

Productivity and resilience

A post-COVID-19 perspective

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This paper offers a detailed account of the main elements, theoretical and empirical, that characterise the separate strands of literature on productivity and resilience. In so doing, the paper adopts a regional perspective to shed light on how the 2008 global financial crisis and the COVID-19 pandemic have gradually reoriented the scholarly debate from understanding what enhances productivity to embracing a wider perspective on regional development. The latter includes the notion of resilience and its many nuances, each focusing on a specific set of mechanisms through which regions can bounce back, adjust or bounce forward to new development trajectories. In this context, the paper offers a thorough discussion of how the notions of productivity and resilience exhibit complementarities and trade-offs in terms of conceptualisations, objectives and policy measures, with the idea that identifying and focussing on the overlapping area between the two constitutes a novel research agenda worth of examination. The paper concludes that the pandemic provides a unique opportunity for moving policy goals along these lines and delineates a new-normal policy approach to regional development. In this framework, the core aim of productivity growth should be pursued through resilience-improving, or at least resilience-neutral, programmes and interventions for different categories of regions depending on their specific features.

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The workshop is a part of the five-part workshop series in the context of the OECD-EC project on "Productivity Policy for Places". The five workshops cover the following topics: (1) Innovation-Productivity Paradox; (2) Productivity in the Private Sector; (3) Public Sector Productivity; (4) Inclusive Productivity? and (5) Productivity and Resilience.

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Table of contents

1 Introduction	4
2 Global crises in the 21 st century, spatial implications and policies	7
2.1 The 2008 financial and economic crisis	7
2.2 The current COVID-19 pandemic crisis	8
3 Long-term productivity growth and regional convergence vs. divergence	11
4 Shocks, disturbances and the resilience perspective	14
4.1 Stability, steady-state and bounce-back	15
4.2 Structure, absorption and reorganisation	15
4.3 Adaptation, adaptability and bounce-forward	16
4.4 The uneven geography of resilience	18
5 Productivity-resilience synergies and trade-offs	19
5.1 COVID-19, cost-efficiency and spatial imbalances	19
5.2 GVCs, globalisation and inequalities during the pandemic	20
5.3 COVID-19, digitalisation and productivity: opportunities and challenges	21
5.4 Productivity-enhancing adjustments: market selection and allocative efficiency	22
5.5 Productivity, resilience and territorial capital	23
6 Post-pandemic policy responses for productivity and resilience	25
7 Concluding remarks	28
References	30

1 Introduction

The last decades have witnessed the emergence and reinforcement of two very significant and interrelated trends. On the one hand, a general and gradual decline in the level of productivity across most OECD countries, which signals the increasing difficulty and inability of advanced economies to successfully sustain their traditional growth paths (OECD, 2019). On the other hand, a persistent and relentless process of increasing divergence between the productivity performances of regional economies within countries, which generates a growing polarization of development and employment opportunities in a very limited set of locations (Iammarino, Rodríguez-Pose and Storper, 2019). In this framework, many governments have made, over the years, a big effort, in terms of public resources and policy interventions, to invert these trends of productivity slowdown and widening territorial gaps. In this vein, traditional efficiency-enhancing policy packages include a varying mix of tools to favour the mobility of workers, foster investment in infrastructures, R&D and education, facilitate industrial specialisation and new technology adoption, as well as open national and regional economies to larger markets and global value chains. While this plethora of measures is adopted with the ultimate aim of stimulating the productivity of firms and workers, the practical outcomes often remain disappointingly fragile and uncertain. In this setting, it has become increasingly evident that, despite these many efforts, some structural weaknesses are rooted into social and economic features of many regional economies within the OECD countries, and that a number of vulnerabilities frequently act as barriers to the realisation of virtuous cycles of local productivity growth. Regional vulnerabilities have become strikingly evident in the wake of the global economic and financial crisis of 2008-2009 that has generated a severe recession worldwide accompanied by persistent economic costs and missed development opportunities. In many OECD economies, the productivity growth rates remain significantly lower than the pre-crisis levels even after many years (OECD, 2016), thus indicating the depth and incidence of the economic outburst. What is even more significant is that the spatial distribution of the impact of the crisis is evidently and systematically uneven, with some regional economies being able to recover swiftly whereas many others are thrown in an economic trajectory of stagnation or decline. As a matter of fact, employment loss remains marked in traditional manufacturing areas within most OECD economies while service-oriented locations and technological hubs have experienced more limited effects and faster recovery. Furthermore, while many of the wounds provoked by the financial crisis are far from healed, the ongoing COVID-19 pandemic and the unprecedented economic costs related to the lockdown measures taken by many governments around the world represent an additional source of economic damage for many already distressed national and regional economies.

In this framework, the present paper aims at discussing the tension between productivity and resilience with specific focus on the case of regional economies. While these two concepts emerge from very different theoretical traditions, thus entailing clear trade-offs between one and the other, the paper attempts to highlight areas for possible integration of the two. Understanding the relationship between productivity and regional resilience is, in fact, a relevant objective of inquiry especially in times of economic recession.

Within the traditional neoclassical framework of growth, increasing emphasis has been placed on the role of technological progress in determining the long-run path towards higher productivity, first intended as exogenously given, and subsequently endogenized through the active role of investment in education and R&D. According to this view, income per capita across locations should converge over the long-term as a result of both spatial adjustment mechanisms, leading factors to move where returns are larger, and technological catching-up processes favouring lagging-behind regions and countries. Nevertheless, the

empirical evidence on these processes remains rather inconclusive, with convergence rates in income per capita remaining rather low and mostly associated with a limited set of club regions. Growing evidence, instead, emerges in favour of systematic and widening territorial gaps across and within countries. In this setting, the shocks related to the economic recession first and to the pandemic in current times may exacerbate spatial disparities. Mostly triggered by the 2008-2009 global crisis and consequent recession, both the academic and the policy debates have gradually re-oriented the focus of their attention from the mechanisms and the dynamics underlying productivity growth to the more encompassing consideration of what is generally labelled as the resilience of an economic system (e.g. Christopherson, Michie and Tyler, 2010; Hassink, 2010; Martin and Sunley, 2015, Faggian et al. 2018). Such a switch of analytical perspective fundamentally denotes a renewed interest for the short- to long-term processes, roles, occurrences and responses to extraordinary economic shocks and disturbances (Simmie and Martin, 2010), in contrast to the dominance of the traditional investigations regarding the causes of long-run growth and technological progress. While understanding the latter certainly remains a fundamental task, the unexpected and sudden global recessions of the last decade call for an alternative approach to understand and address spatial development in a more holistic sense. In this vein, the concept of regional resilience offers the opportunity to understand the short- and long-term patterns and processes that make locations more or less vulnerable to shocks, disruptions and changing circumstances, rather than exclusively focusing on the factors contributing to economic performance in the long-run.

The notion of regional resilience can be understood in different ways to emphasise a set of diverse properties and features regarding the link between a shock and the performance of a regional economic system. These dimensions first include an engineering meaning, intended as the ability of a region to bounce back to a pre-existing path or state after experiencing a disturbance. In this sense, the attention is devoted to the speed and the extent of the recovery process to the pre-shock status and, thus, the idea of resilience is mostly based on a self-restoring equilibrium. A second meaning of the resilience concept is related to an ecology, whereby a resilient region is one able to absorb shocks without mutating its structure. According to this typology of resilience, the stability of the regional economic system is at the core of the analysis as well as the size of the shock that can be tolerated before the regional structure moves to another state. In this sense, the foundational idea of this type of resilience rests on the existence of multiple equilibria. Finally, regional resilience can be interpreted in an evolutionary sense, whereby a resilient regional economic system is able to adapt in response to shocks and bounce forward by maintaining its core performance. While the very idea of resilience can have different implications, it is also important to consider the different nature of the disturbances that can affect regional economies. These can analytically be distinguished based on their temporal nature, although in reality they can be interacting, transforming and self-reinforcing. On the one hand, there can be acute shocks, such as natural and medical disasters or big plant closures, whose occurrence is sudden and unexpected. On the other hand, disturbances can take the form of slow-burns or slow-moving challenges (Pendall et al., 2010), such as deindustrialisation, prolonged recession or climate change, whose effects tend to be chronic.

Therefore, through the lens of the concept of resilience it is possible to account for spatial differences in the way regional and national economies react to change and shocks. In this picture, policies and measures traditionally taken to foster productivity growth can be differently successful across space depending on both the local features of resilience and the nature of the disturbances at work. Furthermore, the framework of resilience allows to consider that certain productivity-enhancing measures could, in some circumstances, be detrimental for the resilience capacity of a regional economic system. For instance, in the face of the current COVID-19 global pandemic, the reorganisation of the health system in many countries according to an efficiency principle might have undermined the capacity of many local economies to successfully deal with the disease and its business implications. Similarly, the celebrated productivity advantages of large agglomerations can be offset by the dramatic spread of COVID-19 in large industrial and concentrated areas (Ascani, Faggian and Montresor, 2021). Therefore, in general, policy approaches over-emphasizing productivity growth could contain the risk of jeopardizing the resilience of local economies in the face of sudden shocks and longer-term challenges. At the same time, the implementation

of other efficiency-enhancing tools, mostly related to the domain of new communication technologies and digitalisation of activities, make a number of business operations still possible in a time of economic lockdown, thus reinforcing the profile of resilience of regional economies.

2 Global crises in the 21st century, spatial implications and policies

The first two decades of the 21st century have been characterised by two major economic crisis: namely, the 2008 financial crisis, initially triggered by the collapse of the sub-prime mortgage boom and house price bubble in the US, and the current crisis associated with the lockdown containment measures required to tackle the COVID-19 pandemic. While the two crises have very different roots and characteristics, their inherently global nature and their spatial consequences can deeply exacerbate the existing patterns of disparities across countries and regions, compromising the recovery opportunities and development trajectories of many local economies. The heterogeneous vulnerabilities of regional economies imply that the impact of the recessions and the economic costs associated with the crises are more pronounced in certain areas as compared to others. This is especially true for the case of the downturn following the 2008 economic turmoil, in which case the productivity growth rates of many areas remain significantly lower than the pre-crisis levels even after a decade (OECD, 2016). Against this background, the current pandemic may deepen the structural vulnerabilities of certain economies and slowdown their recovery even further. In other words, the cumulated costs of the 2008 financial crisis and the COVID-19 pandemic may disproportionately affect fragile regional economies within the OECD area, posing severe obstacles to the recovery and the re-launch of the most affected locations.

2.1 The 2008 financial and economic crisis

The 2008 economic crisis fundamentally started as a financial and mortgage crisis with its deepest roots in the US banking system. As a result of global liquidity bubbles growing over the years, or an easy access to inexpensive credit, borrowers faced increasing difficulties in repaying debts to banks. Nevertheless, starting in the late 1990s, banks were allowed to operate in ways that led them to spread the risk of loans through other financial instruments towards a number of other investors all over the world (Dymski, 2010). In this way, a great share of mortgage finance has become a form of structured debt. In turn, the increase in bank lending reinforced the demand for houses sustaining a growing house prices bubble. When the lending and house bubbles burst, they generated a downward spiral of bank losses and capital decline, foreclosures, restrictions on lending and credit crunch and, ultimately, a dramatic fall in consumers' confidence and a consequent slowdown in households' spending (Martin, 2011). The credit crunch directly impacted many businesses, which led them to reduce investment, lower salaries or decrease employment. At the same time, trade collapsed and unemployment rose in many OECD countries. In this sense, the impact of the 2008 financial crisis can be labelled as an example of 'glocalisation', that is, a phenomenon with local origins and global repercussions and feedbacks (Martin, 2011). In fact, while the financial crisis had its origins in the US mortgage market, the risks of this easy access to credit were globally distributed through other financial instruments to global investors. In turn, the subsequent global credit crunch and the recession had local impacts depending on the specific profile of different locations. Unemployment, in fact, rose disproportionately in the manufacturing and construction sectors, as compared to services and financial activities, mostly because of the obstacles to finance new investments of these firms and the fall in final demand for durable goods (Keely and Love, 2010). Therefore, regional and urban economies

characterised by a manufacturing vocation experienced the hardest consequences in terms of output and employment. In many cases, these were locations and sectors featuring large shares of low-skilled labour and experiencing a slow decline even before the recessions due to the increasing global competition of emerging economies. On the contrary, skilled workers have experienced less risks of unemployment, partly because they have shifted to other lower skilled jobs and partly because employers were more reluctant to let go human capital that is more difficult to find. In this setting, the most concerning implications are associated with large shares of low-skilled youth unemployment, as their opportunities to find new occupations in times of recession and given their lack of specific competences remain very limited. Both the regional patterns of unemployment and the industrial structure of local economies suggest that there is a highly significant geographical aspect to the impact of the 2008 economic outburst. Indeed, the effect of the crisis became evidently and systematically uneven, with some regional economies being able to recover swiftly whereas many others stuck in an economic trajectory of stagnation or decline. Indeed, the loss in employment has remained marked in traditional manufacturing areas within most OECD economies while service-oriented locations and technological hubs have experienced more limited effects and faster recovery.

In general, not only these elements suggest that the economic downturn started with the 2008 financial crisis has highlighted the inability of policy makers and scholars to predict and tackle the recession, but also that most economies are not based on development trajectories able to sustain inclusive growth across geographical space. Not surprisingly, recent years have witnessed a rising and concerning productivity dispersion across firms, even within narrowly defined sectors (Andrews, Criscuolo and Gal, 2016). This implies that the productivity growth of the most productive companies is faster than that of the rest, generating a concurrent trend towards increasing market concentration, profits and income (Grullon, Larkin and Michaely, 2019). From the geographical standpoint, this is not a spatial-neutral process, as the most productive companies are located in core regional and urban economies, where the availability of skills, competences, innovative potential and dense business networks strongly support productivity growth (Suedekum., 2021). Conversely, peripheral regions are mostly characterised by companies with average or low levels of productivity, increasingly losing grounds with the most productive incumbents. Therefore, the dynamics of productivity growth across space may overlap with the patterns of rising spatial disparities accelerated by the economic recession.

2.2 The current COVID-19 pandemic crisis

While many of the wounds provoked by the 2008 financial crisis and the subsequent economic recession were far from healed in many regions, the health crisis triggered by the pandemic of COVID-19 hit the global economy causing large-scale damages, primarily in terms of human losses. As of February 1st 2021, which is almost a year after the WHO officially declared the disease a 'pandemic', the global number of confirmed deaths amounts to 2.2 million with more than 102 million confirmed cases of infections in the world (WHO, 2021). The unprecedented magnitude of this global shock has generated widespread public measures aimed at containing the virus, as the most urgent priority for most governments is to limit the diffusion of the disease and minimise mortality rates. Nonetheless, while these measures are required to alleviate the short-term impact of the pandemic on public health, they set in motion a major economic crisis that still has to unfold its full consequences. Indeed, the stringent lockdowns adopted in many countries at multiple points in time during 2020 and early 2021 have frozen many economic activities, disrupting markets, transactions, exchanges and, ultimately, affecting consumption (Baker et al., 2020). Furthermore, the halt of production in many countries and regions generates cascading effects in terms of international sourcing of inputs and intermediates, thus deeply disrupting global value chains and the organisation of global production. The huge fall in consumption and production, mirrored by a collapse in confidence among consumers and businesses, is accompanied by dramatic consequences for employment in terms of the sheer reduction of working hours and drops of new job creation and opportunities (ILO/OECD, 2020).

In many OECD countries, especially in Europe, these elements have not immediately determined a dramatic increase in unemployment, mostly due to the policy actions to cushion their effects through job retention schemes. However, the prospects for the future remain those of an imminent and very serious job crisis that will plausibly endure after the health crisis is solved and will especially hit the most vulnerable categories of workers, such as young people and women. Furthermore, at the onset of the pandemic, many economies in the OECD still exhibited many long-term vulnerabilities, partially related with the 2008 financial crisis, such as stagnating productivity, rising inequalities, job instability, housing shortages, financial insecurity and high debt. These issues may be exacerbated by the economic crisis unleashed by the pandemic, with deep and prolonged implications for many regional economies whose recovery from the previous recession was slow and difficult. Therefore, the economic consequences of the pandemic may not be evenly distributed across space and society, with weaker and already distressed regional economies and groups experiencing more severe implications.

Against this background, in the months after the COVID-19 lockdowns, many governments have adopted extraordinary economic measures in the face of the mandatory business restrictions. These measures are mostly aimed at supporting companies' liquidity with wage-supporting schemes, paid sick leaves, job retention programmes and unemployment benefits. Moreover, smart-working and digitalisation of both private and public administration operations experienced a notable and encouraging growth, due to the need to maintain a minimum degree of economic activity despite the limitations to individuals' mobility and face-to-face interactions (Ascani, Faggian, Montesor and Palma, 2021). Clearly, informal activities, by their very nature, are hardly covered by these schemes and are therefore severely affected by the pandemic and the consequent containment measures. For some urban and regional economies, this implies the dramatic reduction or loss of income for a very high number of individuals, which are also penalised due their lack of access to social protection (ILO/OECD, 2020).

In this setting, nonetheless, given that the nature of the current economic shock is profoundly different from that of the downturn caused by the 2008 financial crisis, some aspects of the current economic turmoil are also dissimilar. At the onset of the pandemic, in fact, financial markets were healthier than in 2007 and this implies that governments are more able and prone to invest massive resources for stabilisation and recovery programmes. Furthermore, while the dominant approach in the aftermath of the 2008 crisis was underpinned by economic austerity, a larger economic role for state intervention and expansionary policies are now possible and encouraged to safeguard the survival of economic activities, employment and health (Marmefelt, 2020). In this vein, monetary policies, often coordinated across the central banks of different advanced countries, have provided liquidity to the banking system, thus supporting lending and access to credit (Bordo, 2020).

Nonetheless, there are signals that the pandemic-induced economic disruptions may mutate into another financial crisis and credit crunch. The increases in money supply and injections of liquidity to sustain lending from banks to households and firms, adopted to ensure the stabilisation of economies where production and consumption have halted, may generate overly optimistic expectations of profit opportunities in the months to come. This may generate bad investment and financial instability connected to the increase in non-performing loans and lending to unproductive activities. The scarce repayment capacity of households and businesses, especially SMEs, operating in sectors that the pandemic hit the hardest (e.g. tourism), may produce situations of financial uncertainty and insolvency that could affect the banking system and the future financial opportunities (EU, 2020). Not only these prospects can put an additional burden to the capacity of different economies to recover but they can jeopardise the efforts made so far by citizens and governments in tackling the economic impact of the pandemic. In this scenario, both the productivity-enhancing objectives of many governments in the OECD area as well as the actions aimed at generating resilient economies across and within countries may be negatively affected by the mutation of the pandemic crisis into a financial crisis.

In this context of sudden and profound change of the economic and social interactions, however, there are signals that the crisis opens unprecedented windows of opportunity for innovative policy actions and public

investment. The NextGenerationEU, for instance, is described as “a once in a lifetime chance [...] to transform our economies” (https://ec.europa.eu/info/strategy/recovery-plan-europe_en) and it is aimed at fostering digital, green and resilient economic systems. In this context, the Recovery and Resilience Facility of the EU provides more than €670 billion to EU members to support reforms and produce more resilient and sustainable grounds for future growth. Therefore, the current crisis substantially represents a crucial breaking point with respect to the path-dependency that dominated public intervention and the negotiations around the allocation of funds in the previous decades. Hence, a paradigm shift of this size can generate new opportunities to overcome traditional bottlenecks in development objectives and practices.

3 Long-term productivity growth and regional convergence vs. divergence

Modern growth theory has mostly focused on the search for the determinants of long-term growth, by analysing the drivers of per-capita income and long-term productivity. In this sense, these theories entirely consider the quantitative increase of the various factors involved in the process of economic growth, typically capital and labour, while focusing much less on the process of qualitative change and improvement of the economy considered as a social and historical system. Starting in the 1940s, the idea that accelerating capital accumulation would cause growth constitute the core of the so-called “capital fundamentalism” approach to development. The neo-Keynesian Harrod-Domar model perfectly fits such a theoretical view (King and Levine, 1994) as for fixed levels of capital stock, the more one nation saves, the more it is able to invest, to accumulate new capital and eventually to grow. Subsequently, Solow (1956) and Swan (1956) developed the traditional neoclassical model of economic growth, showing that the rise of national output is explained by increases in the capital-labour ratio. However, the increase of capital stock due to the positive difference between savings and depreciation rate tends to slow down in transitional dynamics because of diminishing returns to capital. Hence, when savings equalize depreciation, the steady-state is reached and additional savings have no effects on growth in the long-run. In this setting, long-term productivity growth is determined by an unexplained parameter reflecting technological change. Indeed, technology allows capital accumulation to have a constant impact on output, thus offsetting the negative effects of diminishing returns (Aghion and Howitt, 1998). Thus, the core characteristic of the traditional neoclassical model is that technological change represents the engine of long-term growth, although it remains exogenous (also known as Solow residual). A key implication of this setting is also related to the movement of capital and labour and the patterns of long-term convergence predicted by the theory. In fact, according to the neoclassical approach, the production factors will locate where the returns are higher. Therefore, locations with high capital-labour ratios will experience an inflow of labour, given the high wages offered, and an outflow of capital, while places with low capital-labour ratios will be characterised the opposite flows. Hence, convergence in per capita incomes occurs as a consequence of the equalisation in the returns to factors triggered by the mobility of capital and labour across space. This is a process that develops in the long run and it is mostly based on the idea that factors can freely move and that there is perfect information regarding the conditions of factors’ markets across space. Nevertheless, this prediction of the neoclassical theory is at odds with the increasing evidence on the persistent patterns of regional inequalities within and across countries (Iammarino et al., 2019). In fact, the adjustment mechanisms envisaged by the neoclassical model, namely the flow of labour and capital in places with scarcity of these factors, are rather weak and limited in the real world. This may be due to many frictions to mobility associated with barriers of heterogeneous nature. These may include obstacles related to different institutional settings, social domains, regulations, etc., all elements that pose serious limitations to the functioning of labour and capital markets across space.

Since the 1980s, the unsatisfying framework of the traditional neoclassical model, both in terms of lack of evidence on convergence as well as in terms of the exogenous nature of technical change, led the attempt to endogenize technological progress. The so-called new growth theories adopted two main strategies for this aim, that is, conceptualising the idea of learning-by-doing (Romer, 1986; Lucas, 1988) and developing models with a technology sector (Romer, 1990; Grossman and Helpman, 1991; Aghion and Howitt, 1992). The former implies that new investments in physical and human capital also increase the productivity of firms determining non-diminishing returns to capital and leading to endogenous growth. The latter, instead, assumes the existence of a sector devoted to the production of new technology through R&D that supplies the sector producing final output with intermediate goods. In such an approach, the rate of endogenous growth strongly depends on the amount of resources used for R&D and on the competition that allows producers to appropriate new technologies (Fagerberg, 1994). While the improvements in the explanation of the sources of technological change are fundamental to understand the role of human capital and R&D investment for productivity growth, they are not directly informative on spatial differences in development, productivity levels and the degree of technology adoption. In this sense, however, the neoclassical approach emphasises that locations with lower productivity and lower rates of technological progress can catch-up with the technological leaders through the process of knowledge and technological diffusion. Specifically, the larger the technological distance of a region from the technological leaders the higher the opportunities for catching up and for a rapid productivity growth. Thus, lagging behind regions are expected to sustain higher rates of productivity growth as compared to locations at the frontier of technological progress. These predictions tend to contrast starkly with the evidence about the long-standing development issues and stagnating productivity of many regions in the OECD area, especially in the aftermath of the 2008 economic crisis (Iammarino et al., 2019).

In general, growth economics tends to be confined to the analysis of purely economic variables rather than investigating also the role of further characteristics of the society that are undoubtedly related to economic performance and are extremely significant for human well-being (Sen, 1994). For instance, most growth economics theorizes perfectly informed individuals being motivated by utility-maximization. Social, historical, political and cultural factors remain excluded by these analyses and they are frequently perceived as economic costs or obstacles to maximization. Consequently, the resulting analytical framework is puzzled by country experiences that deviate from the neoclassical growth predictions. This is the case of the success stories of Japan and East-Asian tigers (Skott and Auerbach, 1995). At the regional level, similarly, the case of the Third-Italy, where the role of social and cultural factors for local development was notable, and the case of South of Italy, instead, that lag behind regardless of massive public investment in physical capital, constitute other examples that do not match the prediction of the traditional theory. Moreover, key organizational changes such as the shift from Fordism to more flexible systems require to devote more attention to institutionally-, socially-, culturally- and historically-produced competitive advantage than growth economics pays in explaining the development process and the productivity growth of specific locations (Storper 1993; Amin and Thirft 1994; Martin and Sunley, 1998). For example, such factors may help to explain the rise of successful post-industrial activities after the European industrial restructuring of late 1970s in regions left behind by Fordism. For instance, London, that was a follower behind the more innovative North in the era of mass production, then emerged as a new dynamic space thanks to interactions between local economic strengths and noneconomic characteristics such as internal trust relations coupled with local competition, external connections and the presence of political and sectoral institutions. Hence, it is important to analyse how and why different locations are endowed or reproduce noneconomic elements, such as culture, social structures or institutions that are able to shape economic performance by making local resources more productive and available. Furthermore, in a long-term perspective growth and development trajectories cannot be considered as a-historical and a-institutional outcomes (Martin and Sunley, 1998). Instead, the processes of development and growth should be explored in terms of interactions between economic and noneconomic factors. The latter are path-dependent and may also have instability effects on the whole development process (Myrdal, 1957; Kaldor, 1972). For instance, the persistence of disparities and uneven

development within a country may lead to institutional and political change in order to address such problems. Such transformations are cumulative and have unstable effects on the existing trajectory of development and productivity growth.

4 Shocks, disturbances and the resilience perspective

In recent years, both the academic and the policy debates have gradually re-oriented the focus of their attention from the mechanisms and the dynamics underlying productivity growth to the more encompassing consideration of what is generally labelled as the resilience of an economic system (e.g. Christopherson et al., 2010; Boschma, 2015; Martin and Sunley, 2015, Faggian et al. 2018). Although some of the fundamental ideas underpinning the idea of resilience, such as adaptation, rebound, recovery, etc., are not new to scholarship and policy discourses, the sequence of extraordinary shocks, changes and disturbances that have characterised the first two decades of the twenty-first century have generated new and deep uncertainties, accompanied by unprecedented challenges and risks. In this respect, the specific historical moment, with its intersection of a number of crises of different and interrelated nature, has activated a thorough debate around the generalised sense of vulnerability of places and a systematic search for new and sustainable strategies to improve the responsiveness and preparedness of economic and social actors. Natural disasters, big plant closures, financial collapses, credit crunches, economic recessions, globalisation, climate change, environmental degradation, deindustrialisation, new technological challenges, mass migration, political transformations as well as the current pandemic of COVID-19, all represent or cause serious major disruptions, of different typologies and spatial-temporal attributes. Taken together, nonetheless, these events and the processes they unleash, unexpected and sudden in some cases, while slow and persistent in others, have reshaped in the span of a few years the way scholars, practitioners and policy-makers think about local economic development. In this context, the notion of resilience, although not immune from theoretical and empirical criticisms, has emerged as a promising conceptual umbrella with the objective of explaining how economic and social systems can attain a sustainable configuration and development path in spite of, or following, shocks, interruptions and disruptions.

In this context, the switch of analytical perspective towards resilience fundamentally denotes a renewed interest for the short- to long-term processes, roles, occurrences and responses to extraordinary economic disturbances (Simmie and Martin, 2010), in contrast with the dominance of the traditional investigations regarding the causes of long-run growth and technological progress. While understanding the latter certainly remains a fundamental task, a number of unexpected and sudden disruptions with global reach, such as the financial crisis of 2008 and the COVID-19 pandemic in 2020, recall Keynes' view that "this *long run* is a misleading guide to current affairs. *In the long run* we are all dead. Economists set themselves too easy, too useless a task if in tempestuous seasons they can only tell us that when the storm is long past the ocean is flat again" (Keynes, 1923, p.80). Therefore, the concept of regional resilience offers the opportunity to understand both the short- and long-term patterns and processes that make locations more or less vulnerable to shocks, disruptions and changing circumstances, rather than exclusively focusing on the factors contributing to economic performance in the long-run.

The notion of regional resilience, however, can be understood in different ways to emphasise a set of diverse properties and features regarding the link between a shock and the performance of a regional economic system. These different variants of the concept of resilience are essentially associated with the underlying disciplinary traditions from which they stem, ranging from engineering and psychology, to

disaster studies, ecology, environmental studies and economic geography. When it comes to the resilience of regional economies experiencing shocks and disruptions, the most fundamental differences between these alternative definitions of resilience pertain to how economic processes are thought to unfold in time and space (Christopherson et al., 2010). In this sense, the various meanings of resilience rest on different conceptualisation regarding both the notion of regional economy and the idea of economic change. This inevitably produces a net divide and a fragmentation in the characteristics, functioning and implications of resilience itself depending on the specific perspective adopted. While the very idea of resilience can have different implications, it is also important to consider the different nature of the disturbances that can affect regional economies. These can analytically be distinguished based on their temporal nature, although in reality they can be interacting, transforming and self-reinforcing. On the one hand, there can be acute shocks, such as natural disasters or big plant closures, whose occurrence is sudden and unexpected. On the other hand, disturbances can take the form of slow-burns or slow-moving challenges (Pendall et al., 2010), such as deindustrialisation, prolonged recession or climate change, whose effects tend to be chronic.

4.1 Stability, steady-state and bounce-back

The traditional definition of resilience adheres to an 'engineering' conceptual perspective, where a system substantially rests on a stable equilibrium or steady-state (Holling, 1973). In this sense, resilience refers to the resistance of a system to external shocks as well as to the speed and extent of the recovery process towards the pre-existing steady-state after experiencing a disturbance (Fingleton et al., 2012). In this view, therefore, stability is a core feature of the notion of resilience, as it is its predictability in terms of the restoration of the path and the conditions prior to the shock. This intuitive idea of resilience, hence, encompasses the notion that a system is truly resilient when the normalcy of an equilibrium point is reinstated after any given disruption. From an economic standpoint, this definition of resilience mirrors the neo-classical view of regional economies as systems whose normal conditions are associated with a steady-state growth and market equilibrium. In this context, whenever an economy is affected by disruptive events, its capacity to bounce-back to normality, that is, towards the ex ante growth path and stability, constitutes its resilience. This restoration of the equilibrium state is fundamentally attained through self-correcting market forces, thus denoting that non-resilient economies are those where markets are not free to operate or where a number of frictions limit or slow down the scope of adjustment mechanisms. Clearly, this perspective privileges the analysis of short-term shocks to the system, as these are more clearly identifiable in time and also make it possible to use pre-shock conditions to assess the scope of bouncing-back of a system. While this conceptual perspective on resilience is intuitive and comprehends some of the fundamental aspects of the notion, it remains limited and simplistic when the analysis focuses on complex systems such as regional economies. In fact, the idea of a single-equilibrium and the restoration of the pre-shock conditions typically pertains to one or a few variables, such as output or population, without much attention to the interplay between different elements within the regional economy (Pendall et al., 2010).

4.2 Structure, absorption and reorganisation

Another definition of resilience, mostly stemming from the ecology discipline, focuses on the ability of a system to absorb shocks and perturbations without modifying its structural characteristics and functioning. In this sense, it becomes relevant to consider what size and intensity of a shock can be absorbed by a system before changes occur in its structure and components. Hence, this definition allows for a certain degree of reorganisation and change in a system after experiencing a disruption. If the size and magnitude of a shock exceed the absorption capacity of a system, then it is possible that the system transforms and moves towards another state or equilibrium. This echoes the economic notion of multiple equilibria,

according to which an economy can transition from a pre-shock state to a new post-shock state, with substantial structural differences between the two equilibria. In this perspective, therefore, the effects of the shock are far from being transitory, as it emerges instead in the single equilibrium scenario depicted above, but they can determine permanent changes in the features and relationships of a regional economic system. This hysteresis of the shock on the system paves the way for a new normalcy associated with a path or an equilibrium point that is different from the pre-shock conditions. The 'new normal' state can present features that are more or less desirable than the prior equilibrium. In this framework, the new regional growth path can exhibit a negative hysteresis, if the region is not able to fully absorb the shock and its new normal state is less optimal than the pre-shock equilibrium point. In the short-term, in particular, the 'new normal' conditions can reflect these losses. Nonetheless, the opposite is also possible, thus triggering a process of positive hysteresis. This is the case if for instance the disruption leads to the release of productive resources by crowding out the least efficient companies, and these resources are subsequently used more productively within the regional economy (Martin and Sunley, 2015). These differences in regional resilience across space can clearly exacerbate spatial disparities over time, as different regional economies with similar pre-shock growth paths can tolerate and absorb shocks in a different way, thus generating diverging 'new normal' conditions. Furthermore, in the medium and long term the role of policies might propel actions aimed at shaping 'new normal' conditions that can re-launch the local economy. However, escaping the lock in trajectory caused by shocks and perturbations may require massive measures to break the path-dependent nature of a new equilibrium points that are inferior to the pre-shock growth paths (Pendall et al., 2010). These institutional and policy capacities are plausibly less present in regional systems where the risks of lock-in and negative hysteresis are larger.

4.3 Adaptation, adaptability and bounce-forward

An alternative view of resilience, mostly associated with the field of economic geography, departs from the equilibristic notions described above and tends to focus on how systems, such as regional economies, adapt over time to different perturbations and shocks (Simmie and Martin, 2010). In this sense, this approach aims at understanding resilience intended as an on-going process of constant change and evolution rather than as a return of the system to any point of stability (pre-existing or new). Hence, resilient regions are considered to be able to adapt to the changing conditions of markets, technologies and industries in the long-run, while the lack of resilience implies that local economies can only slowly or hardly adapt to mutating and volatile contexts. In this evolutionary framework, the idea of resilience as the ability of regions to adapt paves the way to a dichotomy between the notion of adaptation and that of adaptability (Pike et al., 2010; Martin and Sunley, 2015). The former regards the capacity of a regional economy to move towards a pre-conceived development paths, by further employing local resources to reproduce existing structures. The latter, instead, refers to the capacity of regions to bounce forward by stimulating and creating new trajectories of development through the commitment of resources to uses that are different from existing pathways. So defined, the notions of adaptation and adaptability suggest that regional economies can face a trade-off between the short-term capacity to reinforce existing structures and the long-term ability to explore new trajectories (Grabher, 1993). As such, regional resilience in an evolutionary sense may be primarily associated with the long-term adaptability of regional economies, rather than with its short-term adaptation, in the belief that the path-dependent nature of existing regional structures may trap regional systems into detrimental lock-in dynamics. According to this simplistic view, history tends to play a negative role, as it inevitably associates the evolution of regional economies to their past trajectories, without much scope for renewal and radical adjustments (Henning et al., 2013).

In terms of regional industrial structure, specialisation and diversification are the two traditional categories describing the local configuration of economic activities. In a resilience perspective, specialised regions have a high adaptation but a low adaptability, since they can internally generate development trajectories that are rigidly connected to their local industrial profile but, at the same time, it is difficult for them to

produce new growth paths because local opportunities to diversify are limited. On the contrary, regional economies with a diversified industrial structure and knowledge base may have low adaptation and high adaptability, as they have more potential to develop new growth pathways at the expense of an industrial focus that allows them to sustain a clear path-dependent trajectory of development. However, the full integration of these non-equilibristic features of regional resilience with an evolutionary theory of regional development and change underlines that both adaptation and adaptability can coexist in the definition and operationalisation of resilience (Boschma, 2015). In this sense, related variety in the industrial structure and knowledge composition of a regional economy can support both these elements of resilience. In fact, related variety entails the presence of different but connected industries and activities that, on the one hand, sustain the path-dependent development trajectory associated with these related sectors and, on the other hand, guarantee a sufficient potential for recombination and diversification into new pathways of growth (Frenken et al., 2007; Neffke et al., 2011). Importantly, while in this perspective the presence of related variety in a region emerges as a core determinant of local resilience, two nuances moderate its role in generating adaptation and adaptability. First, the strength of the input-output relationships between activities characterised by related variety should not be too strong, since otherwise any disruption affecting a specific sector will be easily transmitted to the other activities in the region, thus affecting the whole system (Boschma, 2015). In this sense, the notion of related variety is more associated with the skill and knowledge composition of different activities, rather than their market exchanges. Second, it is possible that in some circumstances related variety per se is not sufficient to boost adaptability in the long term, although it encompasses a relevant pool of diverse activities. In these cases, it is possible that regional profiles of industrial structures also characterised by unrelated diversification, alongside related variety, are more successfully conducive to adaptability. This would imply that together with a local industrial configuration based on related activities, regions should also aim at stimulating sectors that are disconnected from their core industrial and technological base, in order to benefit from the radically novel pathways associated with new knowledge domains (Castaldi et al., 2013; Boschma, 2015).

The tension between adaptation and adaptability is not only confined to the industrial and technological composition of regional economies, but it is also linked to the structure and openness of regional knowledge networks (Simmie and Martin, 2010; Boschma, 2015). Regions featuring strongly inward-looking knowledge networks produce very stable and efficient relationships between partners (e.g. firms, universities, institutions, etc.), thus improving the local adaptation capacity in the face of possible shocks or perturbations. Nevertheless, these regional systems may lack the adaptability feature of resilience, given that the local knowledge network has limited opportunities of combining different sources of knowledge and develop new development paths in the long run (Boschma and Frenken, 2010). At the other end of the spectrum, some regions can be characterised by open and fragmented knowledge network structures, lacking internal cohesion and systemic connections. In these instances, short-term adaptation can be harmed by the barriers to local knowledge diffusion and the resulting fragile or absent collective learning. Nonetheless, in these cases the long-term capacity of adaptability can be favoured as these fragmentation of local networks may provide a large pool of different knowledge sources with strong potential for innovative growth paths. This potential conflict between adaptation and adaptability in the regional structure of knowledge network is solved in specific cases where an internal cohesive structure of knowledge exchanges is complemented by a satellite set of other agents that are loosely connected to the core (Balland et al., 2013). In spatial terms, this can be realised for instance through the integration of extra-regional linkages or pipelines for knowledge sourcing within the regional core networks (Bathelt et al., 2004; Boschma and Iammarino, 2009). The establishment of these non-local connections for ensuring access to diverse and novel sources of knowledge can be realised through the agency of specific regional actors playing the role of knowledge gatekeepers, including nodal actors in inventor networks, high-skilled migrants or multinational companies, to mention a few (Faggian and McCann, 2006; Morrison, 2008; Breschi and Lenzi, 2014; Ascani, Bettarelli, Resmini and Balland, 2020).

Therefore, in an evolutionary perspective the emphasis is on the nature of on-going process of regional resilience and, thus, on the capacity of regional economies to adapt in response to shocks and

perturbations, and to bounce forward by maintaining their core performance. In this sense, the economic need to sustain existing growth paths as well as to stimulate new trajectories is an integral part of the evolutionary theory of regional development, as strategies to avoid stagnation and decline (Boschma, 2015). Nonetheless, these elements acquire even more importance in times of economic distress and during crises, as these shocks can undermine the capacity of a region to sustain positive changes and transformations.

4.4 The uneven geography of resilience

The different interpretations of resilience discussed above provide grounds for the empirical measurement and exploration of regional resilience across space. Nevertheless, considering the long-term implications of various aspects of the notion of resilience, especially those associated with the idea of adaptability, is not always straightforward to assess regional resilience in its many forms. By combining various perspectives on regional resilience, however, it is possible to identify four separate but intertwined dimensions that describe empirically the interplay between regions and perturbations (Martin, 2012; Martin and Sunley 2015). First, 'resistance', defined as the vulnerability of a regional system to shocks and disruptions. Second, 'recovery', associated with the speed and extent of the reaction to perturbations. Third, 're-orientation', indicating the changes activated in a region in terms of employment, industrial structure, technological specialisation etc. Fourth, 'renewal', associated with the capacity to regenerate regional growth paths or shift to new trajectories. While the first two categories mostly pertain to the short-term phases of regional resilience after a shock, the last two dimensions adhere to the medium- and long-term features of regional resilience. As such, empirical evidence is mostly limited to 'resistance' and 'recovery', mostly due to the temporal limitations of assessing recent disruptive events such as the 2008 financial crisis or the current pandemic of COVID-19. Mirroring the growing divergence in productivity performances of regional economies within countries, which generates a growing concentration of development and employment opportunities in a very limited set of locations (Iammarino et al., 2019), regional resilience also emerges as profoundly place-dependant concept, at least in terms of resistance and recovery. The evidence produced by numerous analyses focusing on the global financial crisis and adopting different spatial scales, ranging from NUTS2 to NUTS3 and even more refined spatial units, univocally paints the picture of a complex patchwork of spatial divides in the resilience of regions (Brakman et al., 2015; Capello et al., 2015; Palaskas et al., 2015; Holl, 2017; Faggian et al., 2018; Giannakis and Bruggeman, 2020). A rather intuitive divide often follows the lines of the urban-rural dualism, with service-oriented cities exhibiting higher resilience. However, the geographical unevenness of regional resilience is not only confined to this aspect, but it features a more intricate set of relationships. For instance, second-tier cities often emerge as outperforming large metropolitan areas. Also, regions that successfully attract high-skilled migrants exhibit more dynamic resistance and recovery, while locations characterised by ageing populations remain weakly resilient. From the standpoint of the regional industrial structure, a strong dependence on manufacturing activities often signifies a low resistance and a slow process of recovery, probably due to the concurrent and long-standing effects of globalisation on the traditional industrial sectors of advanced countries. On the contrary, some evidence suggests that intermediate and rural areas with an agricultural vocation can build their resistance and recovery around this typology of activities. Hence, in general, resilience and its many dimensions greatly vary in space both across and within countries, thus requiring a careful consideration of local specificities when designing measures aimed at sustaining regional economies.

5 Productivity-resilience synergies and trade-offs

Increasing long-term productivity while simultaneously promoting more sustainable and resilient development pathways is a grand challenge for advanced economies nowadays. Identifying the overlapping area between productivity and resilience is key to defy the dichotomy between the two, which instead leads to believe that interventions and measures for productivity harms resilience and that resilience-oriented programs are unproductive. This is not an easy challenge, however, as the balance between productivity and resilience can be very slim. This is also an area of uncharted waters in terms of theoretical and empirical research, considering the paucity of works specifically focussing on the actual synergies and trade-offs across these outcomes. Can resilient systems be a driver of productivity growth? Under which circumstances? Can productivity growth be a pathway toward resilient economies? In which conditions? What is the causal nexus between the two and what are the externalities and feedbacks from one to the other? These are fundamental and compelling open questions that acquire even more importance in a time of crisis and pandemic.

5.1 COVID-19, cost-efficiency and spatial imbalances

Multiple and interconnected factors underpin both productivity differences across space as well as resilience, thus determining divergent trajectories of long-term development across and within countries and different capacities to resist, react and adapt to shocks and perturbations. Not all places and regions are equally prepared to face shocks, such as the global recession or the current COVID-19 crisis, and not all shocks and perturbations are the same in terms of the nature of the factors involved, temporal horizons and spatial patterns. What is even more striking is that, in some circumstances, locations traditionally associated with more sustained productivity growth may experience relatively lower resilience to specific disruptions. Descriptive evidence for a number of OECD countries suggests, in fact, that the death toll from the first wave of the COVID-19 pandemic was generally higher in core regions, with due exceptions, while peripheral areas seem relatively less affected in terms of excess mortality. This is the case, for instance, of many countries such as Chile, Colombia, France, US, Italy and Spain (Veneri, 2020). Consistently, recent evidence suggests that the celebrated productivity advantages and cost-reduction benefits of large agglomerations can be offset by the dramatic spread of COVID-19 in large industrial and concentrated areas (Ascani, Faggian and Montresor, 2021). Specifically, locations featuring economic activities characterized by high geographical concentration can experience more COVID-19 infections due to the intense physical interaction of people and commodities associated with the clustering advantages of these industries. Furthermore, these patterns tend to be more systematically associated with concentrated manufacturing activities, rather than services, as the former may involve more continuative and long interactions between a number of co-workers. This may be suggestive of the fact that the tertiarisation of some urban and regional economies may function as a factor diluting the spread of COVID-19. At the same time, it is possible that regional economies with a traditional industrial structure skewed towards manufacturing sectors, already subject to the slow-burn perturbation of globalization and offshoring of production, may experience the strongest effect of the pandemic.

Cost-efficiency and economies of scale can also be behind the sheer decline in hospital beds across most OECD countries in recent years, a decrease that is more relevant especially in peripheral areas within countries. In the last decades, indeed, national health systems experienced strong pressures to increase efficiency and lower costs and this systematically led to structural reforms aimed at the financial restructuring of the health sector, frequent mergers between hospitals and, ultimately, the closure of smaller facilities in areas with relatively lower demand (Giancotti et al., 2017). This consolidation of health centres across space generates scale economies that increase hospital efficiency following a merger, but not only do these advantages diminish over time (Harrison, 2011), they also generate a very fragmented geography of hospital beds. This spatial unevenness penalizes rural and scarcely populated regions more than core and metropolitan areas, thus deeply affecting the capacity and resilience of certain regions to address the current pandemic. Besides these regional patterns and the general decrease of hospital beds across the OECD, there are also large country differences, with cases such as Germany, France, Austria, Japan where health reforms have generated a relatively limited loss and spatial divergence in the availability of hospital beds, while in countries such as the US, Canada, UK, Sweden, Spain and Italy, among others, the availability is low and the regional disparities are often profound (Veneri, 2020).

5.2 GVCs, globalisation and inequalities during the pandemic

The current COVID-19 pandemic and the consequent economic effects associated with the lockdown measures taken by most governments around the world have revamped the debate around the participation of firms, industries and regional economies in global value chains (GVCs) and the role of multinational enterprises (MNEs) in the global economy. Most international trade flows and capital mobility are intimately connected to these global networks and the contribution of GVCs to extending the benefits of globalisation to many countries is quite relevant (World Bank, 2019). In this setting, however, the current pandemic has produced the idea that GVCs can generate further economic risks and vulnerabilities emerging especially in times of international trade disruption (Baldwin, 2020). This view is based on the a number of facts, including the stoppage of production in companies that are part of GVCs, the difficulty of sourcing raw materials and inputs from other firms internationally, the disruption in global transport channels and the restrictions imposed on the mobility of workers (OECD, 2020a). Moreover, GVCs have suffered the shift in demand, mostly due to the uncertainty posed on employment and jobs across many countries. In this sense, the lockdown containment measures have deeply affected also the consumption of local non tradable goods and services, which are not necessarily connected to GVCs. Therefore, firm, industry and regional participation in GVCs has exposed companies, sectors and locations to the transmission of shocks across the globe. Nevertheless, there are suggestions that the recovery can be faster for businesses and regional economies integrated in global production, as their participation in GVCs ensures a collective coordination and cooperation at the international level to re-establish global production (OECD, 2020a). Accordingly, the presence of MNEs within regional economies can re-activate global business networks after the shock and stimulate the local production of goods and services through linkages with local suppliers, outsourcing mechanisms and spillovers (Haskel, Pereira and Slaughter, 2007; Ascani and Iammarino, 2018; Javorcik, Lo Turco and Maggioni, 2018). On the contrary, isolated organisations and locations can experience a very slow recovery since they cannot fully exploit the benefits of international division of labour and the efficiency benefits associated with it.

The health and economic disruption caused by the pandemic of COVID-19 can potentially exacerbate existing inequalities between regions (Bailey et al., 2020). Since the 2008 financial crisis, regional disparities within countries have not decreased and the current downturn could reinforce these uneven geographical patterns in many important economic and social domains. Location close to metropolitan areas represent the only category of regions that has known a relatively fast GDP growth in recent years. While most other regions, including urban areas as well as more peripheral locations, experienced stagnating or declining GDP and productivity (Veneri, 2020). This divergence in growth rates also

encompasses widening disparities between regions along other dimensions. In fact, urban locations enjoy better access to services and more digitalisation opportunities than rural and peripheral areas, but they are also affected by relatively higher levels of pollution, crime and congestion as compared to semi-dense areas and non-urban regions. Therefore, agglomeration dynamics can produce a complex set of advantages and disadvantages for productivity growth that, in a time of crisis, can also interact in heterogeneous ways with the capacity of regions to be resilient.

5.3 COVID-19, digitalisation and productivity: opportunities and challenges

The advent of digitalisation, in particular, generates new opportunities to perform job tasks from remote locations. While this possibility precedes the COVID-19 pandemic, the lockdowns adopted by many governments in many OECD economies to prevent social contacts and the consequent diffusion of the virus produced an inexorable push in this direction for many activities. The shift to remote working, however, is far from homogeneous across regions, due to both the typology of jobs hosted in some locations and not in others and for the technological backwardness of some peripheral locations. Therefore, the resilience of regions in terms of avoiding business interruptions caused by lockdown measures also depend on place-dependent factors. In this case, however, remote working not only allows business activities to remain open and active, but it may also generate positive outcomes in terms of the balance between costs and benefits, as companies may downsize office occupancy costs and enhance labour productivity (Tagliaro and Ciaramella, 2016; Angelici and Profeta, 2020). In this sense, a specific industrial structure based on jobs amenable of digitalisation as well as human capital with sufficient digital skills and a physical infrastructure conducive of digitalisation of activities can generate local conditions facilitating resilience to lockdown measures and a more favourable cost-efficiency ratio in the business sector. Nevertheless, the deep regional disparities in the use of Internet across and within countries, together with the spatially-varying share of jobs that can be performed from remote locations, constitute compelling obstacles to the transition to new forms of work management and organization. In this sense, the geographical line of demarcation across the OECD area clearly separates rural regions, mostly non-digital and with low potential for remote working, from urban interconnected areas with many jobs amenable to remote working.

Nonetheless, the recent advent of digitalisation is not mirrored by a reversal in the declining labour productivity of the last decades (OECD, 2019). There are several reasons for this, mostly underpinned by the fact that the gains from digitalisation can be realised in presence of concurrent key complementary factors, often absent in the case of many regional economies. The successful digitalisation of economic activities requires, in fact, notable and complex organisational, managerial and technical skills at the firm level (Ferreira et al., 2019; Eller et al., 2020). Not all companies are endowed with the necessary assets to pursue a digitalisation strategy, and those who possess these characteristics are more productive than the average firm even before shifting to digital solutions. In this sense, therefore, digitalisation may increase the productivity gap between firms within and across industries and regions. Hence, it is possible that the digitalisation of business activities leads to increased market competition dominated by a limited number of highly productive companies. This may generate business-stealing and crowding-out dynamics penalising organisations that lack the necessary skills for digitalisation or are too slow in transitioning. Furthermore, the geographical distribution of firms that have the capacity to successfully implement a digitalisation strategy may be subject to strong patterns of concentration in specific locations, such as core and metropolitan areas as compared to more peripheral regions. Therefore, digitalisation can also disproportionately favour some locations at the expense of others. Certain skills can also be a complementary factor to digitalisation and both the demand and the returns to these have increased in recent years. At the same time, however, digital technologies, related for instance to automation and artificial intelligence, can provide a substitute for the skills needed to perform routine activities. In these cases, as a consequence, in most OECD economies, the demand for medium-low skilled workers has

notably decreased (OECD, 2019). Clearly, spatial differences in human capital can produce patterns in terms of labour demand that reflect this constant shift towards skills that are complementary to new technologies at the expenses of capabilities that are easier to substitute with the digitalisation of activities. In general, the lack of appropriate skills in peripheral or rural regions, together with the low productivity of local firms, poses serious limits to the benefits of digitalisation in terms of enhancing productivity. In this sense, this stalling of new technology diffusion can be connected to specific lacks in the assets and complementarities at the level of regional economies, whereby spatial differences risk to be exacerbated by digitalisation.

5.4 Productivity-enhancing adjustments: market selection and allocative efficiency

The presence of low-productivity companies with inappropriate capabilities to catch-up technologically, however, may generate scope for efficiency-enhancing market selection mechanisms and allocative efficiency, especially in times of crisis. Market selection implies that market competition pushes low productivity firms to exit the market, as these companies cannot sustain the costs of business operation given their limited levels of efficiency (Melitz and Polanec, 2015). This cleansing effect related to the demography of firms has a positive consequence on aggregate productivity since the exit of the most inefficient companies raises the productivity of an industry as a whole. Furthermore, the economic crisis can reinforce this mechanism by accelerating the process of market exit of unproductive firms. In theory, the workforce freed by the exit of inefficient firms can be reallocated to more productive companies. This leads to the benefits of allocative efficiency, whereby more productive firms may experience expansions in terms of employment shares, while less productive companies either exit the market or downsize their workforce (Bugamelli et al., 2020). This process of creative destruction is seen as a fundamental component of well-functioning markets for sustaining productivity and welfare-enhancing dynamics. However, while allocative efficiency can be an important driver of productivity growth, aggregate unemployment typically increases during economic crises, thus limiting the positive impact of human capital reallocation from low to high productivity firms. Furthermore, increasing evidence points to the fact that the less productive firms that would typically exit the market due to competition actually survive (McGowan et al., 2017; Decker et al., 2020). Surprisingly, the weight of these firms has increased in the OECD area since the early 2000s, although economic crises and recessions should in theory facilitate their exit (McGowan et al., 2017). Not only does this potentially hinder the positive feedbacks of reallocation and efficiency on aggregate productivity, but it may also inhibit the growth opportunities of more productive companies in terms of investment and employment expansion. Furthermore, the survival of unproductive companies potentially affects the formation and success of new and young enterprises by creating barriers to market entry or depressing their performance.

In general, these dynamics may not be spatially-neutral, as the geography of industries and firms along the productivity distribution can be rather heterogeneous across and within countries. Core regions, where the costs of doing business and the degree of competition on the product and factor markets are more intense, may host larger shares of high productive companies, while peripheral locations, on the contrary, can be characterised by relatively less productive firms (Krugman 1991). Therefore, taking into consideration the geography of business may suggest that the mechanisms of market selection and allocative efficiency can also reward and penalise regions, besides firms, thus exacerbating existing spatial disparities and patterns of divergence in long-term productivity growth. These regional patterns in terms of firm demography and productivity levels can be related to place-dependent factors, including the functioning of the local markets, local institutions and regulations, information asymmetries, agglomeration advantages and other aspects of regional economies that influence firm behaviour and performance (Maskell and Malmberg, 1999; Bloom and Van Reenen, 2010). Regional environments, in fact, can activate key enabling and supporting drivers of productivity through the contextual influence exercised on local

industries, firms, workers, institutions and organisations (Tsvetkova et al., 2020). In this sense, the mechanisms related to creative destruction as well as those connected to the expansion and downsizing of employment shares according to firms' productivity levels may not be spatially inclusive, but they can vary quite substantially depending on spatially-bound determinants and their interplay.

5.5 Productivity, resilience and territorial capital

Regional assets and contexts also underpin the processes of local economic development more generally, by favouring the necessary conditions for sustained productivity growth and resilience to shocks and perturbations, and they can be collectively defined as territorial capital (OECD, 2001; Camagni, 2009). These fundamentally represent endogenous factors of locations that condition their development trajectory and growth opportunities. However, not all regions are endowed with the same quality, quantity and typology of territorial capital, depending on the specific mix of local features that facilitate the generation of different sources of territorial capital. Hence, spatial unevenness can be multifaceted in the sense that different locations might have the same quantity of territorial capital but different qualities or typologies of it, and vice versa. By analysing the performance of EU regions during and after the 2008 economic crisis, Fratesi and Perucca (2018) identify seven groups of EU regions by analysing a number of factors pertaining to territorial capital. The resulting geography of regions suggest that the determinants of resilience and long-term productivity can be partially overlapping, with some regional economies possessing all the necessary features underpinning resilience and productivity growth while others being better positioned to face short-term disruptions or, alternatively, able to leverage territorial capital for attaining efficiency objectives. In this sense, regions can be classified into:

- Territorial capital-rich locations, mostly represented by a limited group of metropolitan regions, endowed with high accessibility, strong private capital, agglomeration economies, a well-developed service economy and a thick labour market for high-skilled workers.
- Regions with public tangible capital, associated with second-tier cities and areas close to metropolitan areas, characterised by strong public infrastructure and agglomeration benefits as well as private services.
- Regions with intangible capital, indicating locations with low urbanisation levels but high presence of human capital and a functioning labour market.
- Regions with natural and cultural assets, represented by areas mostly characterised by strong collective and public goods.
- Intermediate regions, by far the most numerous group, associated with locations without specific notable characteristics in terms of territorial capital.
- Regions with poor private capital, indicating regions with lacks in terms of skilled labour and private activities.
- Low territorial capital regions, represented by peripheral locations with weak localised assets.

This taxonomy clearly suggests that the spatiality of opportunities and risks in terms of generating resilient regional economies and sustaining long-term productivity is challenged by many interrelated factors. While a limited number of metropolitan regions and second-tier cities follow trajectories of growth underpinned by solid territorial assets, the great majority of regional economies exhibit a number of weaknesses that can be more or less profound and heterogeneous. Thus, territorial capital based on different typologies of factors can generate different outcomes in terms of resilience and efficiency dynamics. Furthermore, the path-dependent nature of most aspects connected to territorial capital also implies that regions with structural lacks face large barriers in the generation of certain assets in the short-term. To summarise, regional economies face substantial place-dependent asymmetries in their capacity to sustain resilience

and productivity (Capello et al., 2015; Giannakis and Bruggeman, 2017). As a consequence, different regional profiles can be characterised by complementarities between resilience and efficiency objectives, while other locations may experience fundamental obstacles and trade-offs on their pathways to realise productive and resilient outcomes. Peripheral areas, in particular, face very relevant barriers in terms of both risky trajectories of specialisation in obsolete activities and a very low ability to diversify their economic base.

6 Post-pandemic policy responses for productivity and resilience

The challenge of integrating the quantitative growth of productivity with the qualitative improvement of well-being and living standards across different typologies of regions has become very urgent and increasingly difficult after the outbreak of COVID-19. The ongoing crisis clearly indicates that the dominant policy approaches for stimulating long-term productivity and drive it out of the stagnating situation of recent years can have undesirable spatial effects in terms of the generation and reinforcement of uneven patterns of gains and losses. Moreover, the measures taken by many governments in the framework of economic restructuring in the aftermath of the 2007 financial crisis have contributed to the gradual erosion of the capacity of many urban and regional economies to withstand further shocks and disruptions. Therefore, the current pandemic and the consequent economic crisis have highlighted many of the pre-existing vulnerabilities of a number of efficiency-oriented approaches and their inadequacy to prepare diverse regional economies to face future challenges and perturbations.

Most policies for local economic development and productivity growth before COVID-19 were dominated by a narrow focus on the competitiveness of places and businesses, that generated negative consequences in terms of resilience. Most of these policies were fundamentally driven by a de-contextualised and ubiquitous productivity growth rationale, whereby actions and measures taken to promote regional and urban development were frequently disconnected from the features of local economies and their specificities in economic, social, political and institutional terms (Bristow, 2005). Hence, these type of 'placeless' policies cannot be appropriate to foster the synergies between productivity growth and resilience. The evolutionary view of resilience, in fact, fundamentally entails that regional economic systems can develop specific development trajectories based on the local opportunities provided by the qualitative mix of knowledge assets, skills and institutions. As such, ubiquitous efficiency-enhancing measures irrespective of local contingencies can hardly support the qualitative aspect of regional development as opposed to the quantitative character of economic growth. Thus, the lack of inclusion and consideration for the critical aspects of local geographies, urban and regional, generates de-contextualised and standardized policy approaches. These can be easily transferred from one location to another, in the belief that in absence of market frictions they are able to sustain long-term growth, similar to the traditional neoclassical perspective addressed in a previous section. However, in absence of a true assessment of the historical trajectories of regional economies, their strengths and weaknesses remain a black box in the framework of traditional policy initiatives (Boschma, 2004). Therefore, with competitiveness and productivity growth being the only aims of policy tools, the risk is that strategies for resilient and sustainable local development remain at the margins of the agenda, whereas the 2007 financial crisis and the current pandemic suggest that these elements should definitely be part of a more holistic and inclusive view of the process of development.

These considerations imply that the policies for a post-COVID-19 local economic development agenda should be re-adjusted from the narrow focus on placeless efficiency-enhancing objectives to a more encompassing set of place-dependent measures for the qualitative upgrade of urban and regional spaces. The pandemic and the economic shock connected to it provide a unique opportunity for moving policy goals along these lines and delineate a new-normal policy approach to regional development. In other

words, the core aim of productivity growth should be pursued through resilience-improving, or at least resilience-neutral, programmes and interventions for different categories of regions depending on their specific features. In this sense, the first change that should inform the new-normal policy approach regards expectations. This implies that urban and regional development policies should be based on the acceptance of uncertainty and unpredictability of random and/or systemic threats of different nature, ranging from health disasters to financial and economic crises (OECD, 2020b). Acknowledging that disruptive events or slow-burns perturbations will happen in future and may trigger further negative cascading effects can generate a necessary paradigm shift in policy approaches towards a systemic integration of resilience into public choices and interventions. In this way, it is possible to qualify resilience as a core economic and societal goal in the framework of policies aimed at enhancing the long-term productivity of businesses and locations. Second, a further change for a new-normal post-pandemic policy approach to regional development regards the improvement of coordination across countries in terms of complementary development objectives. While this is a change that is already ongoing, especially in the case of EU member countries, as a collective response to COVID-19, the new-normal post-pandemic policy approach should preserve this element of international cooperation and reinforce the supranational safety nets constructed in this period for the future definition of measures to foster place-dependent resilience. This would imply a radical shift from the weak and autarkic austerity-oriented and inward-looking policy regimes (e.g. America first) that have characterised recent years with the result of isolating many OECD countries from the multilateral arena. Therefore, the interconnectedness of responses should become a core element of the new-normal policy approach for regional development and resilience. This is even more relevant nowadays given the complexity of the modern global economy in terms of the dense set of international economic networks and linkages that can easily channel local shocks and disruptions at the global level through loops and feedbacks (Martin, 2011). In this vein, both the 2007 financial crisis and the current pandemic of COVID-19 can be considered as cases of 'glocalisation' where local events, such as the credit and house prices bubbles in the US or the epidemic in a Chinese province, have swiftly triggered global repercussions. It is in the context of a largely integrated global economy that multilateralism and international coordination in setting policy objectives and actions become essential to face future challenges and to build preparedness.

In this new-normal framework for policy, it is essential to consider the complementarities between different measures aimed at fostering productivity and resilience. These measures can have a national, sectoral and local dimension and rest on the interdependence between different spatial factors and determinants of economic performance, ranging from hard elements such as R&D, technology, infrastructure investment and agglomeration economies, to softer drivers such as education, knowledge diffusion, entrepreneurship-enabling institutional, social and financial structures. Besides, a resilience-oriented policy framework also implies that some redundancies should be generated within regional systems in vital spots for the adaptive and adaptation capacity of the local economy. In fact, reasoning in terms of optimal levels for certain services or linkages or merging institutions due to the benefits of scale economies may jeopardise the resilience of certain segments of regional systems by increasing the dependence of economic agents on a narrow set of alternatives. Redundancies in strategic and core areas of local economies, instead, can support urban and regional resilience in times of distress and shocks. This is a valuable implication also for the private sector. For instance, supplier redundancy avoids the risk of interrupting and breaking regional, national and global input-output linkages and business networks in cases of sudden disruptions (OECD, 2020a). Redundancies, nonetheless, may impose additional costs potentially harming productivity in the short-term. Next to the notion of redundancy, another option in a resilience-oriented policy framework is associated with the idea of the modularity of a system, intended as a situation that favours multifunction structures. For instance, the high demand of hospital beds at the peak of the pandemic could be satisfied by conceiving, next to traditional health structures, other flexible structures with a variety of use, depending on the specific needs. This internal re-organisation of economic systems and their resources can generate benefits in terms of resilience, but – ultimately – also increase the productivity of the economy as a whole.

In terms of the spatiality of policies, as mentioned above, placeless approaches often overlook the contingencies of regional and urban systems. Therefore, a place-based approach becomes essential if resilience has to be incorporated into the goals of a new-normal policy context. However, rather than focusing on a mechanical notion of territorial equity to be attained via spatial redistribution, new policies should focus on local inherent structures and territorial capital to sustain spatially distributed development trajectories (Iammarino et al., 2019). In this sense, policies become place-sensitive since they favour a different mix of instruments and interventions for different typologies of local economies. In fact, the requirements in terms of resilience and efficiency of diverse urban and regional systems may vary based on a combination of heterogeneous local strengths and weaknesses. High-income regions, such as large metropolitan areas, are typically endowed with high human capital, a diverse knowledge base and a service-oriented economy, but face issues connected to social exclusion, congestion and housing shortage. Some of these economies may also face the risk of lock-in in terms of their development trajectories, combined with obstacles in gaining access to extra-regional sources of innovation and business. Middle-income urban and regional economies are characterised by the absence of over-agglomeration issues but at the same time they suffer from declining economic activities usually associated with medium and low human capital requirements. This type of economies faces the key challenge of upgrading the local production structure escaping the middle income trap of stagnating productivity combined with a relatively high cost of labour. Low-income and peripheral areas tend to exhibit economic structures based on routine activities and limited territorial capital. Furthermore, their regional assets and skills portfolio remain basic and poorly diversified. The business environment in these locations is mostly unattractive for productive companies and the local economic configuration generates no or very limited agglomeration advantages.

While these three general typologies of regional economic profiles remain archetypes of typical local economic challenges and opportunities, the recognition that post-COVID-19 new regional development policies should combine different approaches that are place-dependent is a fundamental starting point for building more productive and resilient local economic structures. In this context, new economic and highly productive ventures cannot be started in areas where the local capacity to generate the economic and institutional prerequisite for these activities are essentially lacking. On the contrary, policy programmes should aim at leveraging local competences and develop gradual pathways towards new activities within the existing bundle of institutional and economic relationships. This can contribute to generating new economic vitality in lagging behind regions while rooting and embedding novel activities into the pre-existing local industrial structure. In this sense, place-sensitive policies may provide the basis for interventions that support efficiency while reinforcing both regional adaptation and adaptive capacities, intended as two fundamental features of resilient systems.

7 Concluding remarks

The last decades have seen the increasing difficulty and inability of advanced economies to successfully sustain their traditional growth paths of productivity, combined with a growing polarization of development and employment opportunities in a very limited set of locations. Although most governments have attempted to remedy these trends, the traditional efficiency-enhancing policy packages delivered disappointingly fragile and uncertain outcomes. Against this background, it has become increasingly apparent that some structural weaknesses are rooted into social and economic features of many regional economies within the OECD countries, and that a number of vulnerabilities frequently act as barriers to the realisation of virtuous cycles of local productivity growth. These vulnerabilities have become strikingly evident in the wake of the global economic and financial crisis of 2008 and during the ongoing economic crisis triggered by the pandemic of COVID-19. A further fundamental aspect of these severe perturbations regards the uneven spatial distribution of their impact, with some regional economies being able to recover swiftly whereas many others remaining in stagnating or declining trajectories of development. The ongoing COVID-19 pandemic and the unprecedented economic costs related to the lockdown measures taken by many governments, in particular, represent an additional stress test and a source of economic damage for many already depressed national and regional economies. At the same time, however, these crises can also open new opportunities for policy action. The COVID-19 pandemic, for instance, represents a clear policy shock, intended as a sudden process of unexpected change of policy targets at the supranational level. The adoption of the NextGenerationEU and the various national plans for recovery and resilience that are characterising many EU countries witness a profound paradigm shift towards a more encompassing notion of economic development.

In this framework, the present paper discussed the tension between productivity and resilience with specific focus on the case of regional economies. These two concepts emerge from very different theoretical traditions, thus entailing clear trade-offs between one and the other, but areas for possible integration exist. Understanding the relationship between productivity and regional resilience is, in fact, a relevant objective of inquiry especially in times of economic recession.

After discussing the main features of the 2007 financial crisis and the current pandemic in the perspective of regional economies, the paper has addressed the traditional theory of long-term productivity growth, contrasting it with the scarce empirical evidence on the predicted processes of convergence and growth. Subsequently, the notion of resilience was discussed by thoroughly considering its different conceptualisations and theoretical extensions, ranging from a single-equilibrium and a multiple equilibria framework to a more comprehensive and spatially meaningful evolutionary perspective on this concept. The emergence of resilience as a notion that can be discussed along the traditional concept of productivity has become urgent and important especially in the wake of the current pandemic. Consistently, this perspective fundamentally denotes a renewed interest for the short- to long-term processes, roles, occurrences and responses to extraordinary economic shocks and disturbances in contrast with the dominance of the traditional investigations regarding the causes of long-run growth and technological progress. In this vein, the concept of regional resilience provides the opportunity to understand both the short- and long-term patterns and processes that make locations more or less vulnerable to shocks, disruptions and changing circumstances, rather than exclusively focusing on the factors contributing to economic performance in the long-run.

With this in mind, the paper has employed the idea of resilience to consider that certain productivity-enhancing measures can, in some circumstances, be detrimental for the capacity of a regional economic system to face shocks and disruptions. This could be the case of the organisation of the health systems in many countries according to efficiency principles as well as the global organisation of international productions in global value chains that have shown high vulnerability during the pandemic. In general, policy approaches over-emphasizing productivity growth could include the risk of harming the resilience of local economies in the face of sudden shocks and longer term challenges. At the same time, the implementation of other efficiency-enhancing tools, mostly related to the domain of new communication technologies and digitalisation of activities, make a number of business operations still possible in a time of economic lockdown, thus reinforcing the profile of resilience of regional economies. In this sense, the very notion of resilience paves the way for a more inclusive, equitable and balanced approach of development policies, as policy targets encompass a larger set of qualitative elements beyond productivity.

Finally, the paper has discussed the case for a new-normal policy agenda for the post-COVID-19 recovery phase. By acknowledging that most previous placeless policy interventions delivered very fragile results for local economic development, new goals and actions should be readjusted by taking into careful consideration a number of elements. Among these, the recognition that resilience should be incorporated as a core policy aim alongside productivity, as the uncertainty of the global economy may trigger new sudden challenges in the future. Furthermore, multilateralism and the interconnectedness of policies for regional development between different international partners should be strengthened as a response to the glocalised nature of many contemporary shocks. Additionally, resilience-oriented policies may consider that generating redundancies in vital areas of regional and urban systems can be a necessary tool to reinforce the local capacities to face shocks. On these bases, local economic development policies should be sensitive to the contingencies of local economic and social structures, since the mix of opportunities and risks of heterogeneous regional economies require a tailored approach aimed at capitalising on local strengths while minimizing local weaknesses.

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