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**Implications of Covid-19 policies on the sustainable corporate practices of European firms**

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# Implications of Covid-19 policies on the sustainable corporate practices of European firms

## Abstract

*Purpose:* This study aims to analyze how mixes of Covid-19 policy responses are shaping the context in which companies will compete in the following years, defining how the crisis might impact firms' ability to keep their commitments to sustainable practices.

*Design/methodology/approach:* European country-performance data for the years 2019 and 2020 were grouped into indicators of macro sustainability, then cross-analyzed against the policies adopted during the period (also grouped based on their impacts on sustainability pillars), using correlations, factor analysis, and clustering.

*Findings:* The influence of traditional sustainability determinants was reframed according to the novel context shaped by the policy responses to the pandemic crisis. The social and digitalization aspects gained the most relevance and appeared interconnected, with digitalization of employment attaining overall more traction. Moreover, changes in the leadership within sustainability domains were observed for each identified country-cluster, due to newly implemented emergency policies. In fact, environmental innovation, digitalization, and social support policies appeared to be the main variables to be impacted by the intensity of the policy efforts.

*Originality:* This paper provides a cross-analysis of quantitative macroeconomic and quantified policy responses to the 2020 pandemic crisis, linking each indicator to the pillars of sustainability that were relevant for companies between the crucial pandemic outbreak years 2019 and 2020.

*Practical implications:* Businesses monitoring the developments of sustainability policies closely, will observe novel trends in technological applications. *Social implications:* Policymakers and researchers may gauge the efficacy of policies against the Covid-19 crisis in the domain of sustainable development and resilience.

**Keywords:** CSR, covid-19, policies, Europe, sustainability management

## 1. Introduction

The outbreak of the global Covid-19 pandemic had consequences on all the sustainability pillars (Hörisch, 2021), starting from the realization of the global aim of an economic growth that is sustained, and supported by innovation and diversification for higher productivity levels (Anholon *et al.*, 2021). Environmentally-speaking, the main cities experienced a dramatic improvement in air quality owing to lockdowns, also generating, however, higher amounts of waste (Bhat *et al.*, 2021; British Academy, 2021). In the social domain, labor productivity suffered greatly (Brüssow and Timmis, 2021), with the decrease in global employment reaching unprecedented historical levels in 2020: 114 million jobs lost, resulting in a reduction of 8.8% in global working hours – four times more than during the global financial crisis in 2009 – and of 8.3% in labor income (ILO, 2021). Lockdowns additionally caused companies to massively introduce teleworking as an exceptional but standard social measure for maintaining business continuity, and at the same time preventing the spread of the virus through safer working conditions (Asante-Antwi, 2020; Belzunegui-Eraso and Erro-Garcés, 2020; Tripi and Mattei, 2020). This extensive application challenged firms to reorganize their business activities around remote working, prioritizing workplace wellbeing – e.g.

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3 employee's right to rest – and safety – e.g. physical and digital security (Belzunegui-Eraso and Erro-Garcés,  
4 2020).  
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6 Moreover, the consequences of the Covid-19 emergency have put the operational capacity and efficiency of  
7 the public sector to the test, prompting various corporate actors to replace certain public support systems  
8 with their Corporate Sustainability and Responsibility (CSR) initiatives (Bapuji *et al.*, 2020; Santos Jaén *et al.*,  
9 2020). In these circumstances, businesses became the “social institutions” co-accountable for societal needs  
10 amid the pandemic, and thus also legitimized by governments, as they provided support in the form of  
11 donations, food supplies, protective equipment, and public areas disinfections (Abbas *et al.*, 2020; Asante-  
12 Antwi, 2020). In the post-pandemic scenario, CSR is presumed to develop even further, due to the public  
13 expectations for leading brands to contribute to recovery (He and Harris, 2020). In fact, socially responsible  
14 actions have become key reputation factors (Xifra, 2020, p. 19), and firms exhibiting social solidarity will more  
15 likely be rewarded in terms of corporate image, profits and employee commitment during more uncertain  
16 times (Santos Jaén *et al.*, 2020). Nevertheless, not all businesses managed to support society under the  
17 straining pandemic conditions. The focus of smaller firms shifted to short-term survival, at the expense of  
18 long-term CSR investments, with environmental priorities suffering the most. Conversely, social issues – e.g.  
19 employee wellbeing – became the main CSR priority for public sector organizations, which mostly intervened  
20 to relieve financial pressure from smaller and less sustainability-experienced companies, thus encouraging  
21 them to continue their CSR activities (Barreiro-Gen *et al.*, 2020; He and Harris, 2020).  
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26 Several containment and emergency measures were implemented, touching indirectly upon each of the  
27 sustainability domains (Battistini and Stoevsky, 2021; Brodeur *et al.*, 2021, p. 19) and providing a potential  
28 opportunity to respond to specific Covid-19 challenges in the short-run, while making the global community  
29 – where businesses carry part of their operations – more sustainable overall (WHO, 2020). In fact, public  
30 authorities seem to play a key role in a company's ability to maintain its sustainability commitment,  
31 particularly during times of crises such as the one caused by the Covid-19 outbreak. Therefore, the goal of  
32 this paper is to explore whether the short-term policy measures implemented to contrast the pandemic were  
33 effective in changing the corporate sustainability context in which companies operate, helping them to  
34 further pursue their CSR activities.  
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37 The following section presents the conceptual background that supported the choice of the variables to be  
38 analyzed, namely policy measures adopted for the CSR context and macroeconomic metrics that have an  
39 impact on sustainability topics.  
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## 44 **2. Theoretical background**

45 This paper attempts to build on the work of Severo *et al.* (2021) and Winarsih *et al.* (2021), who have both  
46 discussed the impact of Covid-19 on sustainability, respectively of producers-consumers and SMEs.  
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49 Our work, however, further expands the theoretical frameworks described in the above-mentioned papers  
50 by introducing novel elements related to Covid-19 response policies, as well as a more comprehensive set of  
51 macro-sustainability variables, and using a set of methods and methodological tools that are more  
52 appropriate for enhancing the synergy of the analysis.  
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### 55 **2.1 Governmental policy levers for engaging in CSR**

56 CSR gathers a set of organizational practices that account for the socio-economic and environmental impacts  
57 of an enterprise and refer to principles of ethical and sustainable core business operations, stronger local  
58 communities, and engagement in private-public discussions (Nelson, 2008). Governmental interventions can,  
59 in fact, help develop collaborative efforts among the above three levels (corporate, civil society, public),  
60 accelerating the development of sustainable innovations, along with companies' active contribution to

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3 sustainable development, expertise sharing, and legitimization (Almatrooshi *et al.*, 2018; Scherer and  
4 Voegtlin, 2020).  
5

6 Policies for CSR represent the main mechanisms for achieving the above goals. Besides the rare cases of  
7 mandatory “hard” CSR regulations to control for negative global externalities (Halkos and Nomikos, 2021),  
8 “softer” actions – featuring no sanction or compulsoriness – are more frequently adopted in this domain to  
9 encourage the adoption of sustainable business practices (Vallentin, 2015). Literature has also classified CSR  
10 measures by type: they can be funding to encourage investment (awards, grants, subsidies, tax incentives,  
11 export credits), informational tools (guidelines, best practices, training), but also binding standards (e.g.  
12 allowed emission rates), bans (e.g. use of hazardous substances) and quotas (partial bans, e.g. tree logging),  
13 taxes (e.g. carbon tax) and fines to regulate harmful conduct (Ascoli and Benzaken, 2009; Holcomb *et al.*,  
14 2012; Midttun *et al.*, 2015). Researchers have additionally grouped CSR policies according to their functions:  
15 mandating (taxes, bans, etc.) to enhance CSR’s reliability, setting a strategic vision, raising awareness on  
16 sustainability challenges, develop leadership by example (e.g. public procurement), publicly endorsing the  
17 most sustainable firms, creating a dialogue among stakeholders, and empowering companies by boosting  
18 the innovative capacity for advancing sustainable development (Almatrooshi *et al.*, 2018; Bell and Grinstein,  
19 2002; Škare and Golja, 2014).  
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23 Geographically, European countries are considered leaders in implementing innovative policy actions that  
24 promote CSR (Holcomb *et al.*, 2012) and have historically operated through five distinct “soft” models. The  
25 (1) “partnership” or Nordic model (Sweden, Denmark, Finland, with the addition of the Netherlands), fosters  
26 co-responsibility for social welfare and environmental management through public-private-social  
27 organizations. In the (2) “business in the community” or Anglo-Saxon model (UK, Ireland, USA) the public  
28 sector provides incentives for the development of community activities (employment, social inclusion, etc.).  
29 The companies operating in the (3) “sustainability and citizenship” or Continental model (Germany, Austria,  
30 France, Belgium, Luxembourg) are social agents initiating corporate citizenship activities (tax compliance,  
31 operational transparency, etc.), with governments only functioning as motivators. The (4) “Agora” or  
32 Mediterranean model (e.g. Italy, Spain, Portugal, Greece) is quite recent and revolves around finding an  
33 agreement on governmental CSR solutions through the institution of commissions or working groups, where  
34 SMEs represent the major stakeholders (Albareda *et al.*, 2006). Lastly, the Transitional model – Central-  
35 Eastern Europe (CEE) – represents the lowest engagement and social expenditures in CSR after the  
36 Mediterranean Region – with Poland, Slovenia and Hungary being an exception (Steurer *et al.*, 2012).  
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## 43 *2.2 Connecting macroeconomic parameters to sustainability pillars*

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45 There seems to be no direct computational method for measuring the overall sustainability impact of a  
46 country or industry (Munda, 2005), however literature provides some insights on the individual sustainability  
47 components’ metrics. For instance, productivity growth represents a good proxy of economic development  
48 (DCED, 2021; Rodríguez, 2010), followed by sales (consumption) and Research and Development (R&D) (Bae  
49 and Smardon, 2011). Indeed, according to the Sustainable Development Goals (SDGs), consumption and  
50 production are even susceptible to following more sustainable models (UN, 2021a) if supported by policies  
51 for nurturing technological innovation and employment, especially in Small-Medium Enterprises (SMEs) –  
52 and the Gross Domestic Product (GDP) (UN, 2021b).  
53  
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55 Social responsibility is attainable through decent working conditions – e.g. shifts, salaries (Gallagher *et al.*,  
56 2018) – and managerial support stimulating employee engagement and performance in CSR activities (Kim  
57 and Kim, 2021). In policy terms this can be translated to social, fiscal and wage policies stimulating higher  
58 employment and pay rates (UN, 2021c), also considering gender equality (UN, 2021d). Social interventions  
59 are also concerned with local communities’ development – donations, education, etc. – and sustainable  
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3 solutions for consumers' acceptance, which can be monitored through sales (retail trade) too (Arli and  
4 Tjiptono, 2018; UN Global Compact, 2021).  
5

6 As for the environmental pillar, improving urban air quality (UN, 2021e) on one hand, and driving  
7 governmental intervention through climate change policies (UN, 2021f) on the other are currently among  
8 the top priorities, with carbon emissions in million tons of CO<sub>2</sub> (MtCO<sub>2</sub>e) representing the most notable  
9 policy indicator (Boussemart *et al.*, 2020; Cook *et al.*, 2017).  
10

11 In addition to the classic sustainability pillars, literature also discusses three extended components that can  
12 strongly influence the former ones. Digitalization, on one hand enables eco-efficiency through real-time  
13 responsiveness to Information and Communication Technologies (ICT) emergencies (Balogun *et al.*, 2020).  
14 On the other, however, it risks intensifying emissions, energy use and hardware waste generation, together  
15 with disparities in digital knowledge of developing nations (Chen *et al.*, 2020; Miroshnik *et al.*, 2021).  
16

17 International trade can potentially result in growing CSR expertise globally and domestic sustainability  
18 performances (Kim *et al.*, 2019). To avoid degeneration of natural resources, exporting organizations are,  
19 therefore, pressured by importers to adopt cleaner production processes (OECD, 2021). In this area, Foreign  
20 Direct Investment (FDI) represent a reliable indicator that is closely connected to (positive or negative)  
21 emissions and income inequalities (Doytch and Uctum, 2016; Mukhtarov *et al.*, 2021; Xu *et al.*, 2021), with  
22 SDGs being particularly interested in financial, technological, and know-how flows through FDI, especially in  
23 less developed economies (UN, 2021c).  
24

25 And finally, corporate sustainability has the power to determine the general public's perception of a company,  
26 thus defining the success of its business (Echeverry Botero, 2015). Due to the public exposure of the scoring,  
27 creditworthiness can be considered a reputational factor, since firms with good CSR performance are usually  
28 at the top of the credit ratings (e.g. S&P) (Jiraporn *et al.*, 2014), especially if closely engaged with social  
29 stakeholders (e.g. employees and communities) (Attig *et al.*, 2013). The creation of metrics for financial  
30 soundness are the SDG targets that pertain most closely to this theme (UN, 2021c).  
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### 37 **3. Methods**

38 This paper seeks to analyze the macro country-level changes in sustainable development that occurred  
39 during the pandemic outbreak (2019-2020), providing insights into how they would have affected the micro  
40 CSR commitments of businesses.  
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42 We focus on the effectiveness of policy mixes – implemented in response to the Covid-19 crisis – in  
43 supporting corporate sustainability operationg under the specific national circumstances created during the  
44 2020 pandemic in Europe. To this end, empirical literature on sustainability variables and the SDGs was first  
45 consulted to map the status quo of existing indicators for measuring the pillars of sustainability. This resulted  
46 in the identification of a set of macroeconomic variables and policy levers that could be regrouped in the  
47 defined sustainability pillar (traditional and extended) groups below. Table I gathers all such identified data  
48 points, according to this classification.  
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- 52 • Traditional sustainability pillars
    - 53 ○ Economic sustainability production, consumption/sales
    - 54 ○ Social sustainability labor (unemployment, female unemployment, wages),  
55 consumption/sales
    - 56 ○ Environmental sustainability emissions (CO<sub>2</sub>)
  - 57 • Extended sustainability pillars
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- Digitalization employment and job offers in ICT, software purchase
- Cross-border relevance imports, exports, income on inward and outwards FDI flows
- Reputational context in financial market credit rating

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TABLE I HERE  
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Leveraging on the variables mapped, we used several databases and sources to extract data on the macroeconomic and policy variables.

The Organization for Economic Cooperation and Development (OECD) datasets were used to retrieve economic, social, digitalization and international trade data, Standard & Poor's indices were used for credit ratings, and Enerdata (2019) and Nature (2020) values helped retrace information on emissions. Due to the lack of availability of more recent data on emissions, the analysis only focused on the pandemic outbreak years (2019-2020), leaving the evaluation of subsequent periods to future research. Raw values were converted to relative values (increase/decrease % from the previous period) to allow for cross-country comparability.

Policy tracking instruments (OECD, IMF, ILO, Carbonbrief) supported the identification of policy actions. The databases were scanned manually or through keyword searches ("green", "environmental"), and the number of occurrences were noted for each policy type, based on sustainability domains (financial/economic, social, environmental intervention). Only the newly-introduced (or updated) policy measures specifically undertaken to counter the socio-economic crisis caused by the Covid-19 pandemic were considered. This allowed to better define the CSR context stemming from Covid-19 "CSR" policies. The Climate Change Performance Index (CCPI), measuring various aspects of a country's climate performance (CCPI, 2021), was also included as a proxy of environmental policies – to account for the risk of not retrieving all existing policies, given that the search was manual and the qualitative nature of policy information before the conversion. The selected policies can be classified as the mandating mechanisms (with a prevailing financial nature) described in the literature section. Figure 1 maps the typology details and regional frequency of adoption for each identified policy, divided into the three traditional pillars of sustainability.

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FIGURE 1 HERE  
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As for the nations under analysis, section 2.1 helped to identify the macro-regions. Subsequently, the following set of criteria for selecting sample countries was determined: (i) location in the European territory, and (ii) data availability and completeness. This led to exclude Bulgaria, Croatia, Cyprus and Malta due to a lack of complete data, which could have biased the overall results. On the other hand, despite not being part of the EU in 2020, Norway and the UK were included, given the high affiliation with other countries from the sample. A total of 24 nations was selected, all part of the OECD. Table II assigns a "regional" label to each selected country, as per CSR territorial models found in literature and their geographic proximity.

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TABLE II HERE

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From the methods point of view, a quantitative approach was used with the support of statistical tools like R and Excel. R yields several advantages compared to similar statistical software (SPSS, SAS, Minitab, etc.), including the provision of a programming language rather than a simple statistics package, allowing a broader depth of analysis (and visualization) of datasets for various research applications. Given its compatibility with the major operating systems, adaptability, and open source nature, R is nowadays widely adopted by scientists globally, who continuously contribute to update add-ons that improve the software's efficiency (Dobre *et al.*, 2013; Fernández Lizana, 2020; Thomas, 2015). As for Excel, it is a popular, well-suited supporting tool for other statistical instruments to properly and swiftly handle data with more variables, and accessibly represent them through simpler statistical techniques like correlation (Khanijahani, 2020; Slezák *et al.*, 2014).

First, descriptive statistics and correlations between macro and policy variables were examined for each analyzed period to pinpoint any difference in direction of the variables influencing sustainability after the Covid-19 outbreak. Then, factor and cluster analysis were adopted to get deeper into the understanding of these dynamics. Factor analysis was chosen as particularly well-suited for applications in social science research, as it allows to find complex interdependencies among apparently unrelated variables in a simplified manner (Ather and Balasundaram, 2009). To determine the ideal number of factors, a Principal Component Analysis (PCA) was run on the selected variables. After the first round, it appeared that one of the factors was explained by a single variable (social policies regulating value-added taxes, and therefore representing measure on consumers). It was, therefore, necessary to remove it altogether (Figure 1) and a new analysis suggested choosing 7 final components. Factor loadings were observed for inter-variable correlation and interpretation. Cluster analysis is a popular technique that helps to group dataset entries to discover untapped patterns (Lund and Ma, 2021), which is what we need to do with the selected sampled countries. The number of clusters was defined using the “elbow” and “silhouette” method, by visually interpreting the “within sum of squares” graph (kmeans results). After several iterations, the most homogeneous and comparable groups (across 2019 and 2020) were assessed in their average variable values within the new clusters. For clarity of reference, factor categories and clusters are directly presented in the following section. Since several studies found benefits in combining cluster and factor analyses (Anand *et al.*, 2014; Gorman and Primavera, 1983; Visbal-Cadavid *et al.*, 2020), the output of these two analyses was studied together in this paper to understand the integrated dynamics of macroeconomic and policy measures within country groups. Differences across years and clusters were assessed, and policy influences and variations in the resulting cluster “rankings” were verified.

## 4. Results

### 4.1 Descriptive statistics of macroeconomic and policy data

The below figures reconstruct the macroeconomic and policy dynamics (means and correlations) that occurred to the traditional and extended sustainability pillars between 2019 and 2020. Since in most cases the values show the direction of the change from the previous year, the “minimum”/“ maximum” or “worst”/“ best” terms were used to indicate the smallest or largest improvements compared with either the preceding period or another country. An in-depth explanation (including through references to extant literature) of the correlations between macro and policy variables for 2019 and 2020 follows, also comparing the differences between periods. Figures 1 and 2 show positive and negative influences between variables through green pluses or red minuses, respectively. The arrows next to the boxes signal whether there has

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3 been an increase or decrease compared to the previous period. Diamond-shaped boxes feature the main  
4 policy variables.  
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6 Figure 2 shows how in 2019, growing internal sales further developed production – in turn fueling exports –  
7 while imports improved consumption, allowing for an additional increase in production. Overall consumers  
8 had enough purchasing power (positive wages in both sales and production) to feed the social-economic and  
9 international trade mechanisms. Nonetheless, despite new ICT jobs being offered, general unemployment  
10 grew (a little less for women), which might be due to a gap in digital skills required. This leads to assume that  
11 companies' technological progress happened faster than the provision of ICT training (Lyons *et al.*, 2019),  
12 with digitalization being accelerated before the pandemic. The negative correlation between new ICT  
13 positions and sales might be explained by the fact that the retail sector – mainly composed of small  
14 businesses – was not ready for digitalization prior to the pandemic (Kelly, 2020). The CCPI, however, was  
15 positively related to digital employment, showing the reliance of decision-makers on digital professionals for  
16 fighting environmental issues (GGF, 2021). Negative CCPI scores were given by production, confirming the  
17 unsustainable nature of manufacturing structures in all countries (Burck *et al.*, 2018).  
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29 The 2020 macro-economic situation (Figure 3) was quite the opposite. Sales grew slower, due to a lower  
30 increase in production. This dragged exports and imports down, leading respectively to lower wages, and a  
31 big decrease in consumption and employment – female workers being the most impacted this time. The  
32 increase in unemployment also triggered a drop in credit ratings. This situation, however, did not negatively  
33 impact labor earnings in the manufacturing sector, which grew slightly more than in 2019. In fact, the lower-  
34 paid employees are usually the first to be dismissed during a recession, with higher wage workers raising the  
35 average salary (Rouse and Gimbel, 2021). Only when companies tried to purchase digital tools – although  
36 highly appreciated by financial markets as a pandemic recovery solution (Forbes, 2020), given the positive  
37 correlation to credit ratings – manufacturing salaries decreased. The positive correlation between ICT tools  
38 and new experts hired (well received by the credit markets) hinted at businesses being forced to reshape  
39 their professional requirements (from analog to digital) amidst the pandemic crisis (Schilirò, 2021). This was  
40 especially true for ICT positions in sales (positive correlation, unlike in 2019), which might show progress in  
41 the digitalization alignment of classic brick-and-mortar retail (UNCTAD, 2021). Overall, however, the  
42 employment of ICT specialists slightly decreased compared to 2019 (following the downfall of sales), possibly  
43 because manufacturers reconverted their productive capacity to respond to demands for personal protective  
44 equipment (European Commission, 2021) – and struggled financially to maintain operations, which became  
45 the priority. Lower production levels were positively associated with a higher decrease in emissions, possibly,  
46 however, mainly due to lockdowns (Le Quéré *et al.*, 2020). Also, FDI income flows became a relevant  
47 internationalization variable in 2020, despite further falling in percentage, following a slowdown in trade.  
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51  
52 In policy terms, the CCPI index was once again positively associated with ICT jobs, decreasing overall less than  
53 in the pre-pandemic period. Short-term improvements in emissions appeared to stem from environmental  
54 but also innovation measures, leading to believe that the technologies resulting from such supports were  
55 designed to be more eco-friendly. Social responses meant for fostering employment were positively related  
56 to emissions. This is likely because they were largely intended for maintaining salary and contribution  
57 continuity (Figure 1), leading to more travels to the workplace. Social policies, however, were negatively  
58 related to jobs in ICT. Economic incentives helped reduce unemployment – females benefitted less, probably  
59 because gender equality issues lost some importance during Covid-19 (UN Women, 2020) – and effectively  
60

fostered the promotion of new ICT positions, compared to explicit social policies (negative relation) – this could depend on the fact that their objective was to protect existing jobs in the short term, while digital roles' promotion became of secondary importance.

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 FIGURE 3 HERE  
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#### 4.2 Factor and cluster analysis

A factor analysis helped to redefine the initial classification of the traditional (economic, social, environmental) and extended (cross-border relevance, digitalization, and reputation) sustainability variables, into groups that were more fitting with the European socio-economic situation that arose in 2020. (Table III – (“\*\*” symbolizes variables with a stronger relation to other factors; abbreviations in Table I) presents these factors, each comprising both macroeconomic and policy variables as components. This was done to better understand which issues acquired more pertinence and characterized the new pandemic context in which companies are now called to implement their sustainability activities. These reorganized groupings have been labeled as:

- (F1) “Cross-border relevance” – contains the same metrics as per initial classification with the addition of “employment in ICT”, showing the raising importance for firms to employ specialists with digital knowledge that could help maintain their commerce infrastructure and operations.
- (F2) “Environmental innovation” – can be interpreted as the evolving environmental sustainability pillar. Emissions here are complemented by policy measures providing direct (CCPI and environmental measures) or indirect (innovation and employment support policies) innovative solutions to ecological consequences in the short run. Correlation results (Appendix 1) The positive links between these policies.
- Under the new circumstances it appears that the social sustainability pillar became intertwined with the reputational feature, providing 2 new lenses of analysis:
  - (F3) “Social wealth” – variation of unemployment based on fiscal-economic policies and subsequent implications on market credibility.
  - (F7) “Social performance” – combined effect of policies directed at communities and their overall impact on market credibility.
- (F4) “GDP” – represents the economic pillar, including national production along with some components of the gross domestic product (consumption, import, export).
- Digitalization has formed two categories:
  - (F5) “Digital growth” – measures of company digitalization (software purchase and job offers to ICT professionals), as well as wages and market credibility.
  - (F6) “Digital employment” – evaluates how the creation of novel ICT positions is affected by employment and fiscal policies (also those targeted at SMEs).

The strongest policy impacts within factors can be found in

- F2 – where innovation and environmental protection (and to some extent economic and employment) measures decreased emissions
- F3 – where policies in the economic domain had a slight influence on unemployment
- F6 – supporting new ICT jobs through employment and SME policies, and
- F7 – acting on policies that target communities for market credibility.

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 TABLE III HERE  
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The cluster analysis (Figure 4 [shows the output from the statistical software with an indication of the main clusters in both periods](#)) revealed that country groups also required rearrangements by performance, because of the 2019 pandemic outbreak. Apart from the Continental-Mediterranean-Anglo/Saxon (plus Norway) cluster (C2), which remained the same across periods, cluster C1 (Continental-Nordic) became less numerous by one unit (Slovenia moving to the Central European group), while cluster three split into two separate groups – the Central-Eastern/Mediterranean (C3), and the “mainly” Baltic (C4) group (plus Hungary). In the remainder of the text, whenever a country code is inserted in brackets, this refers to the absolute (best or worst) performer for a certain group of variables or countries.

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 FIGURE 4 HERE  
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By combining factors with clusters, it was then possible to draw on the changes in the sustainability context dynamics for the year 2020, as compared to 2019 (Figure 5). In this case, only the common variables between 2019 and 2020 were considered. We provide a factor-by-factor analysis (using the new sustainability variables aggregations) below, highlighting the direction of the performance for each country cluster ([abbreviations for: countries in Table II; for factors' labels in Table III; for variables in Table I](#)). For each cluster (C1, C2, C3 and C4) a matrix is provided, featuring the year of interest (and the changes in cluster composition between 2019 and 2020) in the rows, and the worst (on the left in red) and best (on the right in green) performing factors (/variables) in the columns. The smaller bubbles represent the impact of policy variables within each factor.

For what concerns the **economic** – GDP – pillar, C2 performed poorly overall, while C3 (without C4) was the best performer both in 2019 and 2020, especially considering the positive CO2 outcome.

As for the variations in **international trade**, C2 improved in cross-border relevance from worst (trade=LUX, in\_fdi=GBR, out\_fdi=NOR) to best, replacing C1 in FDI performance (LUX).

In the **social** sphere, C3 used to perform well in social wealth (CZE), however, in 2020 it started underperforming in female equality (GRC in unem\_f) together with C4 (LVA in unem). This improved the situation of C2 and made C1 the best performer in all related indicators (due to its highest credit ranking and 2<sup>nd</sup> best economic policy efforts), including credibility and new ICT jobs. As per social performance, C4 appeared to have the least credibility in the market, while also being the second-worst cluster in enforcing community measures. C1 achieved the highest reputational advantage.

There has been also a switch of environmental dynamics. Regarding emissions, the least performing cluster changed from Continental-Nordic (C1) to Baltic (C4, with LVA underperforming in general). This group was part of C3 in 2019, which outperformed all countries in terms of CO2 reduction that year. Nevertheless, the results of the Baltic countries showed the lowest improvement of all, with levels below those of the worst performer in 2019 (C1), leading this group to be decoupled from C3 (Central Europe) in 2020. The negative outcomes happened despite the fourth cluster issuing the most policies on innovation, so perhaps such measures were not sufficiently strong or correctly directed to improve products or processes for eco-sustainability. The best performer in emissions reduction, therefore, changed from C3 (POL) to C2 (DEU). A

plausible explanation for this could be the highest effort demonstrated in the introduction of several environmental (DEU), employment (DEU) and economic policies during the pandemic, and these measures being effective in influencing the sustainability context in the short-term. Additionally, according to the CCPI proxy variables, C3 (POL) remained the worst overall performer due to having the lowest number or most ineffective policies for environmental protection. This might depend on the fact that, although C4 had the worst results in emissions, it is possible that C3 performed overall worse in energy use, renewable energy, and climate policy (the other elements of CCPI). On the other hand, the best CCPI position changed from C2 to C1 (AUT), despite this latter region having the worst innovation measures – which probably had only minor negative impacts and, therefore, could not undermine the efforts in other environmental fields.

And finally, **digitalization** factors were also redefined. In terms of digital employment, the worst performer switched from C3 to C4 (with HUN still demonstrating good results in SME measures) – yet another factor that forced it to separate from C3 in 2020. C1 was the overall best performer, both in 2019 and 2020, across all indicators (ict\_emp & ict\_nw, crm\_pur=FIN, ict\_emp\_nw=BEL, cred=DNK&SWE, ict\_emp), despite the measures in favor of employment bearing the worst results. Digital growth was the factor in which C1 (earn=LUX) underperformed, replacing C2. The most relevant positions for these variables were held by LTU – which switched clusters from C3 to C4 – and C1 in new ICT jobs (BEL) and credibility.

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 FIGURE 5 HERE  
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Based on these observations, regional clusters were then ranked according to their 2020 performance in the reorganized sustainability pillars. C1 appeared to be the best overall performer, achieving the highest results in social wealth, social performance (mainly in credibility – DNK/SWE), and digital growth (mainly in software purchase - FIN). This confirms results from previous studies that the highest level of engagement in CSR is found in companies operating in more dynamic and advanced industrial and institutional contexts (Pan *et al.*, 2018). C2 can be considered the second-best performer among European countries, achieving top results in cross-border relevance (FDI=LUX), environmental innovation (co2=DEU, p\_env=DEU), and digital employment (p\_s\_emp=DEU, p\_fis=IRL). The third spot can be virtually assigned to C3, being the best mainly in GDP (with SVK the absolute best in cons) and community policies (POL). Finally, the least performing cluster appeared to be C4, with somewhat good results in trade, innovation policies, production, wages (LTU being the absolute best) and policies for SMEs (HUN).

## 5. Discussion and conclusions

The present study aimed at investigating the consequences of the policies, enacted in response to Covid-19, on the operational landscape in which companies are called to develop their CSR activities. For this purpose, two frameworks on the impact of Covid-19 on sustainability were used as a starting point: one of them focusing on sustainable production and consumption (Severo *et al.*, 2021), and the other on sustainable SMEs (Winarsih *et al.*, 2021). To contribute to advance the knowledge in this field and provide a more comprehensive picture, additional macroeconomic data was also explored in combination with a series of measures introduced by European countries to fight the immediate crisis effects.

The results presented in this paper show that, even in the short-term (yearly variations from 2019 to 2020), there appeared to be some switches in sustainability dynamics, therefore providing a supplementary perspective to previously published literature. First, the importance and influence of the traditional

(economic, social, environmental) and extended (digitalization, international trade, reputation) groupings of sustainability determinants have been reorganized considering the novel context that has been shaped by the responses to the pandemic crisis: GDP, social wealth and social performance, environmental innovation, digital growth and digital employment, and cross-border relevance. The social and digitalization aspects are the only ones that were evaluated under two different facets, demonstrating their preponderance even in crisis times. Concerning social issues, according to literature, companies focusing on them as their areas of excellence have the potential to improve employee productivity (Romi *et al.*, 2018), thus understanding how to tackle this area can be of primary importance for resilience building in the pandemic context too.

Second, the countries under analysis formed four distinct groups, with one (Baltic) splitting from a major cluster (Central Europe) in 2020. In general, the Continental-Nordic cluster (C1) outperformed the others in several domains – including social wealth, social performance, and digital growth – whereas the Baltic group appeared to have had the least improvements compared to the other country groups. As a whole, the different country clusters have indeed shown some changes in the leadership of the various sustainability domains, with the newly implemented emergency policies (mainly financial in nature and mandating) driving this change. In fact, environmental innovation, digitalization, and social support policies have been, for example, found to be the main variables to be impacted by the intensity of the policy efforts. Researchers have recognized the importance of country-level sustainability analyses for discerning good quality governance across nations (Avci and Sungu-Esen, 2022), hence the relevance of the contribution of the present study.

The main limitation of this paper is the broadness of the chosen variables under study, which was dictated by the scarce data availability, given that the pandemic outbreak happened quite suddenly, but data takes time to be gathered.

As for the implications of this work, the results can be of use to managers for gauging the business trends occurring with respect to the relevance of the digitalization of employment and innovation in environmental technologies in the new (post-) pandemic scenario. Looking at policy makers, the utility of this article's findings lies on the observation of the effects that specific policy measures had on the macroeconomic variables related to the sustainability scenario of firms. Future policy improvements can then be inspired, especially considering new emerging sustainability concerns in the post-pandemic scenario. In terms of implications for research, scholars might use our results as a starting point to later observe how macroeconomic dynamics in the wake of a global crisis like Covid-19 can evolve. Future studies could concentrate on statistical assessments of the evolution of the sustainability context for companies.

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## Appendix

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APPENDIX 1 – FIGURE HERE

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APPENDIX 2 – TABLE HERE

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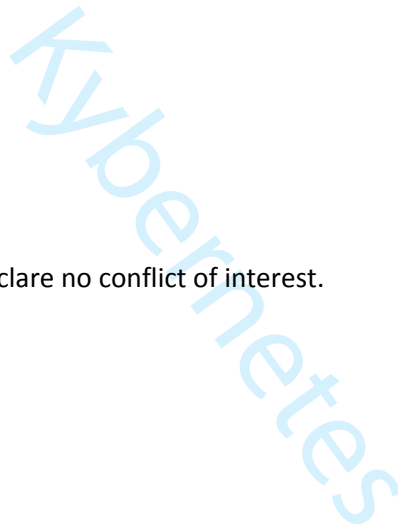
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**Acknowledgements**

*Conflicts of Interest:* The authors declare no conflict of interest.

Ethics statement: Not applicable.

*Funding statement:* Not applicable.



**Table I. Overview of the explored macroeconomic variables and policy measures**

Variable	Type	Database	CSR topic	Abbr.
Production of total industry (=production)	index (2015=100)	<a href="#">OECD (Stat)</a>	Fin_sus	prod
Private final consumption expenditure (=consumption)	% growth on n-1	<a href="#">OECD (Stat)</a>	Fin_sus, Soc_sus	cons
Imports in goods	% growth on n-1	<a href="#">OECD (Stat)</a>	Cross-bord	imp
Exports in goods	% growth on n-1	<a href="#">OECD (Stat)</a>	Cross-bord	exp
Total retail trade (= sales to final consumer)	index (2015=100)	<a href="#">OECD (Stat)</a>	Fin_sus, Soc_sus	trade
Income on outward FDI flows	% growth on n-1	<a href="#">OECD (investment policy)</a>	Cross-bord	out_fdi
Income on inward FDI flows	% growth on n-1	<a href="#">OECD (investment policy)</a>	Cross-bord	in_fdi
Unemployment rate	% (aged 15-64)	<a href="#">OECD (stats)</a>	Soc_sus	unem
Unemployment rate (females)	% (aged 15-64)	<a href="#">OECD (stats)</a>	Soc_sus	unem_f
Hourly earnings (manufacturing) (= wages)	index (2015=100)	<a href="#">OECD (stats)</a>	Soc_sus	earn
Credit rating	index	<a href="#">Standard &amp; Poor's (S&amp;P)</a>	Reput	cred
CO2 emissions (MtCO2/day)	% growth on n-1	<ul style="list-style-type: none"> <li>• <a href="#">Enerdata (2019)</a></li> <li>• <a href="#">Nature (2020)</a></li> </ul>	Env_sus	co2
Businesses purchasing CRM software	%	<a href="#">OECD (Stat)</a>	Digital	crm_pur
Businesses employing ICT specialists	% growth on n-1	<a href="#">OECD (Stat)</a>	Digital	ict_emp
Businesses offering positions for ICT specialist	% growth on n-1	<a href="#">OECD (Stat)</a>	Digital	ict_emp_nw
CCPI score	index	<a href="#">CCPI</a>	Env_prox	p_CCPI
Environmental sustainability tax measures	occ	<ul style="list-style-type: none"> <li>• <a href="#">OECD (country policy tracker)</a></li> <li>• <a href="#">IMF (policy tracker)</a></li> <li>• <a href="#">ILO (country policy responses)</a></li> <li>• <a href="#">Carbonbrief (green policies)</a></li> </ul>	Env_pol	p_env
Social sustainability tax measures (community)	occ		Soc_pol	p_s_comm
Social sustainability measures (employees)	occ		Soc_pol	p_s_emp
Financial sustainability measures (innovation, investment in high tech, digitalization)	occ		Fin_pol	p_innov
Financial sustainability measures	occ		Fin_pol	p_fis
Financial sustainability measures (SMEs)	occ	Fin_pol	Fin_pol	p_sme

Abbr: CCPI (Climate Change Performance Index), CRM (Customer relationship management), Cross-bord (cross border relevance), Digital (Digitalization), Env\_pol (Environmental Policies), Env\_prox (a proxy for environmental policies), Env\_sus (Environmental sustainability), FDI (Foreign Direct Investment), Fin\_pol (Economic/Financial Policies), Fin\_sus (Economic/Financial Sustainability), ICT (Information and Communication Technology), n-1 (previous period), occ (occurrences), Reput (market reputation), SMEs (Small-Medium Enterprises), Soc\_pol (Social Policies), Soc\_sus (social sustainability)

**Table II. Sample of selected countries**

Country	Code	Region	2019	2020
Austria	AUT	Continental (Center)	√	√
Belgium	BEL	Continental (West)	√	√
Czech Republic	CZE	Central-Eastern	√	√
Denmark	DNK	Nordic	√	√
Estonia	EST	Central-Eastern (Baltic)	√	√
Finland	FIN	Nordic	√	√
France	FRA	Continental (West)	√	√
Germany	DEU	Continental (Center)	√	√
Greece	GRC	Mediterranean	√	√
Hungary	HUN	Central-Eastern	√	√
Ireland	IRL	Anglo-Saxon	√	√
Italy	ITA	Mediterranean	√	√
Latvia	LVA	Central-Eastern (Baltic)	√	√
Lithuania	LTU	Central-Eastern (Baltic)	√	√
Luxembourg	LUX	Continental (West)	√	√
Netherlands	NLD	Continental (West)	√	√
Norway	NOR	Nordic	non-EU	non-EU
Poland	POL	Central-Eastern	√	√
Portugal	PRT	Mediterranean	√	√
Slovak Republic	SVK	Central-Eastern	√	√
Slovenia	SVN	Central-Eastern	√	√
Spain	ESP	Mediterranean	√	√
Sweden	SWE	Nordic	√	√
UK	GBR	Anglo-Saxon	√	non-EU (31.01.2020)

Table III. Interpretation of factors

	<b>F1</b> cross-border relevance (Xborder)	<b>F2</b> environmental innovation (EnvInno)	<b>F3</b> social wealth (SocialWe)	<b>F4</b> GDP	<b>F5</b> digital growth (DigitalGr)	<b>F6</b> digital employment (DigitalEmp)	<b>F7</b> social performance (SocialPer)
<b>Macroeconomic</b>	trade out_fdi in_fdi ict_emp	co2 **cons	unem unem_f **cred	prod cons imp exp **co2	earn crm_pur **ict_emp_nw **cred	ict_emp_nw	cred
<b>Policy</b>		p_CCPI p_env p_innov **p_s_emp **p_fis	**p_fis			p_s_emp p_fis p_sme	p_s_comm

**Appendix 2 – Mean values and value change of common variables for 2019 and 2020**

Variable	2019	2020	growth Δ
prod	109,08	103,78	↓
cons	0,02	-0,06	↓
imp	-0,03	-0,08	↓
exp	-0,02	-0,06	↓
trade	1,09	1,09	↓
out_fdi	-0,05	-0,10	↓
in_fdi	-0,04	-0,13	↓
unem	6,16	6,88	↑
unem_f	6,40	7,10	↑
earn	117,49	120,80	↑
co2	-0,03	-0,07	↓
ict_emp	0,01	0,00	↓
ict_emp_ nw	0,00	0,00	↓
p_CCPI	-0,03	-0,03	↑

**Appendix 3 – Factor (F) loadings**

Variable	F1	F2	F3	F4	F5	F6	F7
trade	0,81		-0,15	0,36	-0,13		
out_fdi	0,96	-0,17					0,15
in_fdi	0,88	-0,21				0,10	
ict_emp	0,41	-0,17		0,21		0,12	0,25
co2	0,15	-0,59		0,43		0,13	0,10
unem	0,10		0,98	-0,11			-0,12
unem_f	0,13		0,96				-0,23
prod	0,38	-0,37		0,62	-0,22	0,30	-0,14
cons		-0,41	-0,17	0,50	-0,13	-0,36	0,14
imp	0,25		-0,40	0,82	0,25	-0,18	
exp	0,34			0,69	-0,35		
earn	0,28	-0,24		0,38	-0,72		
crm_pur		-0,23			0,73	0,21	0,19
ict_emp_ nw	0,23		-0,13		0,53	0,57	0,12
cred			-0,41		0,45	0,21	0,68
p_CCPI	0,24	0,45	-0,16	-0,18	0,38	0,15	
p_env_tot	0,11	0,94		-0,15			0,26
p_innov		0,69			-0,16		-0,23
p_s_emp	0,14	0,42	0,16		-0,16	-0,67	
p_fis	0,12	0,41	-0,45		0,29	0,54	-0,23
p_sme	0,16					-0,59	
p_s_com m			0,12				-0,70

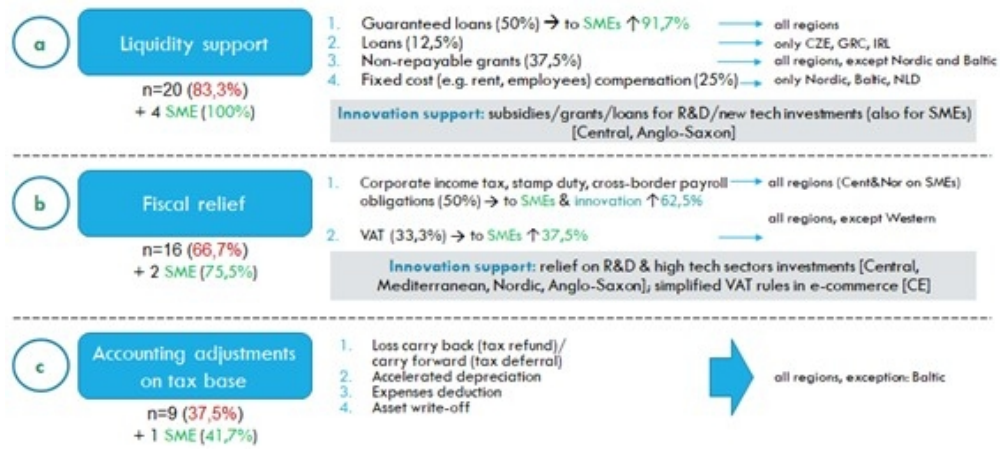
**Appendix 4 – Factor/Cluster and Minimum/Maximum analyses**

(a) 2019						
Factors	Variables	C1 N-C (W)	C2 W-S-NW (C-N)	C3 C-B (S)	Min	Max
<b>F1) cross-border relevance</b>	trade	1,097	1,009	1,187	LUX (0,32)	SVN (1,31)
	out_fdi	0,066	-0,098	-0,083	NOR (-0,56)	GRC (0,35)
	in_fdi	-0,017	-0,054	-0,036	UK (-0,42)	GRC (0,2)
	ict_emp	-0,004	-0,001	0,022	SVN (-0,02)	POL (0,1)
<b>F2) environmental innovation</b>	**co2	-0,023	-0,023	-0,056	EST (-0,22)	LUX (0,08)
	p_CCPI	-0,016	-0,004	-0,085	POL (-0,16)	DNK (0,15)
<b>F3) social wealth</b>	unem	5,579	7,530	4,875	CZE (2,08)	GRC (17,45)
	unem_f	5,508	8,112	4,925	CZE (2,45)	GRC (21,68)

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<b>F4) GDP</b>	prod	114,557	101,508	114,438	NOR (92,47)	SVN (124,47)
	**cons	0,017	0,016	0,031	ITA (0,002)	HUN (0,05)
	imp	-0,041	-0,032	-0,025	SWE (-0,07)	SVN (0,04)
	exp	-0,019	-0,035	-0,017	NOR (-0,16)	IRL (0,03)
<b>F5) digital growth</b>	earn	109,015	107,720	136,058	LUX (101,28)	LTU (182,03)
<b>F6) digital employment</b>	**ict_emp_nw	0,008	0,006	0,000	POL (-0,01)	GRC (0,02)

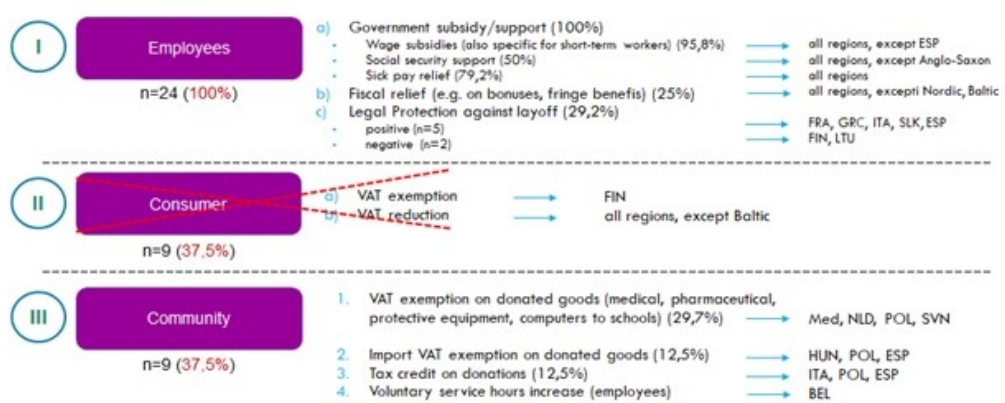
<b>(b) 2020</b>							
Factors	Variables	C1 N (C-W)	C2 W-S-NW (C-N)	C3 C (B-S)	C4 B (C)	Min	Max
<b>F1) cross-border relevance</b>	trade	1,080	1,012	1,158	1,229	LUX (0,32)	POL (1,29)
	out_fdi	-0,269	0,059	-0,146	-0,229	AUT (-0,97)	LUX (2,14)
	in_fdi	-0,242	-0,033	-0,132	-0,264	AUT (-0,98)	LUX (1,22)
	ict_emp	0,012	-0,010	-0,005	0,011	ITA (-0,03)	HUN (0,03)
<b>F2) environmental innovation</b>	**co2	-0,031	-0,118	-0,036	-0,011	DEU (-0,32)	LVA (-0,004)
	p_CCPI	0,002	-0,004	-0,070	-0,059	LTU (-0,12)	AUT (0,07)
	p_env	0,200	0,800	0,167	0,333		DEU (2)
	p_innov	0,000	0,600	0,167	0,667		
<b>F3) social wealth</b>	unem	6,655	6,931	6,846	7,175	CZE (2,6)	GRC (16,48)
	unem_f	6,570	7,161	7,679	6,633	CZE (3,03)	GRC (19,95)
<b>F4) GDP</b>	prod	107,688	95,205	110,064	113,298	LUX (88,47)	POL (119,39)
	**cons	-0,060	-0,082	-0,044	-0,047	ESP (-0,12)	SVK (-0,01)
	imp	-0,060	-0,097	-0,058	-0,072	LUX (-0,14)	DNK (-0,01)
	exp	-0,058	-0,098	-0,023	0,028	NOR (-0,21)	IRL (LTU is avg) (0,06)
<b>F5) digital growth</b>	earn	109,228	109,248	125,889	168,438	LUX (99,29)	LTU (196,64)
	crm_pur	0,232	0,146	0,086	0,062	POL (0,05)	FIN
<b>F6) digital employment</b>	**ict_emp_nw	0,009	-0,004	-0,009	-0,013	HUN (-0,02)	BEL (0,03)
	**p_s_emp	2,000	3,100	3,000	2,667		DEU, GRC (5)
	**p_fis	2,800	3,000	2,000	1,667		BEL, IRL (5)
	p_sme	0,600	0,700	0,333	1,000		HUN (3)
<b>F7) social performance</b>	**cred	14,200	12,200	9,833	9,667	GRC (3)	DNK, DEU, LUX, NLD, NOR, SWE (15)
	p_s_comm	0,200	0,900	1,000	0,333		POL (4)



Policy measures for financial, social, and environmental sustainability - (a) economic sustainability policies

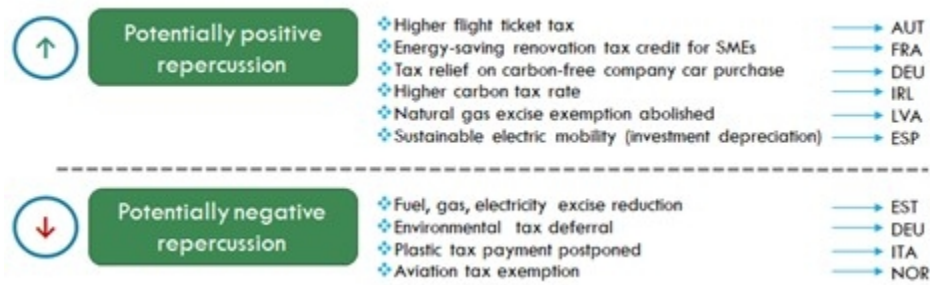
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Policy measures for financial, social, and environmental sustainability - (b) social sustainability policies

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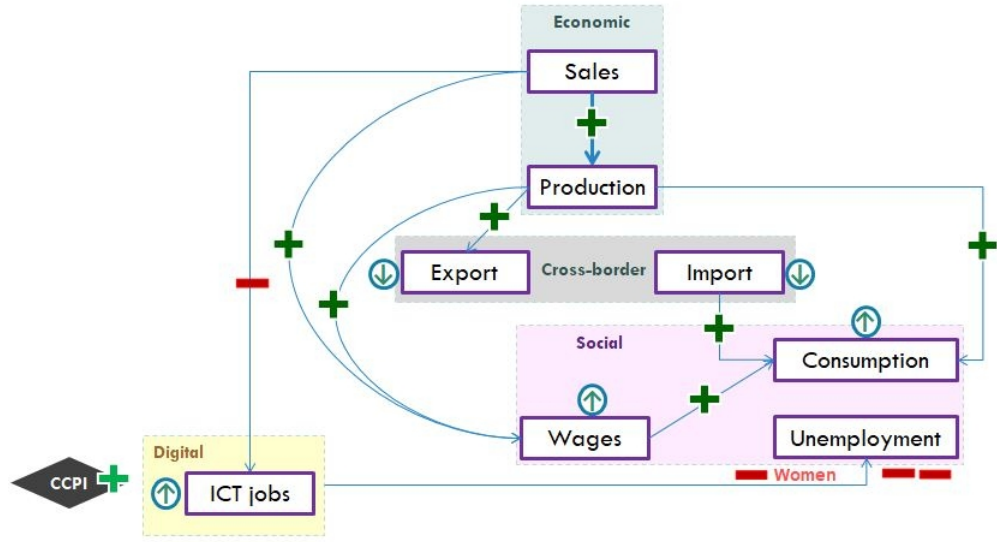


Policy measures for financial, social, and environmental sustainability - (c) environmental sustainability policies

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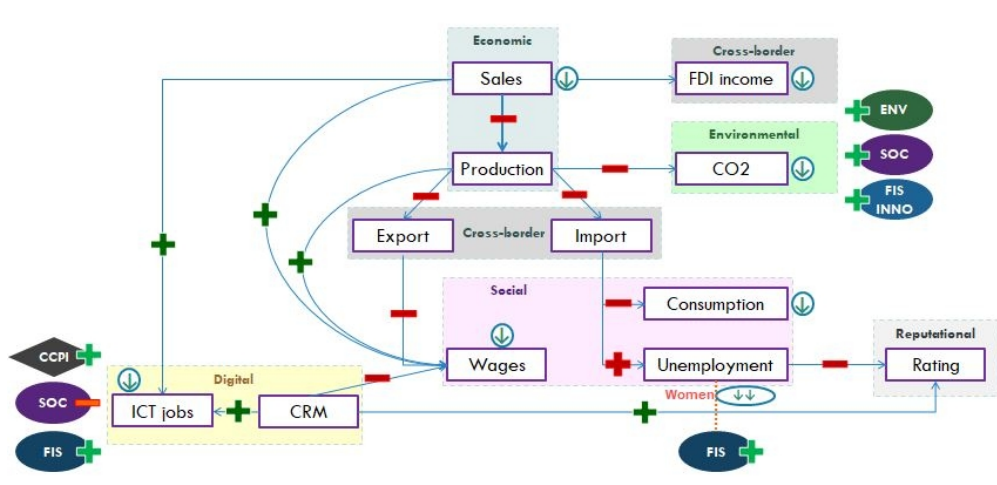
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Outlook of traditional & extended sustainability pillars in 2019

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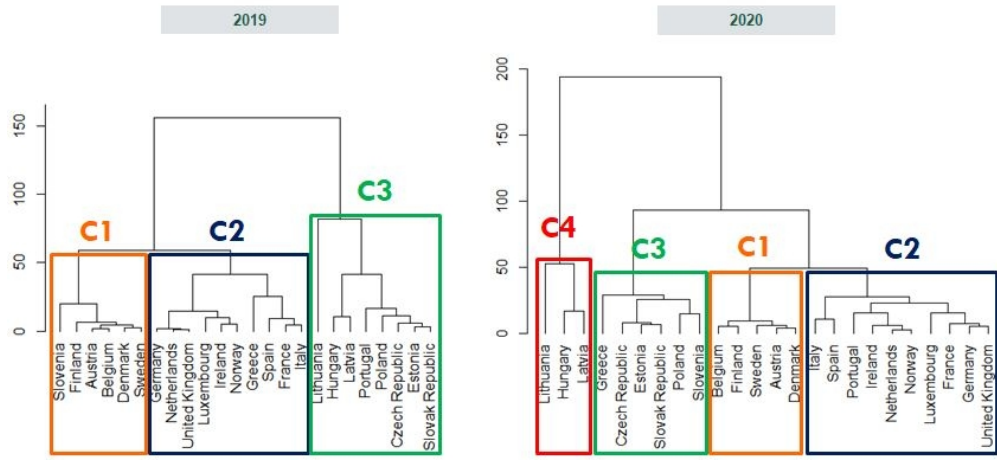


Outlook of traditional & extended sustainability pillars in 2020

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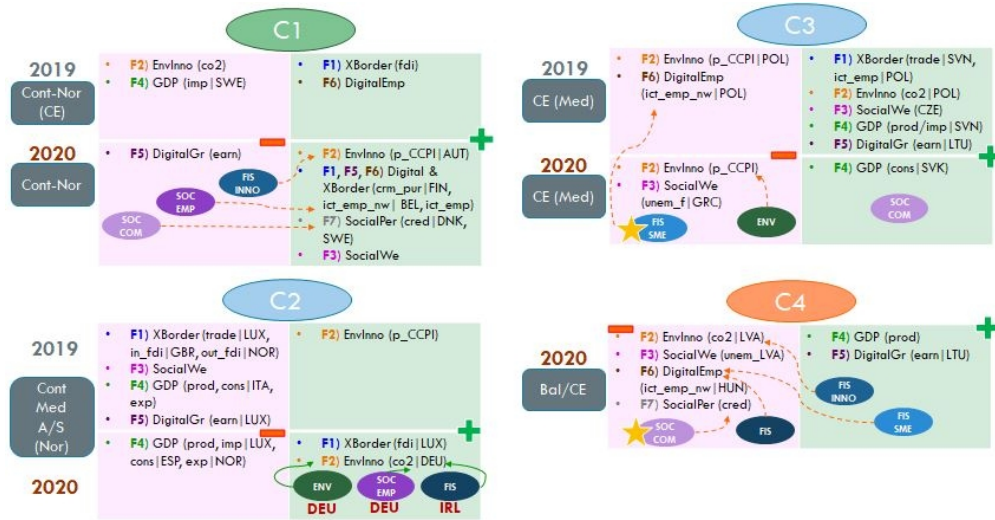
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Clusters in the pre- and pandemic context for CSR

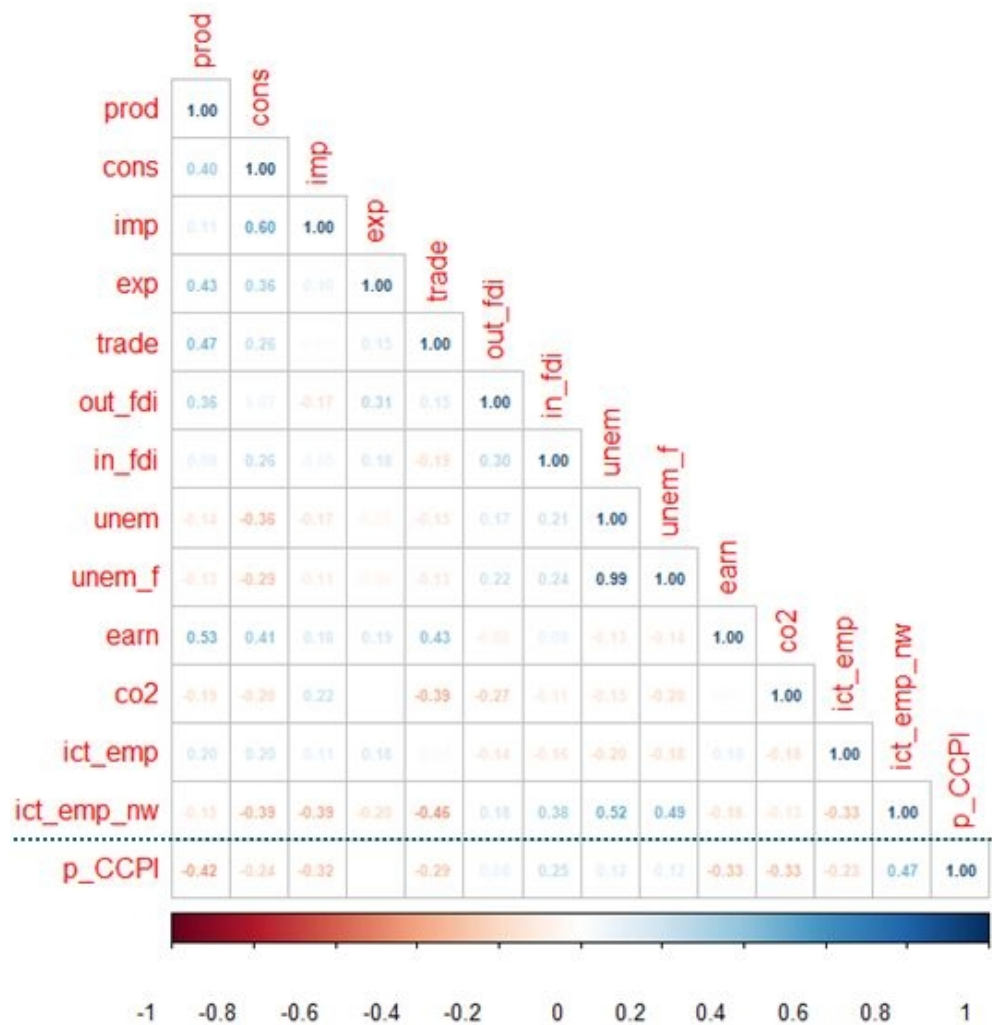
223x106mm (96 x 96 DPI)



Overview of macroeconomic and policy dynamics for the CSR context during 2019 and 2020

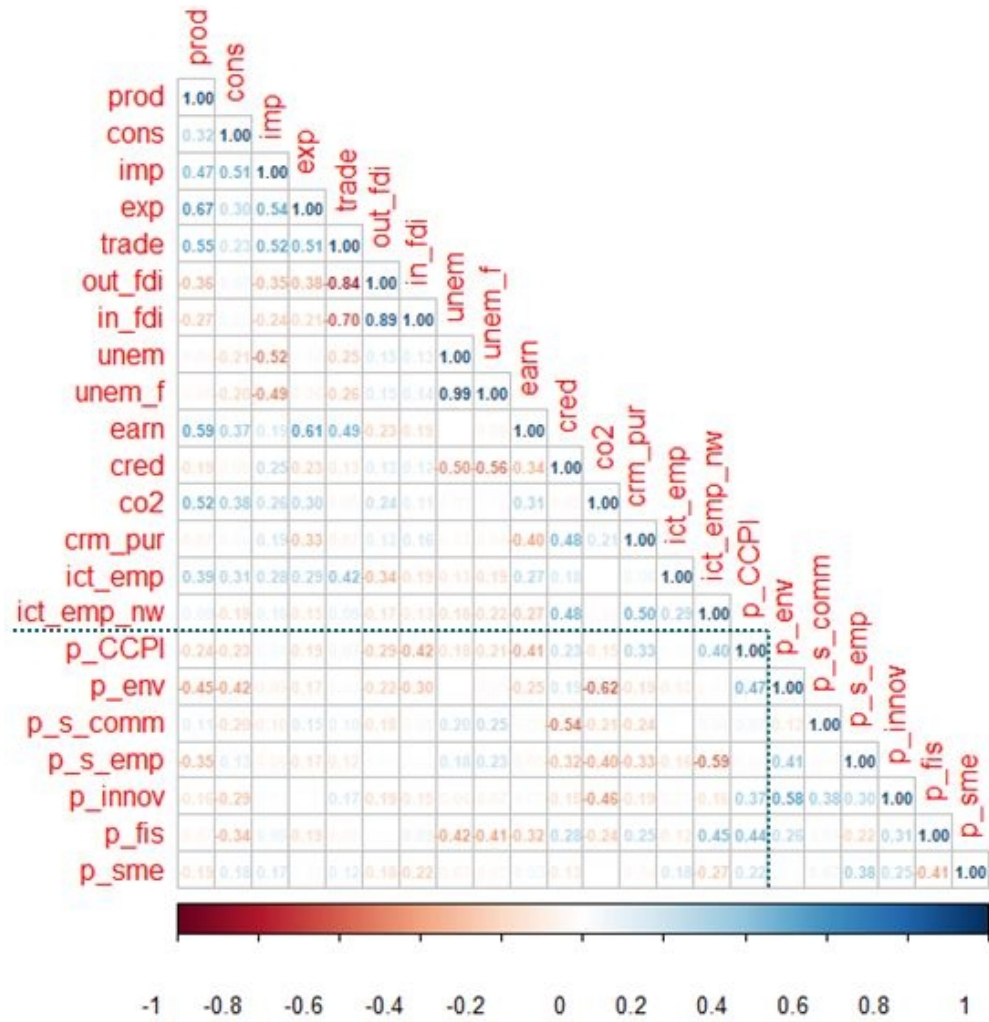
Abbr: Cont (Continental), Nor (Nordic), CE (Central European), Med (Mediterranean), A/S (Anglo-Saxon), Bal (Baltic)

224x117mm (96 x 96 DPI)



Correlations of macroeconomic and policy performances - (a) 2019 data

143x147mm (96 x 96 DPI)



Correlations of macroeconomic and policy performances - (b) 2020 data

144x148mm (96 x 96 DPI)