiatives (Eurostat, 2019: 6). For its part, admissibility ensures that the indicators comply with the Code of Good Practice for European Statistics and, finally, for purposes of quality control, the indicator is scored from 0 to 3 depending on various criteria, such as the frequency of disclosure or the temporal coverage of the data (Eurostat, 2019: 6). Thus, the indicators used for the Europe 2020 Strategy have also been used to monitor some of the objectives contained in the 2030 Agenda. In this sense, Table 1 indicates the rough correspondence of the Europe 2020 Strategy with the 2030 Agenda.

Table 1. Comparison of the Europe 2020 Strategy versus the 2030 Agenda

Europe 2020 Strategy	**2030 Agenda**
Employment	Goal 8: Decent work and economic growth
R&D and Innovation	Goal 9: Industry, Innovation, and infrastructures
Education	Goal 4: Quality eduction
Poverty and social exclusion	Goal 1: End poverty
Climate change	Goal 13: Climate action
Energy	Goal 7: Accessible and clean energy

Source: Authors' elaboration from Eurostat (2019a:15)

To measure the progress made in Europe (with respect to the Sustainable Development Goals), the European Commission will review the actions of the Member States (regularly reporting on the contributions of the EU to the 2030 Agenda) (2016: 16). In turn, the European Commission (2016: 18) "*will introduce the Sustainable Development Goals as an essential principle to be followed in the policies and initiatives of the European Union*."

3. Methodological framework: elaboration of synthetic indices

This section presents the method of construction of the synthetic indices used in our study. It is worth noticing the existence of 'pros' and 'cons' when constructing a composite index (see OECD-JRC-EC, 2008: Box 1 for further technical details). On the positive side, they help us to summarize complex, multi-dimensional frameworks with a view to supporting decision makers, making easier the overall interpretation. Moreover, they can assess progress of countries over time contributing to obtaining comparative empirical evidence. However, on the negative side, they may lead to misleading policy messages when poorly constructed or misinterpreted. Furthermore, they will be useful to support a desired policy only if we warrant that the construction process is transparent and based on sound statistical and conceptual principles. Lastly, it is important to avoid political disputes related to the selection of indicators and weights.

As a first step in calculating the synthetic indices, tables have been drawn up for each objective indicating, among other things, the temporal and geographical availability of data, the quality of the data given by Eurostat

(from 0 to 3), and the type of variable (direct or reverse).[6] These tables have served as a guide for making the synthetic indices, indicating those series of data not available for each indicator by year and country, as well as the quality of each indicator.

For elaboration of the synthetic indices for each objective, we have followed the methodology of Rivero and Fernández (2008) used to calculate synthetic indices of sustainable tourism. Unlike the methodology proposed by Herrero and Villar (2012), where a new way of calculating the HDI (Human Development Index) is proposed, the chosen methodology facilitates working with inversely defined indicators (*i.e.*, for those indicators that yield the better result, the lower the value of the variable; as for example in the obesity rate).

To normalize the indicators and assign them a value between 0 and 1, the following formula was used for the direct variables (those variables in which a higher value indicates a higher probability of a country to achieve the objective):

$$\mathrm{h} = \frac{H_i - Hmin}{Hmax - Hmin}$$

where *H* is the real value achieved by country *i* in a given year, *Hmin* is the minimum value achieved in that indicator among the EU countries in that year, and *Hmax* is the maximum value reached among the EU countries in that given year. The value of *h* will oscillate between 0 and 1 according to the performance of the country in that indicator: "valued at 1 for the country in which the maximum value of the variable is registered, and valued at 0 for the country in which the minimum value of the variable is observed" (Rivero and Fernández, 2008: 33).

For the inversely defined indicators (mentioned above), the following normalization methodology is used:

$$\mathrm{h} = \frac{Hmax - H_i}{Hmax - Hmin}$$

thus ensuring that *h* will take the value of 1 when country *i* succeeds in the performance of the indicator, and 0 when the opposite occurs.

Once all the indicators within each objective have been normalized between 0 and 1, they are added to obtain the partial synthetic indices relative to each objective (15 in our case) and divided by the number of indicators used in each block; that is to say, an average is computed:

$$yi = \frac{\sum_{i=1}^{n} h_i}{n}$$

with *yi* being the synthetic index obtained for each country, and *n* the number of indicators that make up each objective.

According to its authors, the methodology here used may have some weaknesses:

> On the one hand, not all the original variables are used to obtain these aggregate indices due to the lack of statistical information in a high percentage of countries for some variables. On the other hand, the aggregate index is calculated as a simple sum of the standardized variables, which means that weights are not established for each of the variables that make up the aggregate index (2008: 33).

In our case, the first of the drawbacks referred to affects the process of elaboration of the synthetic indices on sustainable development, since in some Eurostat indicators information is lacking for some years, or data are not directly available for most of the EU Member Countries. In this regard, an attempt has been made to minimize such a lack by verifying the quality of the data *ex ante*.

Regarding the second drawback, we have already mentioned how the UN considers all the goals, targets, and indicators as equally important; so this will not affect our work.[7]

From these indices, a global synthetic index has been obtained for each country using the methodology described above. The maximums and minimums are calculated with the same procedure, but with *Hi* representing the value of each synthetic index for a given year, target, and country. Finally, the results obtained for each objective by each country are added and divided by the number of objectives considered in the calculation of this index (as we have eliminated goals 6 and 14, we divide by 15 in order to obtain our global synthetic index).

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[6] This information is available (in Spanish) in Onrubia *et al*. (2022).

[7] To emphasize this idea, we cite the UN (2015: 32): "The goals related to the means of implementation included in each of the Sustainable Development Goals and in goal 17, referred to above, are essential to put our Agenda into practice, and all have the same importance as the other targets and goals. For this reason, we will give them equal priority in our implementation activities and in the global indicator framework used to track our progress."

$$\mathrm{h} = \frac{synthetic\ index\ ODS\ i - Hmin}{Hmax - Hmin}$$

$$yi = \frac{\sum_{i=1}^{n} h_i}{15}$$

This global synthetic index will allow us to obtain a general idea of the performance of each country, in addition to the performance toward each of the objectives described in the 2030 Agenda.

Finally, whenever possible, we calculate the main results for the years 2005 and 2017. If the year 2005 is not available, or if it proves more convenient to use another year, then the year 2009 or 2013 is instead used.

To establish the limits (scores) within each value of the synthetic index, the same criteria are used as with the Human Development Index, as established in Table 2.

Table 2. Scores of the synthetic indices

SYNTHETIC INDEX VALUE	SCORE
Very high	0.800 or higher
High	0.700 to 0.799
Medium	0.550 to 0.699
Low	under 0.550

Source: Authors' elaboration from PNUD (2018:3)

4. Partial synthetic indices

In order to assess the general performance of each EU country in achieving the objectives of the 2030 Agenda, synthetic indices have been calculated, objective by objective. These outcomes are the result of the characteristics and actions of each country, shown through the indicators collected for each objective.[8] This further provides us an idea of the global synthetic index of each country, analyzing the strengths and weaknesses of each.[9]

Due to lack of space, we present here only those results corresponding to the Europe 2020 Strategy; that is, goals 1, 4, 7, 8, 9 and 13.

4.1. SDG 1: End poverty

Figure 1 shows the synthetic indices of SDG 1 (which we term synthetic index 1) for the years 2005 and 2019.[10] This reflects the relative performance of each country[11] in the corresponding dimension.

It is found that Finland, Czech Republic and Netherlands scored the highest synthetic index values in 2019. Bulgaria and Romania scored the lowest values in that same year. There are countries whose index score decreases over the period (Sweden, for example) and countries where the score increases (in the outstanding cases of Poland or Latvia).

Eurostat maintains that "overall, the EU has made progress on all aspects of poverty, although more needs to be done to achieve the poverty and social exclusion target of the Europe 2020 Strategy. As a result, progress is visible in the greater part of the indicators contained within this objective, except for 'poverty of the working population' and 'poverty after social transfers'" (2019: 37).

The rise in these indicators is one of the reasons that Sweden saw a worsening in synthetic index 1 from 2005 to 2019. While in 2005 the proportion of the population at risk of poverty after social transfers was at 9.5%, by 2019 it had climbed to 18.8%.

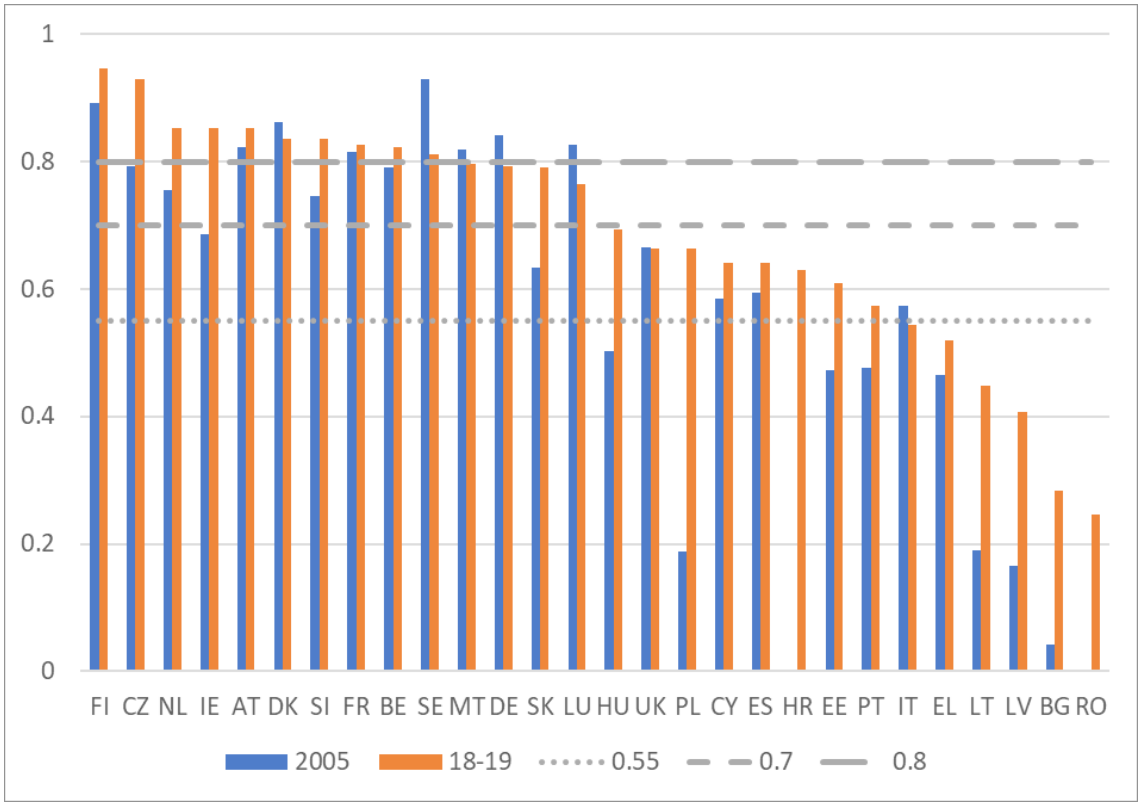
8 See Onrubia *et al*. (2022), Annex II, for more detailed information in this regard.

9 In Onrubia *et al*. (2022), Annex III, the main characteristics and results of each country are presented (a table with the partial synthetic indices for each objective, and a spider graph with the average synthetic indices based on the partial synthetic indices) along with the positions of each objective in the ranking of the 27 countries considered. Due to lack of space, we do not elaborate on the details of each case.

10 To prevent from the impact of missing values on indices estimates, we attributes to 2019 the maximum value of 2018 and 2019.

11 It should be recalled that the United Kingdom is no longer a Member State of the European Union. However, the UK has been taken into account in this analysis, given that it was still part of the EU during the period under analysis.

Figure 1. Comparison of SDG 1 (2005 and 2019)



AT=Austria, BE=Belgium, BG=Bulgaria, CY=Cyprus, CZ=Czechia, DE=Germany, DK=Denmark, EE=Estonia, EL=Greece, ES=Spain, FI=Finland, FR=France, HR=Croatia, HU=Hungary, IE=Ireland, IT=Italy, LT=Lithuania, LU=Luxembourg, LV=Latvia, MT=Malta, NL=Netherlands, PL=Poland, PT=Portugal, RO=Romania, SE=Sweden, SI=Slovenia, SK=Slovakia, UK=United kingdom.
Source: Authors' elaboration

In a striking case, Poland managed to reduce its population at risk of poverty or social exclusion from 45.3% in 2005 to 13% in 2019. The population living in severe material deprivation meanwhile decreased from 33.8% in 2005 to 4% in 2019.

Performance was good in this poverty-related goal, both by the individual countries and in general. The only countries with a low value for synthetic index 1 (below 0.55) in 2019 were Italy, Greece, Lithuania, Latvia, Bulgaria, and Romania. In fact, Eurostat (2021) considered this to be one of the targets where the European Union has made the most progress in recent years.

4.2. SDG 4: Quality education

This goal considers various indicators in order to measure the quality of education in the European Union: early dropouts from education and training, proportion of the population that has completed higher education, participation of adults in learning, and results of the PISA tests, among others.

Figure 2 shows how the synthetic index for SDG 4 changed from 2005 to 2019. The countries that obtained the best results here in 2019 were Sweden, Ireland, Luxembourg, and Netherlands. The worst performing countries in 2019 were Spain, Bulgaria, Italy and Romania.

Spain's position worsened in 2019 compared to 2005, this being the country with the highest early school-leaving rate (17.3% of youth), while its employment rates for recent graduates are among the lowest in the EU (64.6% of the population between ages 20 and 34). This impacts very negatively on the country's results in education.

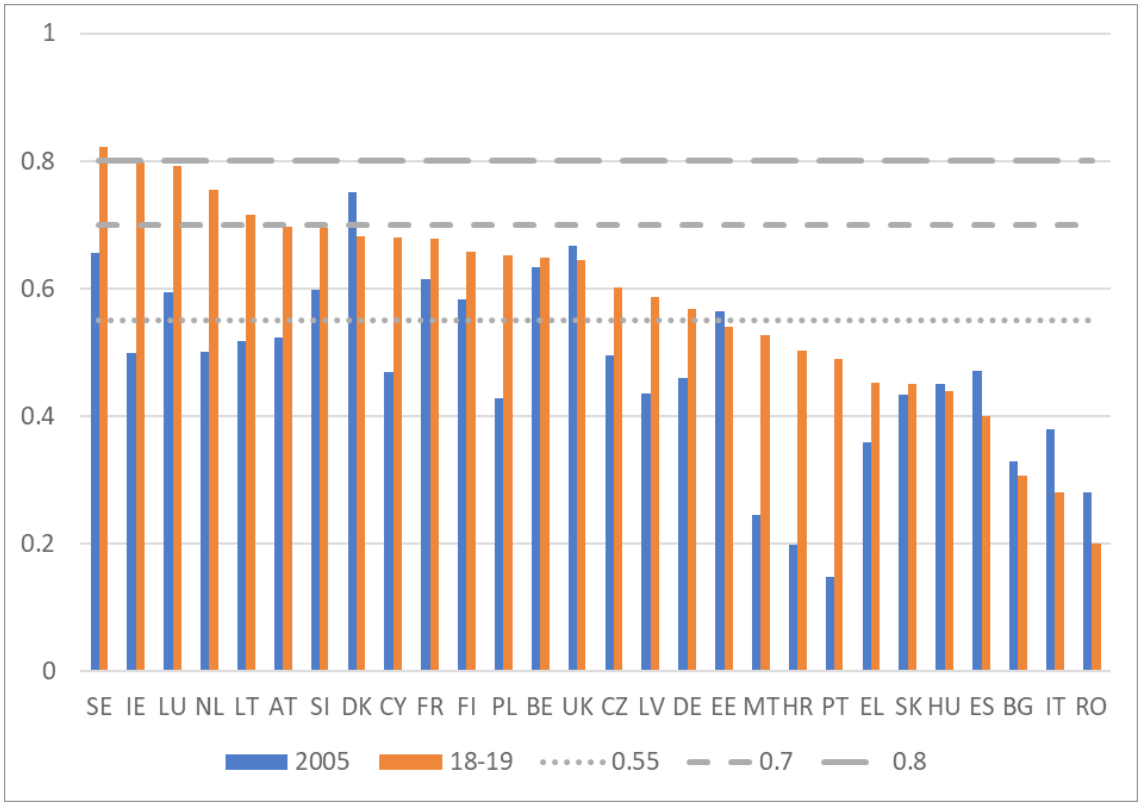
Eurostat (2021) affirms that in this goal, the EU has improved over recent years, but some indicators do not keep progressive pace with the rest, such as those measuring the participation of adults in learning or the results in PISA tests, which differ greatly from one country to another.

In general, good results have been achieved in this goal, with most of the synthetic indices scoring high and medium values. However, there are a number of countries where this index score is considered low: Spain, Hungary, Malta, Cyprus, Italy, Slovakia, Greece, Bulgaria, and Romania.

As mentioned above, Bulgaria and Romania diverge most markedly from the rest, because these are countries with significant populations opting out of education and training; together with Cyprus, they also obtain the worst results in the PISA tests, while proportions of the population completing higher studies is small (especially in Romania, at just 15.1% of those between 15 and 64 years of age). Moreover, the employment

rates for recent graduates are low, and less than 5% of the population between 25 and 64 years old participate in some learning activity. In addition, these results are worsened by multipurpose indicator 8.2 (the proportion of persons between 15 and 24 years of age who do not study, are not employed, and do not receive training), with rates above 15%.

Figure 2. Comparison of SDG 4 (2005 and 2019)



Source: Authors' elaboration
Note: See Figure 1 notes for EU countries acronyms.

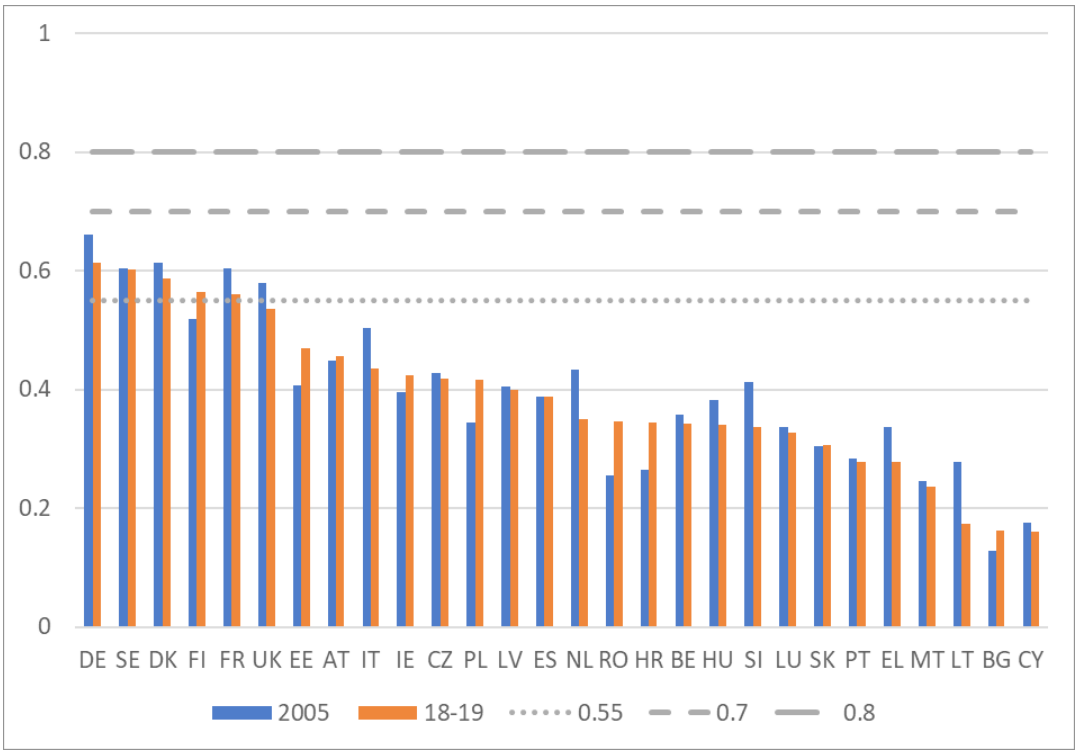
4.3. SDG 7: Affordable and clean energy

This goal includes indicators concerning modes of energy consumption and amounts consumed: both final and primary energy consumption, energy productivity, use of renewable energy, and energy dependence. Figure 3 presents the results from calculation of this index.

In 2019, Germany, Sweden and Denmark are scoring the best results. Accordingly, the worst results in the same period were for Cyprus, Bulgaria and Lithuania. Overall, a few sample of countries outcomes are above our "low" reference level (0.55), indicating the poor general performance in this dimension. Indeed, according to Eurostat (2021:163), "*Achieving the 2030 target, however, is likely to remain difficult. In energy supply, the use of renewable energies further increased with moderate progress towards the 2030 target, while a dependence on energy imports from outside the EU keeps rising*."

In summary, the EU still has much to do in the field of energy, the main priorities being to increase the share of renewable energy to the detriment of traditional energies, to reduce energy dependence on other countries, and to reduce energy consumption.

Figure 3. Comparison of SDG 7 (2005 and 2019)

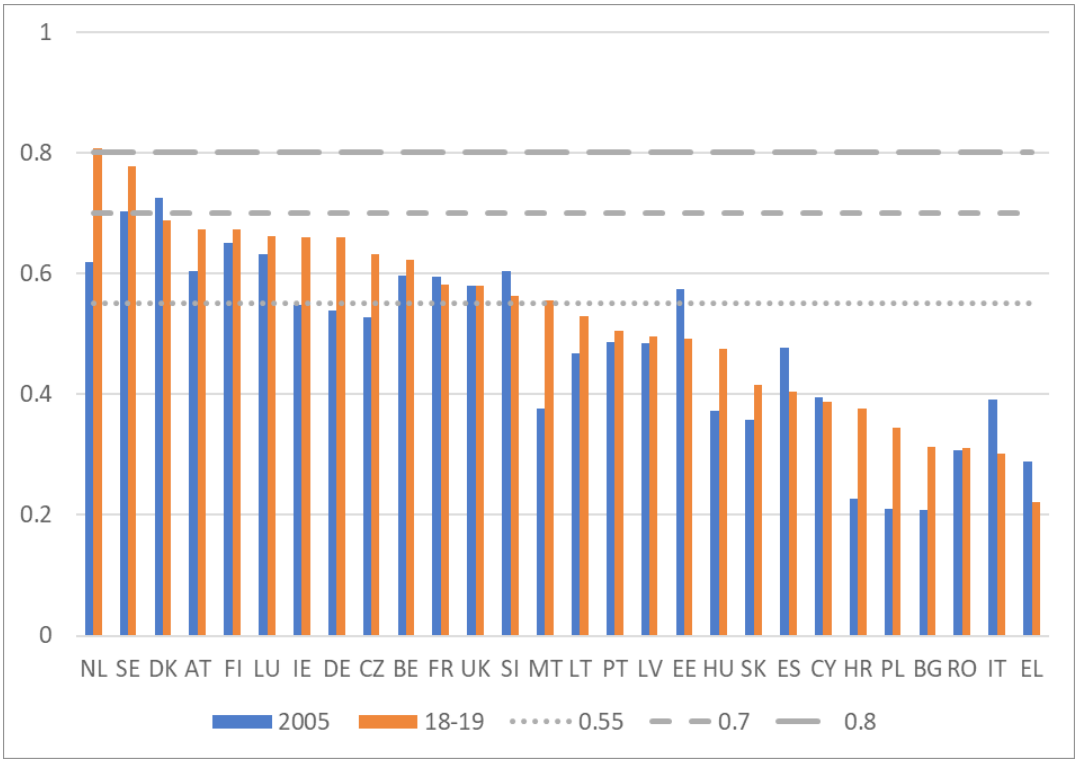


Source: Authors' elaboration
Note: See Figure 1 notes for EU countries acronyms.

4.4. SDG 8: Decent work and economic growth

Goal 8 includes indicators of economic growth (focused on GDP growth and investment) and employment (including the employment rate, the long-term employment rate, occupational accidents, the proportion of young people who do not study or work, and others).

Figure 4. Comparison of SDG 8 (2005 and 2019)



Source: Authors' elaboration
Note: See Figure 1 notes for EU countries acronyms.

In Figure 4, significant changes are shown from 2005 to 2019 in the synthetic index for SDG 8. The best results in 2019 were for Netherlands, Sweden, Denmark, Austria and Finland. The worst results in 2019 were for Bulgaria, Romania, Italy, and Greece.

We now turn to analysis of why Spain is among those countries with a "low" performance in this objective. In the first place, Spain has a large proportion of so-called '*ninis*' (youths who neither study nor work) – 16.4% of the population between ages 15 and 29. Secondly, Spain's employment rate (64.6%) remains low compared to most EU countries, and its long-term unemployment, at 10.9% of the total workforce, is among the highest (below only that of Greece). To this must be added the negative effects of multipurpose indicators 1.41 (the rate of the working population at risk of poverty) and 5.4 (the proportion of the population unemployed due to care responsibilities), at 12.9% and 26%, respectively. Both Greece and Spain have seen very negative impacts on their employment sectors since the economic crisis that began in 2009.

Eurostat states that "*the EU has managed to make progress in terms of sustainable economic growth in recent years, and while the general situation in the employment market and working conditions have also improved, the gender gap in the labor market and the economic security of the working population continue to be problems*" (2019: 167).

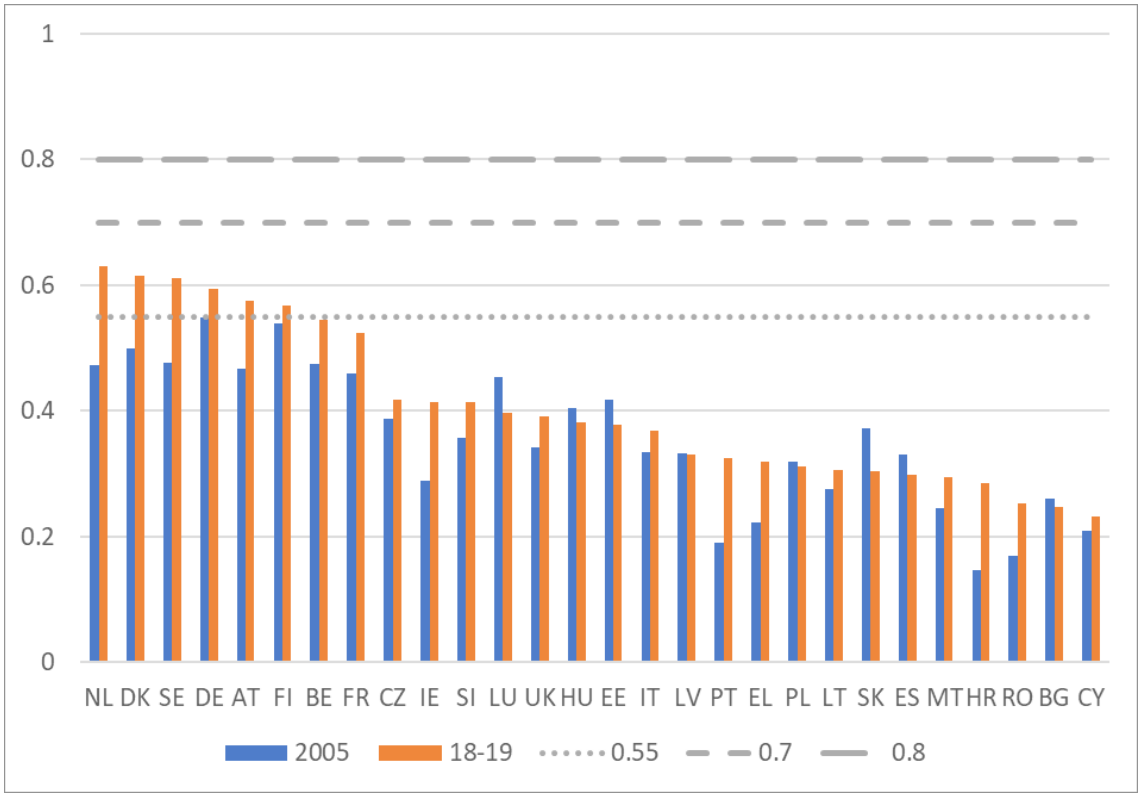
Figure 4 also reflects how most countries improved their index scores in 2019, especially Poland and Malta. These two countries with low rates in 2005 significantly increased their employment rate over the period and reduced the number of young persons who neither study nor work (these being the most significant changes).

According to Eurostat (2021: 11), goal 8 is among those that have experienced the most progress in recent years in the EU. Still, in 2019 nearly a half of the countries presented a low synthetic index score.

4.5. SDG 9: Industry, innovation, and infrastructure

This goal includes indicators concerning R&D and innovation (on employment and GDP) as well as indicators related to infrastructures (proportion of passengers traveling by bus and train, participation of rail and waterway activity in relation to total transport). Figure 5 presents the synthetic index scores for goal 9 in the years 2005 and 2019.

Figure 5. Comparison of SDG 9 (2005 and 2019)



Source: Authors' elaboration
Note: See Figure 1 notes for EU countries acronyms.

The countries that achieved the highest values in the synthetic index for SDG 9 in 2019 were Netherlands, Denmark, Sweden, Germany and Austria, whereas the worst performing countries were Bulgaria, Romania, and Cyprus.

As illustrated, the synthetic indicators in this goal do not range very high (the highest being Sweden, with 0.63 in 2019). According to Eurostat (2021: 200), European Commission will urge for the collaboration between Member States, industry representatives and other relevant stakeholders. Specifically, the first steps are focused on low carbon energy-intensive industries and on circular industries in order to face the radical transformation needed to reach the 2030 targets.

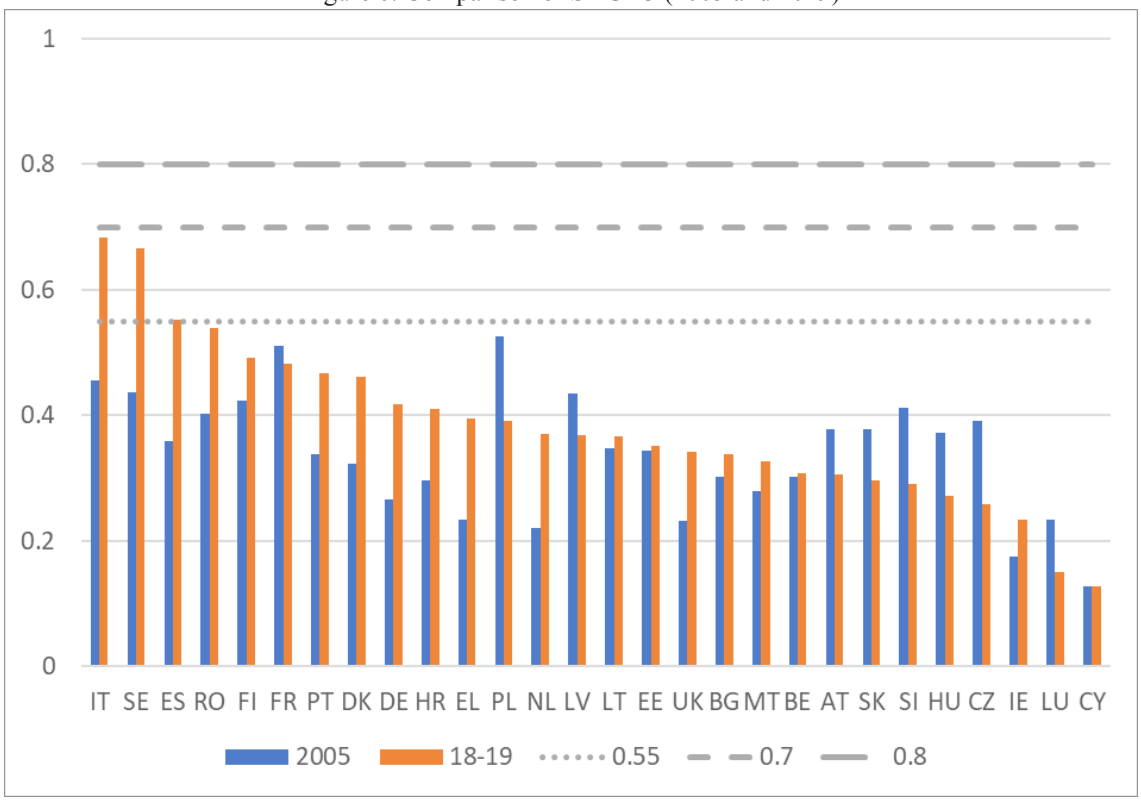
As shown in the graph, there was no convergence among the different countries in 2019, but significant differences did exist between them in most cases, and most of them (20) scored low synthetic indices. It is therefore deemed urgent that the EU take measures to improve these results in order to meet this goal in 2030.

4.6. SDG 13: Climate action

This index measures the mobilization of countries around the fight against climate change, including indicators on greenhouse gas emissions, the intensity of gas emissions, and the participation (in millions of euros) in this commitment under the UNFCCC. Figure 6 depicts changes in this index from 2005 to 2019.

In 2019, Italy, Sweden, Spain, Romania, Finland and France topped the list. On the contrary, the worst results in 2019 were for Cyprus, Luxembourg, Ireland and Czech Republic.

Figure 6. Comparison of SDG 13 (2005 and 2019)



Source: Authors' elaboration
Note: See Figure 1 notes for EU countries acronyms.

It is striking here that Luxembourg, with the highest per capita income in the EU, obtains the worst result in this synthetic index. This is due to large amounts of greenhouse emissions (20 tonnes per capita, the highest of all EU countries), a low proportion of renewable energy in total final energy consumption (7.05%), high CO_2 emissions from new vehicles (127 grams per km), and low participation in the UNFCCC commitment (40.43 million euros, compared to 529.06 million euros from Spain).

Progress toward this objective is not very clear, since greenhouse gas emissions have not decreased significantly, the use of renewable energies remains very low, and the Earth's temperature and ocean acidification have increased (Eurostat, 2019: 255).

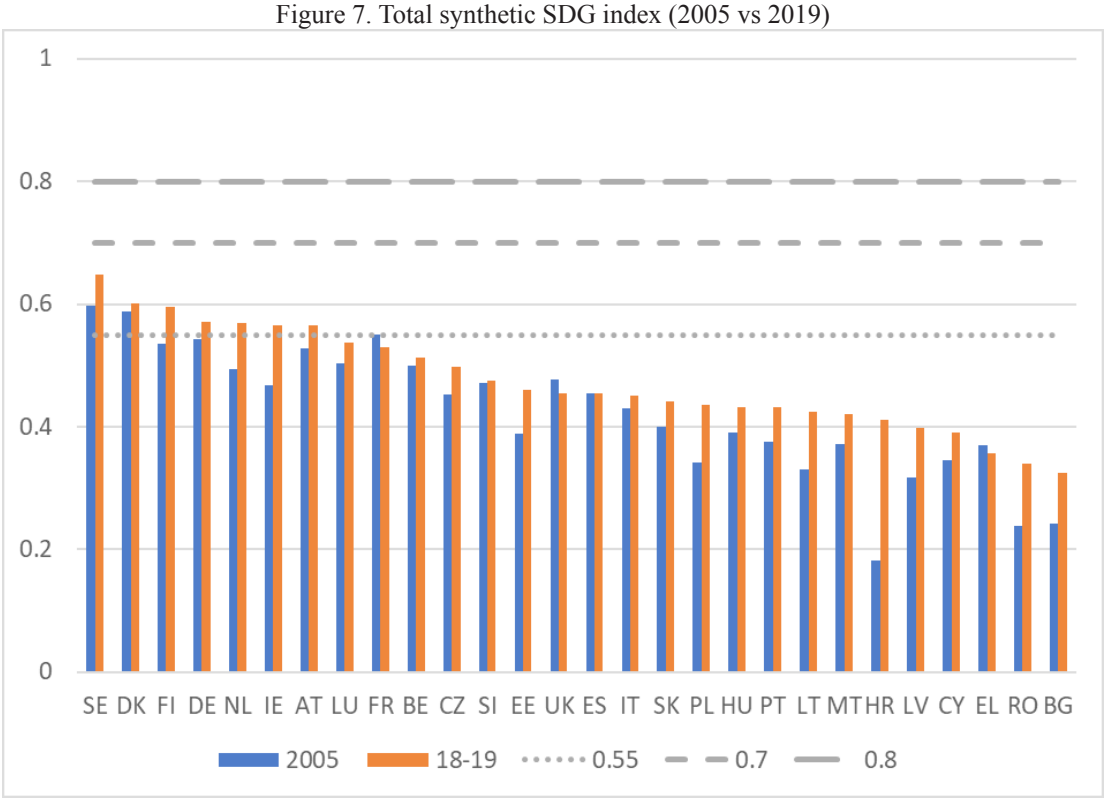
In conclusion, most countries here obtained a low synthetic index in 2019, demonstrating the clear necessity of raising awareness and taking urgent measures to combat climate change in Europe.

5. Total synthetic index

In this section we analyze the results obtained by calculating the total synthetic indices (under the methodology explained above) for the countries of the European Union.

Figure 7 compares the total synthetic index scores of the European Union countries in 2005 and 2019.[12]

Figure 7. Total synthetic SDG index (2005 vs 2019)



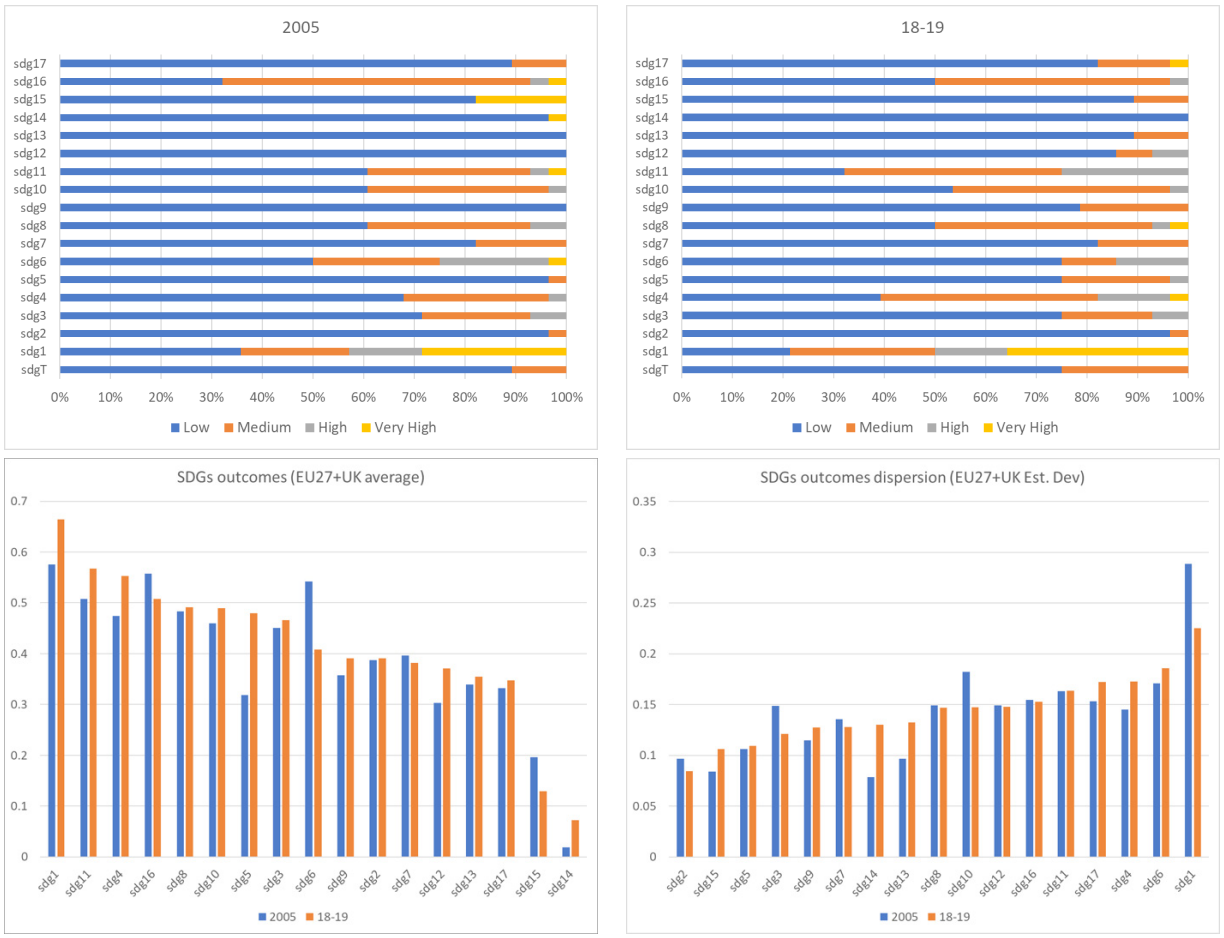
Source: Authors' elaboration
Note: See Figure 1 notes for EU countries acronyms.

The top-scoring countries in both years were Sweden, Denmark, Finland, Germany, and the Netherlands. These countries also performed best in the partial synthetic indices. Sweden obtains the best position due to achievements in all the goals, making it the EU country most committed to the 2030 Agenda. In the same vein, Denmark follows with a very high synthetic index in both years. Other countries that follow with a 'medium' synthetic index score are Finland, Germany, the Netherlands, Ireland and Austria. Another group of countries share similar total synthetic index values in 2019 (very close at 'medium' levels): France, Belgium, and the Czech Republic. Moreover, this segment of countries differs little from the 2005 grouping. Rearrangements to the rankings occurred in this group after 2005, although Bulgaria obtained the worst scores in almost every year compared. Poland and Croatia is among the countries that improved the most between 2005 and 2019, while France, Greece, and the United Kingdom all worsened their results.

Grouping country-specific results for every SDGs (Figure 8) we could compute aggregate statistics to get an overview about the current achievement of the 2030 agenda. In this regard, at top panels, we first classify country-specific outcomes as indicated in Table 2 for 2005 and 2019. In addition, we include average and standard deviation estimates at bottom panels (on left– and right-hand sides, respectively). In view of this Figure, the policy implications may not be so positive as the achievements are still "low" for most of the countries and SDGs. Furthermore, it seems that convergence did not occur among the countries of the European Union during this period – indeed, quite the opposite is true, with great differences persisting the differences in the results of certain partial synthetic indices scores.

[12] In Onrubia *et al*. (2022), Annex IV, tables of the synthetic index figures for the years 2005, 2009, 2013, and 2017 can be consulted, along with graphs for the years 2009 and 2013.

Figure 8. Country-specific SDGs outcomes distribution



Source: Authors' elaboration

Within the European Union, we consider groups of countries (clusters) with similar idiosyncratic characteristics (see Table 3). For each group of countries, we have computed the partial average synthetic index for each goal

Table 3. Classification of EU countries according to idiosyncratic characteristics

Group	Countries
Mediterranean	Spain, Portugal, Italy, Malta, Cyprus, Greece
Central European	France, Germany, Belgium, Netherlands, Austria, Czech Republic, Luxembourg
Nordic	Denmark, Sweden, Finland
Baltic	Lithuania, Latvia, Estonia
Eastern European	Poland, Croatia, Hungary, Slovakia, Slovenia, Bulgaria, Romania
Anglo-saxons	UK and Ireland

Source: Authors' elaboration

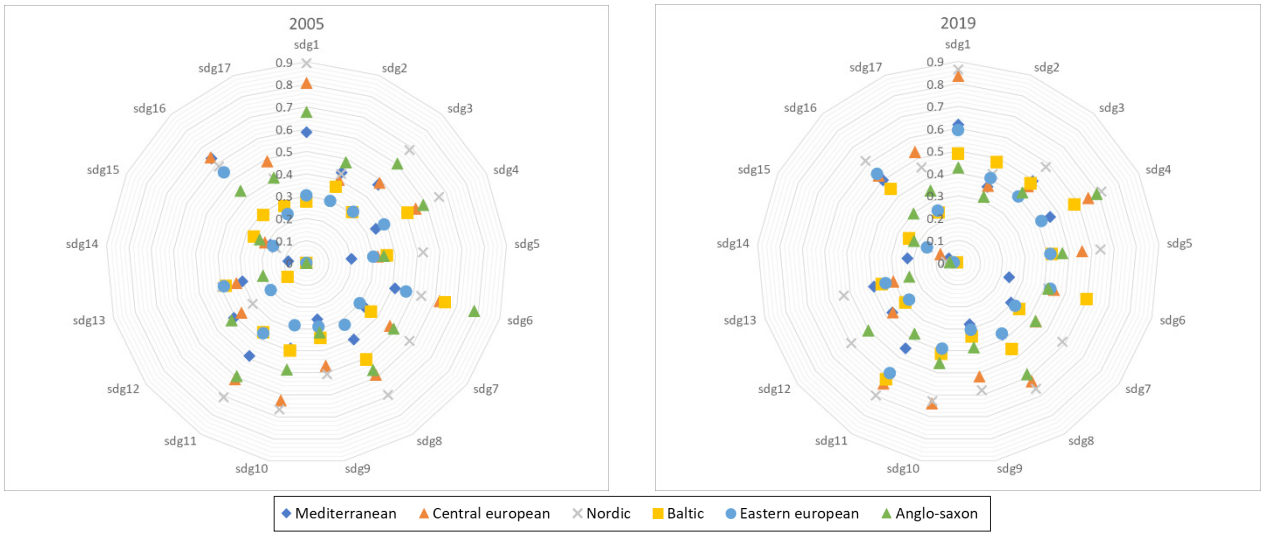
Thus, Figure 9 show the temporal evolution of the general performance in each SDG for the groups configured (for the years 2005 and 2019). The main conclusion is that the Nordic countries have been front-runners in all the objectives for all the years shown. Their partial synthetic indices hardly vary throughout the period, ranking this group first and differentiating it from the others. The images show a very important difference with respect to the Mediterranean, Baltic, and Eastern countries, with values closer to the center of the graphs. On the other hand, the Nordic and Central European countries show continuous predominance in most of the SDGs, these being by far the groups that best demonstrate their commitment to the 2030 Agenda.

In general, the Mediterranean and Eastern European countries as well as the Baltics are seen to lag behind in important aspects such as innovation and industry (goal 9) and income inequalities (goal 10), meanwhile achieving unremarkable results in other targets, with the exception of health (goal 3) and energy (goal 7),

where figures similar to and sometimes higher than those of their European peers. Indeed, in the case of energy, their scores prevail.

From a different perspective, obtaining a greater convergence in performance toward meeting the SDGs would be one way to achieve greater cohesion among the countries of the European Union, which remains a pending issue. Therefore, this criterion can be considered useful to the European Union, helping to direct EU aid to the countries that are furthest behind in achieving the goals established by the European Commission. This can be observed combining Figures 8 and 9 so that we can group those SDGs where convergence among the group of countries is greater. In particular, this is the case for goal 2 (hunger), goal 15 (life on land), goal 5 (gender equality), goal 3 (health and well-being) and goal 9 (innovation). On the other hand, the remaining objectives show a greater degree of divergence between the different countries, apparently making it difficult for certain countries to improve their performance. Specifically, this is the case for goal 1 (poverty), goal 6 (clean water) and goal 4 (education).

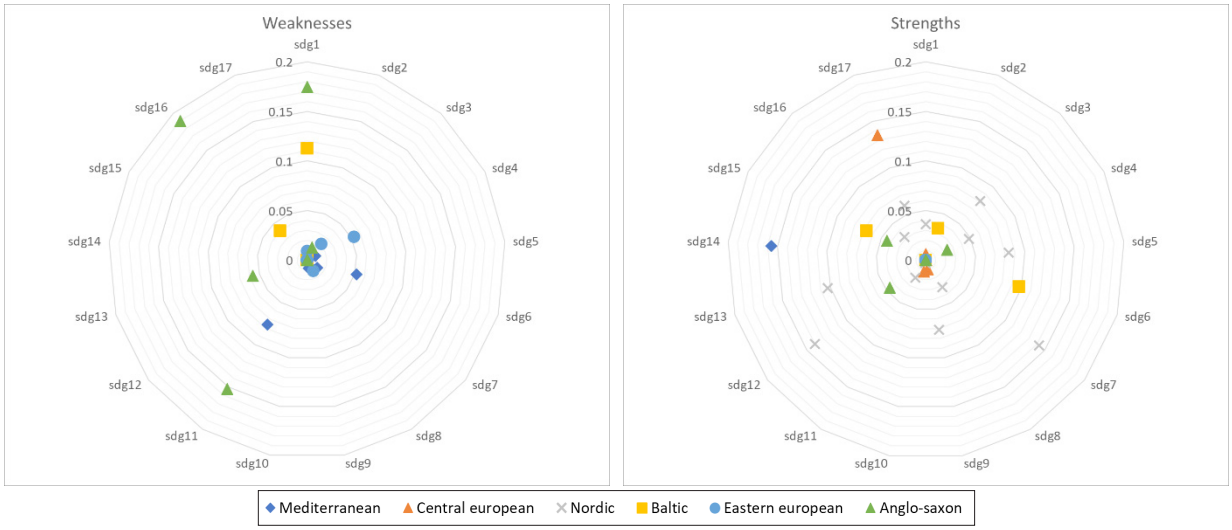
Figure 9. Partial synthetic SDG indexes' relative performance. Groups of countries



Source: Authors' elaboration

Finally, considering Group of countries introduced in Table 3 also allows to identify the strengths and weaknesses of each one, as expressed in Figure 10. For the sake of concreteness, we will adopt as criteria to include a SDG as weakness (strength) if SDG partial synthetic index estimate is below (above) the Q1 (Q3) percentile of the whole distribution of country-specific outcomes. The main conclusion is that Anglo-saxon and Eastern European countries are those more present in the left-hand panel (the one related to weaknesses), where Nordic and Central European countries present strengths in a greater number of SDGs. Moreover, Mediterranean and Baltic present mix evidence as they combine some partial indices with weaknesses and others with strengths.

Figure 10. Strengths and weaknesses relevant to achieving the SDGs for Groups of countries



Source: Authors' elaboration
Notes: "Weaknesses" are identified if SDG outcome states below Q1, whereas "Strengths" are identified when the Group is above Q3.

6. Concluding remarks

In 2015, the UN approved the 2030 Agenda for sustainable development, a global project that commits all countries to meet a series of goals and targets related to various matters of urgent relevance. Seeking to apply these UN goals to the European Union in a precise way, Eurostat established a series of indicators that its Member States must observe to fulfill the 2030 Agenda. These objectives are measured through indicators that reflect the situation for each country in each of the areas that make up the 2030 Agenda: poverty indicators, health and hunger indicators, employment indicators, climate action indicators, and many others.

In the present paper, synthetic indices have been constructed in order to measure and give an approximate idea of the compared performance of the countries toward each SDG, along with a total synthetic index to provide a more general view. The synthetic indices produced seek to assess the situation in each country, permitting us to highlight strengths and weaknesses within each dimension. This further allows for comparison between countries in terms of convergence or divergence with respect to progress toward the stated goals.

This analysis has yielded specific information on each country within the European Union, where divergences are found between countries with a higher GDP per capita (Sweden, Denmark, Finland, the Netherlands, Austria, etc.) and those in eastern and southern Europe (Bulgaria, Romania, Greece, Cyprus, Hungary, Italy, and Spain, among others). The most notable divergences are in terms of income inequality (goal 10), gender equality (goal 5), education (goal 4), alliances to achieve goals (goal 17), peace, justice and institutions (goal 16), responsible consumption and production (goal 12), and industry, innovation and infrastructures (goal 9). Nevertheless, in certain objectives the latter group of countries are found to have shown better performance, particularly in land ecosystems (goal 15) and in energy (goal 7) due to lower consumption, lower dependence, and greater general use of renewables. The most optimistic results are found in objectives related to poverty (goal 1), hunger (goal 2), health (goal 3), and employment (goal 8), where the highest synthetic index scores are observed and where greater convergence is noted among the members of the European Union.

Looking ahead, in order to comply with the provisions of the 2030 Agenda, it is necessary to work on those goals showing clear deficiency in the results here presented. We have obtained clear evidence of divergent outcomes between most of the countries of the European Union. In view of these results, the EU should consider and focus its aid upon those countries that are lagging and that offer stronger resistance to improvements in basic aspects such as education, health, or inequalities.

We underscore the need for improvements to the availability of many Eurostat indicators in both temporal and geographic terms. These gaps in data may have at times limited the calculation of synthetic indices, causing the exclusion due to lack of data coverage.

Finally, we propose as a subject of study in future work an analysis of the differences between those countries of the European Union obtaining the highest total synthetic indices and those with the lowest synthetic indices. This would amount to a study of the inherent characteristics of each country: the quality of its institutions; the main policies in social, economic, and political matters; and relevant historical antecedents. In short, such analysis would seek to cover anything that might help explain the results expressed in each synthetic index for each corresponding country, as well as the reasons behind any differences. For our point of view, this is one important research question which should be further studied in future analyses.

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