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Regional growth and disparities in a post-COVID Europe: A new normality scenario

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Abstract

This paper addresses the important question "Which European areas will be able to better react to the crisis induced by COVID-19 and how regional disparities will look like?" To provide an answer, a "new normality" scenario is built, comprising the structural changes likely to take place in the aftermath of the COVID pandemic. To develop such scenario, two intermediate steps are necessary, in both cases relying on the use of the latest generation of the MAcroeconomic, Sectoral, Social, Territorial (MASST4) model. First, short-run costs of the COVID-induced lockdowns, in terms of missed GDP, are calculated for all European NUTS2 regions, needed because of the lack of short-run statistics about the extent of the regional costs caused by the lockdowns that will only appear in 2 years. Second, a long-run simulation of the economic rebound expected to take place from 2021 through 2030 is presented, assuming, among other trends, that no further national lockdowns will be undertaken in European countries. In the "new normality" scenario, regional disparity trends will decrease as a result of a decisive rebound of those countries mostly hit by the pandemic.

KEYWORDS

regional disparities, regional growth forecasting models, short- and long-run regional effects of COVID-19

1 | INTRODUCTION

The lockdown of economic activities put in place to face the COVID-19 pandemic in Spring 2020 in all European countries (with the exception of Sweden) had deep consequences on the economy; an immediate drop of GDP, relatively quickly transmitted to the labor market with a substantial increase in unemployment rates, with a vicious cycle of consumption and investment reduction, and consequent GDP contraction. Early estimates suggest the extent of this slump to be comparable in size with the largest contractions in the last century (WWII excluded). According to the World Bank's baseline forecasts for 2020, this reduction will likely reach −5.2%. Based on Gopinath (2020), the contraction will reach 3% of World GDP; which will make it at least as bad as, or even worse than, the 1929 Great Crisis, when World GDP fell by roughly 3% (Bolt et al., 2018).

Because of the sheer magnitude of the likely GDP contraction, and the vast number of macroeconomic and microeconomic effects this is likely to engender, several attempts to gauge the economic costs due to the COVID-19 outbreak have already been produced, mostly focusing on aggregate figures. Country-level estimates are based on survey evidence (Coibion et al., 2020), Computable General Equilibrium (CGE) model simulations (Maliszewska et al., 2020), and analyzed in terms of their effects on various markets, such as on the labor (Kong & Prinz, 2020), tourism (Qiu et al., 2020), and financial (Zhang et al., 2020) ones.

Still, to date little is known about the regional breakdown of these costs, that are likely to be characterized by relevant spatial heterogeneity. In fact, if the lockdown has taken place at the national level, therefore closing all activities in all regions of a country, the effects on the single regions depend on the resilience of local economies to react to a crisis. Moreover, the capacity to develop a long-term way out of the crisis is also differentiated across regions. Is it reasonable to expect that regions most severely hit by the economic crisis will also be those that will have a more difficult recovery trajectory? Or will on the contrary regions that suffered relatively less from the economic crisis due to the lockdown register a more limited rebound?

To reply to such questions, two relevant steps must be sequentially made. The first step is to estimate the economic costs of the COVID-19 pandemic at regional level. Existing estimates are based on the national level, and no information at regional level to date exists for European regions. The second step needed is to build a scenario on future development trajectories. The long-term scenario requires to embed the structural changes that the COVID-19 pandemic has caused to the economy and society: new business models, new travel and social behaviors, different consumption and investment patterns. For this reason, the scenario is defined as "new normality."

Developing a post-COVID-19 scenario exercise is particularly complex. In fact, the Spring 2020 contraction is a typical example of a symmetric exogenous shock, with lockdown measures typically involving multifaceted interventions, acting on multiple markets with consequent second- and third-order (induced) effects that are typically awkward to model. These interrelations can be more comprehensively assessed by means of CGE models simulations. However, such models are most apt to capture single policy shocks (Brandsma et al., 2015), rather than offering a comprehensive picture of multiple exogenous variations across multiple markets. Moreover, CGE models typically hinge on equilibrium conditions across markets that are typically not fully met in times of structural changes (Capello et al., 2017a).

A solution to this conundrum is to resort to more traditional macroeconometric regional growth models, typically working on the basis of partial equilibrium conditions, and whose structure is based on the empirical assessment of structural relations among economic actors across multiple markets. The lesser importance attributed in this class of models to general equilibrium is typically counterbalanced by the possibility to better capture off-equilibrium variations in economic outcomes. Yet, to date no such exercise has been attempted with the aim to capture spatial variations in the economic costs due the outbreak of COVID-19 in European regions.[1]

[1]It is important to further clarify that the goal of this exercise is not to provide point estimates of future GDP growth rates, that is, what is formally termed a "forecast," but rather illustrate quantitative foresights of the outcomes due to the realization of a scenario. More details on this issue are also illustrated in Section 3.

In this paper, we fill this gap by providing first-hand simulation results of the *regional* costs of COVID in Europe, using the latest generation of the MAcroeconomic, Sectoral, Social, Territorial (MASST4) model. The advantage of the use of the MASST4 model lies in the possibility to take account of multiple exogenous shocks, which is precisely the way lockdown measures enacted in Spring 2020 need to be modeled. With the same model, by introducing the assumptions characterizing a long-term development pattern based on new habits, new organizational production and consumption models, a picture of the regional growth potentialities of European regions is obtained.

To reach the goal of the paper, we proceed as follows. Section 2 provides an overview of the way lockdown measures have been enacted in Spring 2020 across Europe. The aim of this section is to identify common traits across different national strategies, so that a comprehensive scenario can be devised. In Section 3 we briefly introduce the structure of the latest generation of the MASST (MASST4) model, to expose the way scenario building exercises are carried out with this tool. Section 4 describes the hypotheses needed for simulating lung-run rebounds (*new normality* scenario). Section 5 discusses long-run (2021–2030) recovery processes. Section 6 discusses the effects of COVID-19 on short- and long-run regional disparities in Europe. Lastly, Section 7 concludes drawing some early policy implications for the way recovery will actually take place.

2 | COVID-19, LOCKDOWN MEASURES AND EXPECTED CHANNELS OF ECONOMIC IMPACTS

In Spring 2020 a mosaic of measures aimed at slowing down the diffusion of the COVID-19 germ have been implemented in most EU28 countries, with only the exception of Sweden, that famously behaved differently (Savage, 2020). This section aims at finding common tracts in these lockdown policies, to incorporate their effects into the simulations presented in the second part of the paper.

In Table 1 we provide a classification of lockdown measures across the EU28 Countries. We classify these in six main classes:

- closure of manufacturing and retail establishments and public offices;
- closure of touristic establishments;
- increase of public expenditure;
- travel restrictions and full or partial border closures;
- ban of public events and gatherings;
- encouragement of social distancing.

While Italy embarked in lockdown measures earlier than all other EU28 Countries (European Centre for Disease Prevention and Control, 2020), most EU member states followed suit. As Table 1 shows, the restrictive measures adopted across Europe are relatively similar, and mostly focus on the strong encouragement of smart working, the closure of all businesses and activities implying social gatherings (such as public events and hotels and restaurants), while at the same time being associated with a full or partial suspension of the Schengen treaty, with consequent limitations to the free movement of people and freight (EC, 2020a).

In their turn, these restrictive measures, lasting from a few weeks to roughly two months, have caused several second-order consequences that have been modeled as described in Section 4. Before discussing the assumptions, we will first briefly introduce the scenario building methodology used to assess the short- and long-run regional economic impacts of the COVID-19 emergency, viz. the MASST4 model.

TABLE 1 Lockdown measures enacted in EU28 countries

Country	Closure of manufacturing and retail establishments and public offices	Closure of touristic establishments	Increase of public expenditure	Travel restrictions/ border closures	Ban of public events and gatherings	Encouragement of social distancing
Austria	X	X	X	X	X	X
Belgium	X	X	X	X	X	X
Bulgaria			X	X		
Cyprus			X	X		
Czech Republic	X	X	X	X	X	X
Germany	X (partial)	X	X (minor)	X	X	X
Denmark	X	X	X	X	X	X
Estonia			X	X		
Greece	X	X	X	X	X	X
Spain	X	X	X	X	X	X
Finland	X	X	X	X	X	X
France	X	X	X	X	X	X
Croatia			X (minor)	X		
Hungary	X	X	X	X	X	X
Ireland	X	X	X	X	X	X
Italy	X	X	X	X	X	X
Lithuania	X	X	X	X	X	X
Luxembourg	X	X		X	X	X
Latvia	X	X	X	X	X	X
Malta			X	X	X (partial)	X (partial)
Netherlands	X	X	X (minor)	X	X	X
Poland	X	X	X	X	X (partial)	
Portugal	X	X	X	X	X	X
Romania	X	X	X	X	X	X
Sweden			X	X	X	X
Slovenia	X	X	X		X	X
Slovakia			X	X		
UK	X	X	X	X	X	X

Source: BBC (2020), Beblavy (2020), BNN (2020a, 2020b), Caroll (2020), DW (2020), EURONEWS (2020), EUROSTAT, Gronholt-Pedersen and Skydsgaard (2020), *Luxembourg Times* (2020), Ward (2020). Authors' elaboration.

3 | THE MASST4 MODEL

In this section, the MASST4 model is first introduced with a nontechnical description aimed at offering a broad picture of its functioning.[2]

The MASST model has been initially conceived with the goal to overcome the conceptual dichotomy between models interpreting regional growth as a bottom-up process, thus relatively ignoring the relevance of Country-level determinants, and models instead interpreting regional growth as a top-down process, whereby national growth is distributed to regions according to their weights (Capello, 2007; Capello & Fratesi, 2012; Capello et al., 2017b). The model has been recently updated to its fourth generation (Capello & Caragliu, 2021).

The MASST model is a macroeconometric regional growth model built to simulate long-run regional growth rates for European regions. The label comprises the building blocks it comprises, i.e. Macroeconomic, Sectoral, Social and Territorial. In the MASST model, regional performance is explained both by macroeconomic features, playing the lion's share and modeling the national and global side, and by regional competitiveness factors capturing supply-side, with the sectoral, social, and territorial aspects of each region (Figure 1). The regional dimension is included by taking into consideration:

- *territorial capital*, representing the set of tangible and intangible assets that represents the growth potentials of a region (Camagni, 2009);[3]
- *territorial complexity*, reflected in the set of context specificities and synergies that characterize regional growth, like differentiated territorial patterns of innovation, regional urban structure, net agglomeration economies, and structural urban dynamics (Camagni & Capello, 2020).

Building a scenario through the MASST4 model requires a two-stage procedure. Firstly, structural relations in various national and regional equations are econometrically estimated on the basis of the specifications derived from the standard approaches in the extant literature. Next, the estimations thus obtained are used to simulate likely future growth rates (usually, over 15–20 years' horizon), and given an internally coherent set of assumptions forming regional growth scenarios. Scenarios comprise a set of logical relations depicting a possible (however not necessarily more likely) future development trajectory of European regions, to which the system converges by means of national and regional targets.

In its turn, the target mechanism works as follows. All variables exogenous to the model are levers in the hand of the modeler, and allow her to set qualitative future values depending on the way scenarios are implemented. In Equation (1), x is the variable modeled with the target mechanism, indices t and $t-1$ indicate two consecutive time periods, T is the value of the target at the end of the simulation period, and, finally, s is the speed of adjustment:

$$x_t = x_{t-1} + s(T - x_{t-1}). \tag{1}$$

For higher s, adjustment to the target is faster; in fact, for $s = 1$ the adjustment to the target value takes place instantaneously (i.e., in the first simulation year).

In the most recent version of the model, presented in Capello and Caragliu (2021), for the first time targets are dual for all variables. The modeler is allowed to set two targets for each variable, with a switch year left as a decision lever to model and incorporate regime switches, if any. While in the absence of conceivable breakthrough

[2]Because of space limitations, and since this is not the scope of this specific work, this section only synthetically summarizes the highlights of the model structure, while also dealing with the major advances in the fourth generation. More specific details can be found in Capello and Caragliu (2021). This marks a difference with respect to more technical papers such as Lecca et al. (2018), which are dedicated specifically to introducing as many details as possible about the model. A more detailed discussion is also, for the sake of readability, presented in Supporting Information Appendix A.1.

[3]Territorial capital comprises both tangible and intangible growth-enhancing regional features while also modeling proximity effects, that are in their turn rooted in the *Milieu Innovateur* theory. Pumain and Torre (2020) summarize both proximity effects and the Milieu Innovateur, within the broader picture of the French contributions to Regional Science.

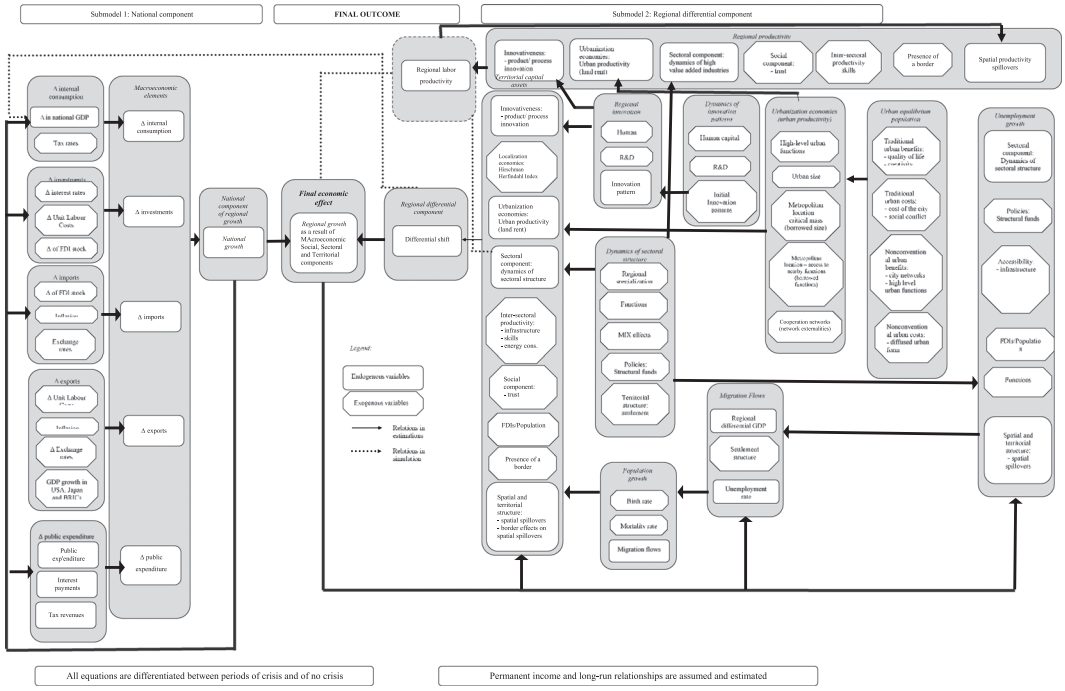

FIGURE 1 Structure of the MASST4 model. *Source:* Capello and Caragliu (2021)

events such as a major crisis this mechanism is not needed, and can be left dormant, in the present situation this improvement appears particularly promising, in that the short-run values of many exogenous levers will likely suffer from short-run decreases or contractions due to the lockdowns enacted in Spring 2020, only to resume their long-run tendencies once the slump is over.

An important point to touch upon is related to how realistic convergence to targets proves to be. This is a fundamental point for CGE models, and is increasingly under criticism because of the likely changing regime in the parameters estimated within economic relations (Cogley & Sargent, 2005; Koop & Korobilis, 2012). This issue becomes even more important, given the rapidly changing evolution of events, both health- as well as economics-related, associated with the COVID-19 pandemic. However, for the sake of quantitative foresights, this is a much less substantial issue. On the one hand, the MASST model aims at capturing simultaneous changes in several parameters, proper of a scenario building exercise; thus, single exogenous shocks are not expected to drive the final output of the model. For this reason, a linear target mechanism, as also illustrated in the Supporting Information Appendix, is employed in the model. Moreover, the MASST4 model now encompasses three sets of estimates, already taking the changing nature of parameter estimates into account. Actually, the simulated New Normality scenario could never be possible before the model was modified to take account of the parameter changes induced by the 2007/2008 global financial crisis (Capello et al., 2017b).

Figure 1 presents the structure of the model in the fourth and most recent update. The model merges national and regional features factors by explaining regional growth (ΔY_r) as the sum of national growth rates (ΔY_N) and the regional differential shift (s) (Equation 2.; Capello & Caragliu, 2021):

$$\Delta Y_N = \Delta Y_N + s;\ r \in N. \tag{2}$$

The national sub-model is based on a Keynesian quasi-identity, modeling GDP growth (ΔY_N) as a function of consumption, investment, public expenditure, export, and import growth rates. This first part of the model captures

macroeconomic determinants of regional growth according to a partial equilibrium setting, focusing on macroeconomic policies and trends in interest rates, in public expenditure, in inflation rates, in investment rates that can differ rather substantially among European Countries. Major dichotomies characterize in particular Eastern and Western Countries, and Northern and Southern ones. Lastly, the national sub-model also captures idiosyncratic differences between individual Countries through Country fixed effects.

The second component in Equation (2) is the regional differential shift (*s*) that is explained by regional competitiveness, measured as the efficient use of local resources, increases in the quality and quantity of production factors, including human capital, infrastructure, energy efficiency, European Structural funds, and interregional spatial linkages, capturing growth and productivity interdependence as suggested in Ertur and Koch (2007).

While a full-fledged description of the specific functional forms of the equations in the model cannot be presented here for reasons of space limitations, at this stage it is worth mentioning the major advances of the model's fourth generation. These mostly characterize the regional sub-model, and build upon major structural breaks in the behavior of regional economies as evidenced by the econometric analyses presented in Capello and Caragliu (2021).

The first structural break is associated with the *4.0 industrial revolution*. While before the 2007/2008 financial crisis European regions were mostly facing a long-run process of deindustrialization (Rodrik, 2016), after 2012 several EU economies witnessed a revamp in manufacturing, driven by the *Industry 4.0* technological paradigm. This is shifting the technological frontier upward in a few hotspots of efficient production and diffusion of new technologies, based on general-purpose technologies capable of widespread adoption in several manufacturing industries. In MASST4, this process is modeled with a new component of the regional sub-model explaining the probability of a region to experience a structural evolution in its territorial innovation patterns (Capello & Lenzi, 2018).

The second major trend identified in Capello and Caragliu (2021) refers to the political instability and institutional fragility that has over the past decade affected many EU Countries. The most important instance of this trend is the decision by the UK, made through the close call referendum held on June 23, 2016, to withdraw its membership in the European Union (henceforth, *Brexit*). The MASST4 model is now capable of modeling similar disruptive processes of EU membership withdrawal, also for other EU Countries (Capello et al., 2018).

A third and fundamental trend is related to the growing importance of cities as drivers of economic growth. In fact, over the past two decades a lively scientific debate took place over whether large cities overperform with respect to the Country they are belong to, thus engendering positive growth spillovers for the rest of their context environments, or whether instead large agglomerations actually drag down their own Countries (Capello et al., 2015; Dijkstra et al., 2015; Parkinson et al., 2015).

The MASST4 model now incorporates this debate by including an additional equation explaining agglomeration economies (proxied by urban land rent) with the intensity of high-quality functions hosted, quality of local institutions, and interurban cooperation (Camagni et al., 2016). The value of agglomeration economies thus predicted enters the explanation of the regional differential shift.

One last landmark improvement of the regional sub-model in MASST4 is related to the endogenization of labor productivity. While up to the third generation of the model this parameter was treated as exogenous and left in the hands of the modeler, the MASST4 model now explains regional labor productivity, with a relevant improvement in the explanatory power of the model, at least from the standpoint of regional economics. In fact, in a spatial equilibrium setting, employment and wages adjust to exogenous shocks through a geographical reallocation that guarantees in fact spatial equilibrium to hold (Camagni, 2020).

4 | A "NEW NORMALITY" SCENARIO: MODELING THE REBOUND EFFECTS

A scenario has been built for the time period 2021–2030. The scenario is not an extrapolation of the pre-COVID trend. We built a scenario in which the way European firms and consumers adapted to the 2020 situation drastically changes. The rebound scenario is therefore not a pure trend scenario of the postcrisis

TABLE 2 Assumptions for the new normality scenario

Variables	Assumptions for the new normality scenario (2021–2030)
Macro factors	
Debt/GDP	Convergence toward Maastricht parameter
Interest rate	Increased debt levels cause higher interest rates
Inflation rate	Reprisal of inflation rates
Deficit/GDP	Maastricht targets are met by Northern European Countries; some relaxing of Maastricht rules for Southern European Countries
GDP growth US-JP-BRIC	Lukewarm GDP growth in US and Japan; growth in BRIC Countries
FDIs	FDIs resume to pre-COVID levels
Consumption levels	Consumption levels almost regain pre-COVID levels
Investment	Major investment boost due to the recovery plan
Export and import levels	Major reprisal of import and export levels
Regional factors	
Industrial specialization	Pre-COVID levels for high-tech activities; permanent contraction for tourism and transport; contraction for other manufacturing
Input/output relations	I/O relations resume to pre-COVID levels
Innovation	Major increase in innovation intensive regions; medium increase in medium performing regions; minor increase in other areas
Trust and social capital	Partial reprisal of trust levels everywhere w.r.t. the lockdown period
Death rate	Return to pre-COVID rates
Energy efficiency	Increase due to the measures issued in the recovery plan

Source: Authors' elaboration.

period (which is typically dubbed "baseline" scenario), but rather a scenario where structural elements modified during the 2008 crisis are coupled with the normative interventions and the structural evolutions of the COVID-19 pandemic period. Geographical reorientation and structural reorganization of the production value chains, new business models, new travel and social behaviors, different consumption and investment patterns hint at a "new normality."

The assumptions made for the new normality scenario are shown in Table 2.

Some assumptions stem from the measures undertaken at EU, national, and local level to counterbalance the effects of the COVID-19 pandemic. In fact, the scenario takes into consideration the funds available by the recovery plan decided by the European Commission (EC, 2020a). These measures have been taken after several rounds of discussion among EU member states and aim at supporting the recovery of EU economies through the injection of 1,824.3 billion Euros, comprising the multiannual financial framework (MFF) as well as an extraordinary recovery effort represented by the *Recovery Plan*. A new normality scenario encompassing the benefits stemming from increased investment due to the EU's *Recovery Plan* will imply an accelerated rate of investment growth. Clearly, investment will become more intense in healthcare-related axes (the EU has so far committed additional budget for getting easier access to COVID-related treatments and testing, while also committing funds toward structurally reforming EU healthcare systems; EP, 2020). At the same time, the Recovery Plan comprises actions aimed at stimulating full recovery in EU economies most affected by the Spring 2020 contraction. In addition to the EU's standard budget, EUCO (2020) formalized a plan to allow borrowing on international markets up to 750 billion Euros of extra resources (roughly equal to 5% of the EU27's GDP, in its turn equal to 13,922

Euros in current prices in 2019). Such external resources will be devoted mostly to additional investment meant to revive economic growth in European Countries.

The new normality scenario also captures the structural changes that are perceived to take place in the economy and in the society. For the former, consumption habits will likely "be modified by new regulations and procedures in the way consumers shop and buy products and services. New habits will also emerge by technology advances, changing demographics and innovative ways consumers have learned to cope with blurring the work, leisure, and education boundaries" (Sheth, 2020). This may happen through an enhanced frugality, most importantly in leisure-related expenditure. Consumption growth rates are then expected to partially resume to a fraction of the pre-COVID era.

The pandemic has in fact brought about a significant slowdown of international trade, in association with a reduction in offshoring processes, if not a reshoring proper (e.g., Gereffi, 2020 for the case study of medical supplies). Still, many argue that such strategy is not feasible and that the gains from international trade will make it highly unlikely that the offshoring process will not resume its precrisis path (Miroudot, 2020). For this reason, in our assumptions a major reprisal of both imports and exports is assumed, together with an interregional Input/Output relations as going back to their pre-COVID levels.

The support by the European Central Bank (ECB) of rapidly growing debt stocks in several EU Countries is unlikely to be sustainable in the long run. In Spring 2020 the ECB gradually moved its deposit facility rate to −0.5%, thus basically subsidizing firms for lending money (Schnabel, 2020). In a few years, though, the evidence suggests that holding interest rates in the negative ground for prolonged periods may have a negative impact on banks' profitability (Heider et al., 2019). In the absence of substantial support, it can be argued that the overburden of public debt in several EU Countries, mostly located in its least performing areas (Italy, Spain, Greece, and Portugal) would again elicit speculative attacks on international markets, thus causing increases in the cost of servicing public debt. Higher levels of debt will also mean that, while a full-fledged revision of Maastricht criteria is not to be foreseen, and some selected tolerance will be applied for Countries that entered 2020 far from debt and deficit Maastricht targets, and will likely end the year with even more substantial stocks of debt.

At the global level, uncertainty across developed and developing economies, and the prolonged negative effects of the COVID-19 pandemic, coupled with growing levels of public debt, are expected to exert a negative influence on economic growth (IMF, 2020). Lukewarm economic performance in both US and Japan, on the one hand, and BRICs, on the other hand is foreseen.

Structural breaks with respect to the past are expected to take place in socioeconomic behaviors. New business models through digital markets will explode, at the expense of traditional commercial activities. New social behaviors will emerge. Digital communications (e-meetings, e-conferences, and webinars) imposed by the COVID pandemic will enter the habits of people. Even though not with the same intensity, they will replace many face-to-face meetings, with a consequent contraction of business travels with respect to the pre-COVID period. The sense of insecurity and fear of moving around will influence the behavior of many people, and long-distance tourism travels will be substituted (at least in the medium term) with short-term distance travels (Gössling et al., 2020). At the same time, new consumption behaviors learnt during the lockdown, namely an e-commerce oriented more to necessary goods rather than luxury ones, will continue. Within this framework, the Industry 4.0 paradigm would also resume its decadal growth at full extent, thus reinforcing the growth of high-tech manufacturing.

Associated to this point, in a *new normality* scenario trends in R&D expenditure emerging in European regions in the period before the pandemic are assumed to resume, pushed by the need to develop the 5G network program. In a context of increased focus on innovative activities, the budget committed to innovative activities will increase, most importantly in areas exiting the crisis with a major wealth of innovative capacity. This does not necessarily imply that only strong areas will benefit; in fact, regions less strong in innovative activity may still

TABLE 3 Rebound in EU28 Countries: annual average GDP growth 2021–2030

Country	2021–2030 annual average GDP growth
Austria	4.13
Belgium	4.29
Bulgaria	5.18
Cyprus	4.69
Czechia	4.14
Germany	4.34
Denmark	4.74
Estonia	5.22
Greece	5.06
Spain	5.23
Finland	4.07
France	5.55
Croatia	5.43
Hungary	4.56
Ireland	4.69
Italy	5.45
Lithuania	4.57
Luxembourg	4.95
Latvia	4.80
Malta	5.16
Netherlands	4.52
Poland	4.25
Portugal	5.44
Romania	4.38
Sweden	4.47
Slovenia	4.20
Slovakia	4.94
UK	4.25
EU	*4.75*

benefit from creatively adapting General Purpose Technologies, or externally-produced innovations, to local needs, or by creatively recombining existing practices in a novel way.

The need for "social distance" imposed during the pandemic will definitely leave traces in the way people trust each other. While during the lockdown period trust in institutions has often peaked (Sibley et al., 2020), once the initial emergency ended initial evidence suggests that the social fabric is only slowly, and to a limited extent, returning to prior trust levels. In fact, evidence collected for prior similar events suggests that the time needed to

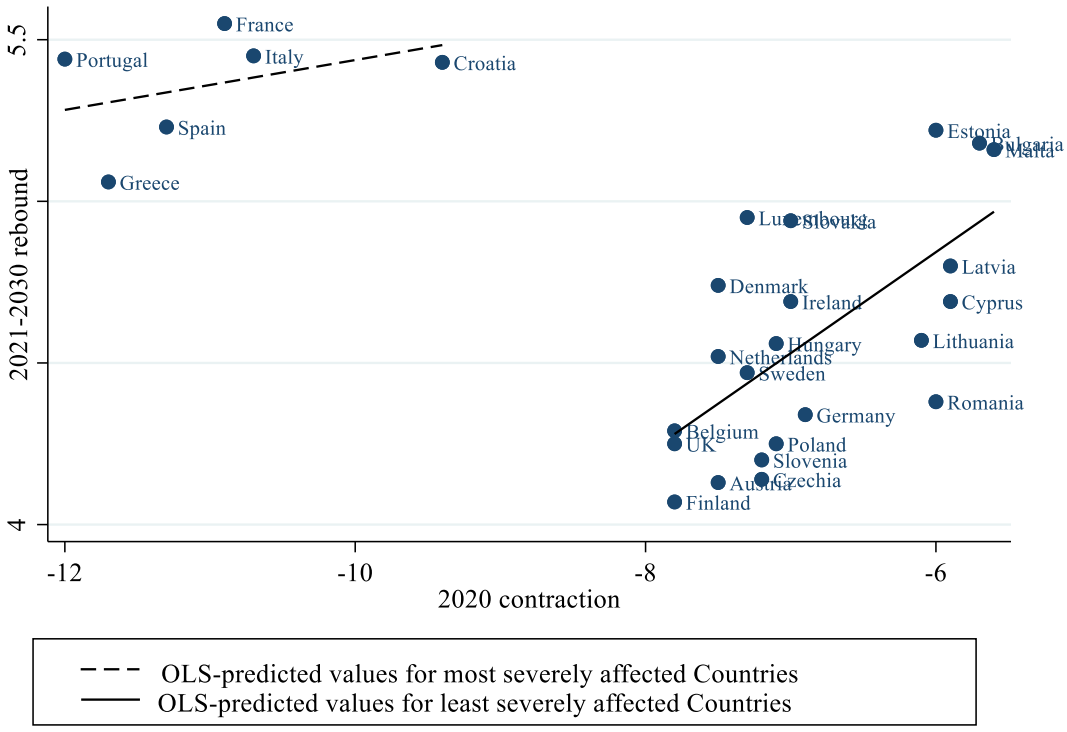

FIGURE 2 2020 GDP contraction and 2021–2030 GDP growth in EU28 Countries, MASST4 simulations. *Source*: Authors' elaboration [Color figure can be viewed at wileyonlinelibrary.com]

fully regain trust in both peers and formal institutions is quite substantial after severe pandemics have ended (Barry, 2009).

All in all, our scenario assumptions depict on the one hand a world of imperfect return to normality, while on the other hand capturing the structural change that the exogenous and symmetric shock has prompted in the behavior of EU consumers and firms.

5 | RESULTS OF THE NEW NORMALITY SCENARIO

Table 3 presents the results of the new normality scenario, with average yearly GDP growth rates being shown for the period 2021–2030 (therefore excluding the lockdown period). Rebounds seem to be rather substantial for Countries that have been most severely affected during the Spring 2020 crisis. In particular, foresights for Croatia, Italy, France, Spain, and Portugal present particularly robust growth rates. While these rates may appear overly optimistic, given the magnitude of the contractions registered in the wake of the Spring 2020 crisis, they lead all EU28 Countries to regain their initial 2019 GDP levels in 2030.

Given the nature of the MASST model, average annual growth rates in Table 3, while appearing too high, should again be read as quantitative foresights. Time-wise, the recovery is expected to initially be quick, and then to flatten over the simulation period.

Results in Table 3 should not be read separately from those described in Supporting Information Appendix A.4. Taken altogether, Supporting Information Table A.4 and Table 3 depict a two-speed Europe, with the group of Countries hit the hardest from the Spring 2020 crisis that also tend to rebound faster than

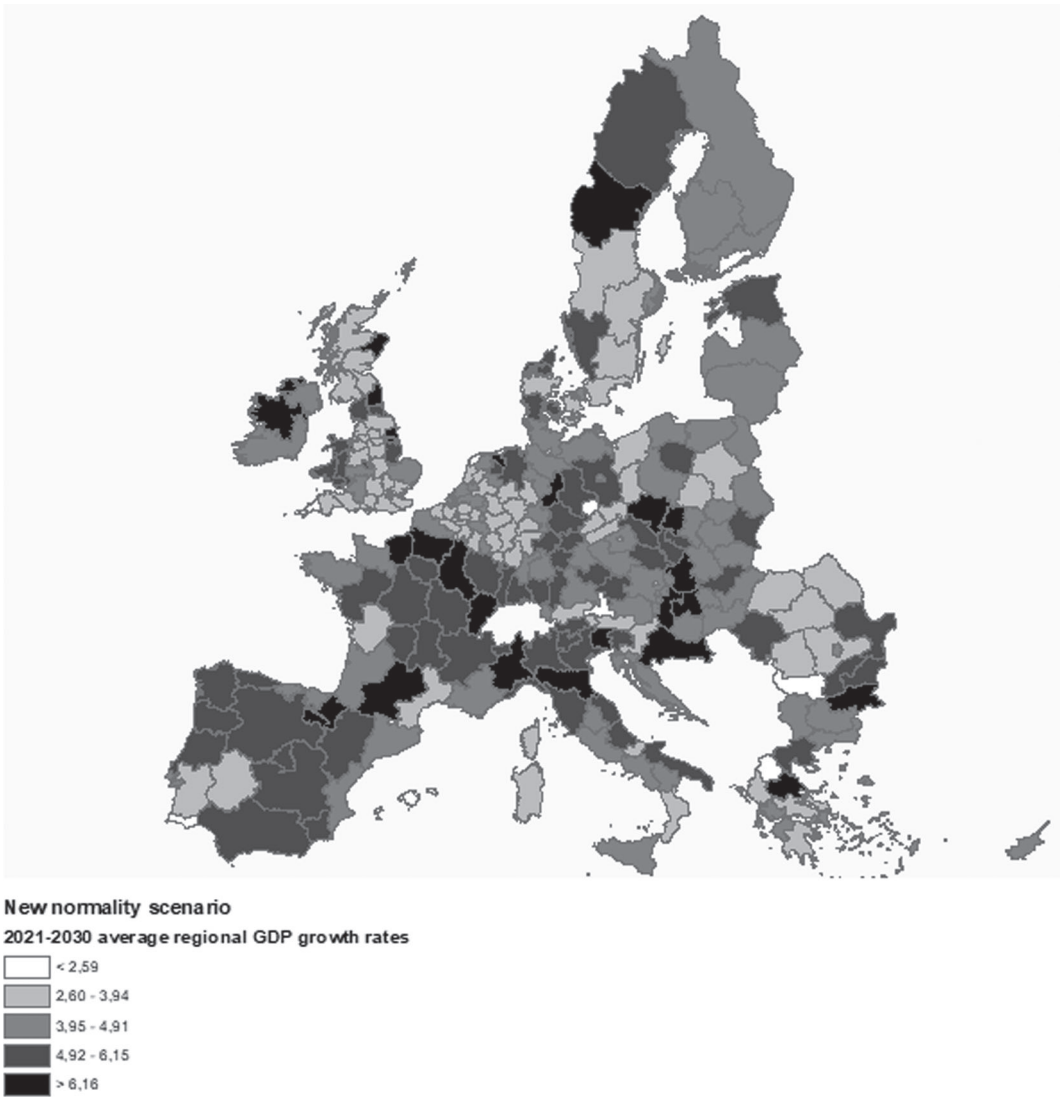

FIGURE 3 2021–2030 regional annual average GDP growth rates. *Source*: Authors' elaboration

the rest of Europe, while within those two groups, regions incurring in lower costs tend to enjoy faster post-2020 growth rates.

This argument is best illustrated with a scatter plot representing the 2020 contraction on the *X*-axis and the 2021–2030 rebound on the *Y*-axis (Figure 2). Countries clearly cluster in two main groups. In the North-West quadrant lie Countries that both face major costs due to the Spring 2020 lockdowns (namely, France, Spain, Italy, Greece, Portugal, and Croatia). Among those Countries, a relatively weak positive association between Spring 2020 GDP contractions and 2021-2030 GDP growth is found ($\beta = 0.08$, $R^2 = 0.16$; dashed line in Figure 2). In the South-East area of the graph one can find Countries that were both relatively less affected by the COVID-induced contraction, while at the same time presenting a less pronounced bounce back in its aftermath. These Countries also present a positive and significant association ($\beta = 0.31$, $R^2 = 0.42$; solid line in Figure 2).

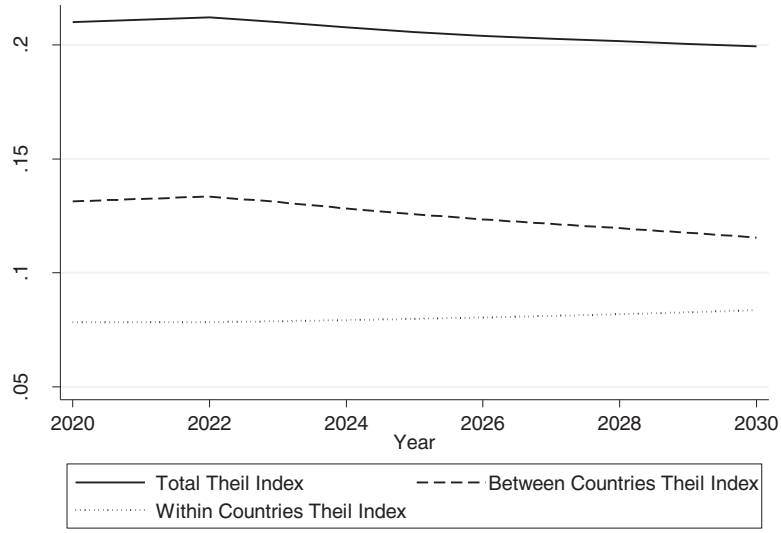

FIGURE 4 Total, between countries, and within countries Theil indices, 2020–2030. *Source*: Authors' elaboration

Figure 3 provides instead a regional breakdown of the 2021–2030 average GDP growth rates. This map highlights that a major rebound from the peak of the 2020 contraction can in general be expected everywhere.

More in particular:

- in general, areas hit the hardest from the COVID emergency tend to significantly rebound (this is the case, for instance, of France, and to a lesser extent Spain and Italy); the only exception in this respect is the case of UK, which probably suffers the negative consequences of Brexit;
- CEECs and their regions tend to register slightly lower growth rates in this second subperiod, but their overall economic performance remains stronger in the long run, due to the lower losses registered during the lockdown;
- some capital cities, but not all, tend to gain faster with respect to second and third-rank cities (this is the case for instance of Berlin, Bucharest, and Helsinki).

6 | LONG-RUN REGIONAL DISPARITIES IN EUROPE

The natural question emerging is the influence that the COVID-19 and its rebound trajectories will have on regional disparities (Camagni et al., 2020). With this purpose, a traditional Theil index[4] has been calculated, with the formula:

$$Theil = \frac{1}{N}\sum_{i=1}^{N}\frac{y_i}{\bar{y}} ln\left(\frac{y_i}{\bar{y}}\right), \tag{3}$$

where N is the number of regions, y_i is the variable of interest in the ith region (in this case, regional GDP) and $\bar{y}$ is the average regional GDP calculated for all regions (OECD, 2016).

The Theil index allows a decomposition into inter-national (Between Country Theil index) and intra-national (Within Country Theil index) disparities, thus making room for an analysis of the sources of its intertemporal

[4]See Nijkamp (2020) for a review of Theil's contributions to the Dutch School of Regional Science.

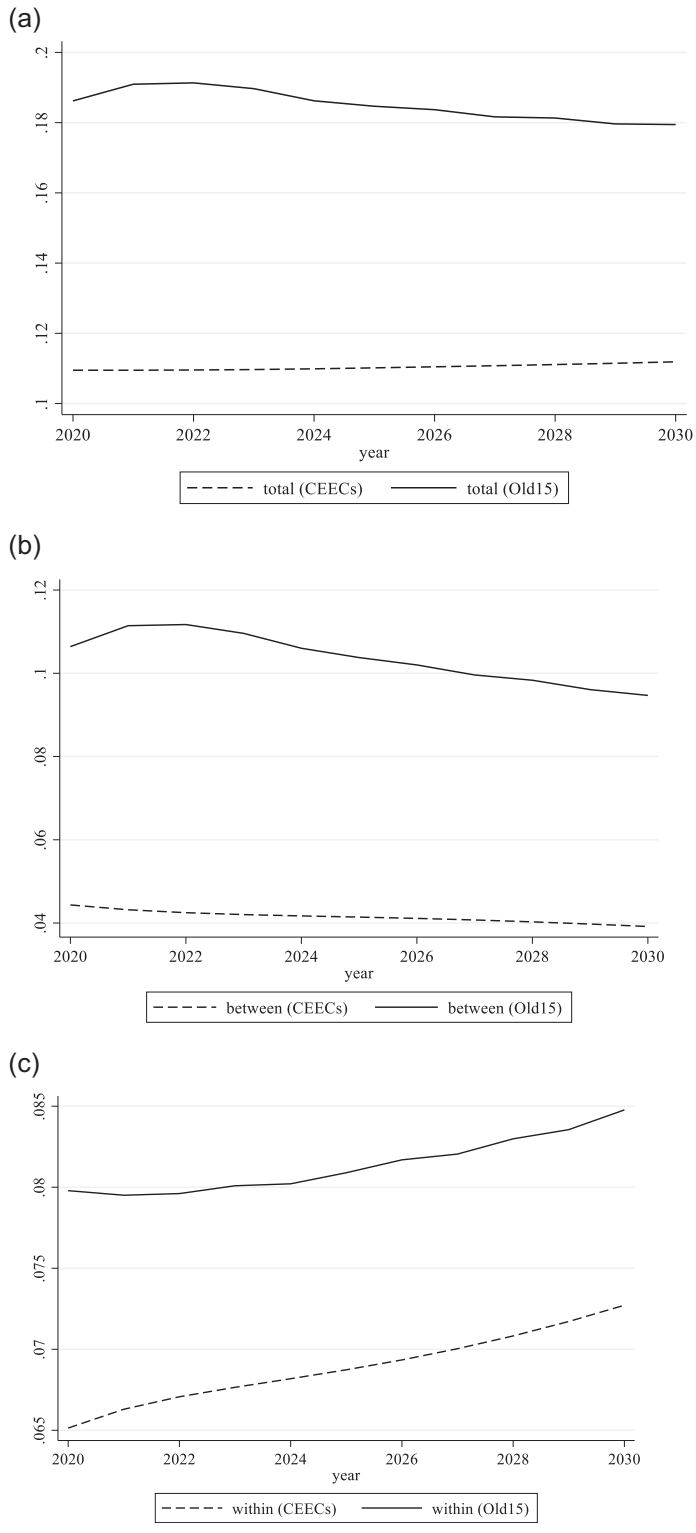

FIGURE 5 Total (a), within (b), and between (c) Theil indices for Old15 Countries and CEECs. *Source*: Authors' elaboration

evolution. Results of this empirical result are shown in Figure 4, where the Total Theil index is represented with the solid line, the Between Countries Theil index is shown with a dashed line, and the Within Countries Theil index is drawn with the dotted line.

Figure 4 shows that the initial (and major) GDP contraction leads to an increase in regional disparities. This trend is led by an increase in between country disparities, as a result of countries entering the crisis with a lukewarm economic performance (this is for instance the case of France, projected at a 1.5% GDP increase in 2019 with respect to 2018, and Italy, with a meager 0.3% growth) and incurring major costs from the earliest and most severe lockdowns. These Countries, typically located in the South-Western region of the EU, have already prompted many to talk about an emerging North-South divide (Landesmann, 2015), to be added to the historical lag registered by Countries with socialist economies before 1989.

This interpretation finds evidence by breaking down the EU28 Theil Index into their Old-15 and CEECs components. This is done in Figure 5a–c; across the three panels, dashed lines always refer to CEECs, while solid lines indicate Old15 Countries.

Figure 5a shows the Total Theil Index, that clearly suggest that in Western countries disparities increase among countries, while they remain stable in Eastern countries. When the trend is unpacked into "between" and "within" country disparities, western countries register the highest increase, while eastern countries even slightly decrease.

In the new normality scenario, total regional disparity trends change their trajectories, and decrease (Figure 5a). Also in this case, the between country disparities drive the general trend. The trend is due to the strong rebound taking place in the western countries more hit by the pandemic (Figure 5b). In Eastern countries, the total trend slightly increases (Figure 5a), as the result of a drastic increase in within country disparities, counterbalanced by a decrease in within country disparities.

In both western and eastern countries the new normality scenario registers a higher increase in the strong and core areas of the countries, increasing within country disparities (Figure 5c). As in all crisis period, the relaunch starts from the strongest and most equipped areas of each country.

7 | CONCLUSIONS

This paper set the ambitious aim to provide a first assessment, with a spatial breakdown, of a new normality scenario, as the result of the way European regions have first faced the initial contraction in 2020, and then will exit the crisis over the next decade.

Both simulations were obtained with the use of the latest generation of the MASST (MASST4) model, which allowed to both simulate the short-run GDP contraction taking place in 2020 as a result of the Spring lockdowns (2 years ahead of the likely publication of the EUROSTAT regional statistics), while also providing long-run foresights about the way European regions will exit the crisis.

A possible limitation of the analyses carried out with the pandemic still going on is that the economic impacts of further restrictions, in their turn due to the reprisal of pandemic waves, could have been underestimated. However, while we did assume that no additional strict national lockdowns would take place in autumn and winter 2020, and as we are undertaking these revisions, evidence that a second (and in some cases, third) wave of lockdowns (in general with milder measures with respect to the spring ones) is being enacted, incorporating their effects into these simulations would not change our findings from a spatial point of view. In fact, the second wave of the pandemic in Europe is proving to be, unfortunately, more pervasive and spatially homogeneous even than in spring 2020 (Cacciapaglia et al., 2020), thus likely causing less spatial imbalances than those already illustrated by the foresights here presented.

Our findings further suggest that, at least in the short run, remarkable increases in overall disparities may affect European regions, driving them off the long-run path of convergence still representing a major

policy target for the European Union and that they had followed before the crisis, unlike regions in other developed contexts such as the US (Choi et al., 2020). This result is likely due to the severe Country-specific impact that the COVID-19 emergency, and the associated economic costs, had on areas in the South-West of the EU28.

In the long run, total disparities decrease, but within country disparities increase. As it has always been the case, a relaunch starts from the most advanced and equipped areas of the countries. It will therefore be an additional burden for European Regional policies.

While the present development of the COVID-19 pandemic makes it hard to foresee how economic costs will evolve, and in particular whether further waves of lockdowns will be required, our findings do point at substantial regional variations that must be taken into account when shaping policies aiming at minimizing the costs, and at fostering the European economy's bounce back.

Our findings may also be subject to an ex-post assessment, that will be feasible once real GDP data at regional level will be made available by EUROSTAT. Calibrating in this way macroeconometric regional growth models will also make them more capable of interpreting major crises such as the presently ongoing one, thus providing more powerful instruments to foresee regional reactions to possible similar negative shocks. This will ultimately make the European economy more resilient, and allowing institutions to enact evidence-based policies.

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CONFLICT OF INTERESTS

The authors declare that there are no conflict of interests.

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Additional Supporting Information may be found online in the supporting information tab for this article.

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