Natural disasters and the economy

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1 Introduction

The COVID-19 pandemic is only the latest catastrophic event showing humans how “little” they are in a much bigger and integrated eco-system. All human activities, including those to produce, exchange and allocate goods and services, are contingent upon the functioning of the natural system. With this awareness, it becomes increasingly important for human beings to develop ways to face—and solve—the various challenges thrown at them by their environment. For example, several studies recently underlined the correlation between climate change and the likelihood (and magnitude) of hydrogeological events such as droughts, rainfall, cyclones and landslides (Stott 2016; NAP 2016).

Disasters triggered by natural phenomena are a shock often difficult to overcome. According to CRED (2019), 315 natural disasters—accounting for 11,804 deaths and 131.7 billion dollars in economic losses across the world—have been recorded in 2018, while over 68 million people have been directly affected by extreme events worldwide. The socio-economic impact generated by these natural disasters need to be carefully studied and, in fact, there is an ever increasing demand, from both the public and the private sector, for actions aimed at preventing, mitigating and adapting to the damages produced by natural disasters (Zeleňáková and Zvijáková 2017).

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However, it is important to note that the occurrence of extreme natural events not always turns into a disaster. In fact, natural events might be labelled as “disasters” only when they severely affect vulnerable areas, inhabited by humans (Mela et al. 2017). This special issue on “*Natural Disasters and the Economy*” aims at providing a comprehensive vision of the interaction between natural disasters and socio—economic regional structures, covering different aspects of the economic evaluation of natural disasters, from both an ex-ante and ex-post perspective.

The economic effects of extreme events vary according to a series of elements, which should be jointly considered. For instance, a natural disaster might generate a different outcome according, not only to the type of event under consideration (clearly a flood produces different effects of an earthquake or a wildfire), but also to the socio-economic conditions of the affected regions and the “interaction” between hazards and the affected communities. Moreover, long-term consequences are also related to the capacity of regions to absorb, bounce back and adapt to a shock. Therefore, all the components of the risk (hazard, socio-economic exposure, vulnerability and resilience) might be jointly evaluated, and at the lowest possible scale of analysis, to uncover the strengths and weaknesses of a region. This can be done both in an ex-ante perspective (e.g. risk reduction, risk assessment) and in an ex-post perspective (e.g. risk management, assessment of damage, reconstruction activities). In fact, according to Pelling (2003), any disaster can be decomposed into three phases: a pre-event phase (i.e., preserving the status quo or preparing for the natural event), the actual occurrence of the natural event, and the post-event phase that includes both the emergency and recovery phase (Modica et al. 2019b).

In each phase, there are concepts that are fundamental. First, *economic exposure*, i.e. all the physical and monetary assets that could potentially be affected by external events, needs to be carefully defined and evaluated. Second, the concept of *Vulnerability*, as the “*inherent characteristics of the exposed objects/areas that create the potential for harm*” (Sarewitz et al. 2003, p. 805), is crucial. *Resilience* is also a fundamental concept for areas threatened by external, potentially catastrophic, events. Starting from Holling (1973), different definitions of resilience have been proposed in the literature, highlighting the capacity to i) bounce back, ii) recover, iii) adapt to an external shock (Modica and Reggiani 2020 and Faggian et al. 2018). Lastly, the concept of *risk*, as the interaction between exposure, hazards (and their frequency and the severity) and vulnerability is of paramount importance (Alexander 2000; Birkmann 2007 and Marin et al. 2019).

Undoubtedly, there is an increasing need for concrete solutions that can reduce the vulnerability and enhance the resilience of territories, populations and activities by developing, for instance, updated municipal risk management plans. At the same time, evaluating the objects under risk, and the risk itself, can provide interesting insights for a correct risk management by policy makers and all the actors involved.

2 The contributions of the special issue

Despite the theoretical and empirical advancements by scholars in natural disasters studies, more inter- and cross-disciplinary work is necessary to define better risk

mitigation strategies (in an ex-ante perspective) and recovery policies. In fact, the conditions that turn an extreme event into a disaster depend on the intersection between the natural and the built environment. Therefore, both natural and human factors need to be jointly considered to build credible scenarios of the potential damages of extreme events and also to define suitable recovery strategies.

Extreme events may also provide an opportunity for the development of the affected areas (Urso et al. 2019), especially for regions “locked-in” an underdevelopment path (Belmonte et al. 2020; Modica et al. 2019a). In other words, a disastrous event may generate a temporary window of opportunities by the implementation of ad-hoc procedures (e.g. simpler and faster administrative procedures, as those to counter the spread of COVID) that may accelerate both the reconstruction activity and the development in the aftermath of the event.

This special issue includes a selection of theoretical and applied articles that aim at providing a better understanding of how natural events interact with the man-made environment and at identifying the main regional characteristics that could turn an hazard into a disaster. Among the 5 contributions (with case studies from three continents: Asia, Europe and South America), some are the result of cross-disciplinary collaborations, to highlight the importance of these collaborations in studying complex phenomena such as disasters.

The special issue consists of two parts. The first part, with three papers, deals with ex-ante issues such as the effect of climate change, the concepts of risk perception, vulnerability and susceptibility. The “*fil rouge*” of this part is the understanding that many of the effects of extreme events are conditional to the characteristics of the areas affected. In fact, not all natural events become natural disasters, but most importantly, the extent of the damages depends upon the socio-economic features of the regions. The second part includes two papers instead on the short and long-term effects of a natural disaster, which includes not only costs but also possible benefits in term of resources for future local development strategies.

The first contribution by Rampa is theoretical and explores the interaction between catastrophic scenarios and environmental policies. In particular, it analyses the way in which extreme case scenarios are modelled and the role of climate change in creating hydrogeological hazards. The paper clearly shows that natural hazard and vulnerability have a high degree of geographical variability.

The second paper by Astuti and Handayani, analyses another Indonesian case study, Tambarok Lorok. This area has peculiar characteristics and, despite being in proximity of an urban agglomeration, it is struggling to cope with natural disasters prevention. In fact, using a classical vulnerability index approach, this area appears particularly vulnerable showing how local characteristics are fundamental in facing extreme events.

The third, and final, contribution in part one by Donnini, Modica, Salvati, Marchesini, Rossi, Guzzetti and Zoboli looks at an Italian case study, i.e. the Umbria region. In line with the previous contribution, this multi-disciplinary article shows the importance of physical and socio-economic characteristics of different municipalities in coping with disasters. The novelty of this work is in its cross-disciplinary approach, combining hydrogeological and economic studies to assess the vulnerability of the different areas to landslides.

The second part of the special issues is devoted to the ex-post analysis of disasters. In particular, the work by Mendoza, Breglia and Jara proposes a short-term comparison of three case studies: Chile, Ecuador and Italy. The paper clearly shows how different was the reaction to similar earthquakes in these three contexts. While in Ecuador some positive effects on employment and labour income could be identified, the same could not be said for Chile and Italy. According to the authors, the difference can be linked to the different labour market structure and institutions.

The last paper in the special issue, by Kourtit, Nijkamp and Bănică, highlights the role of natural disasters as an opportunity for local development. In fact, the authors provide evidence of long-run positive effects of extreme events on the economic development, although conditional to the capacity of the system to effectively react to the shock.

3 Lessons learned

Natural disasters represent a shock often difficult to overcome. However, extreme events may not only be a challenge, but also provide opportunities for areas lagging behind in the development process. Although the destructive effect of these events should not be underestimated (especially in terms of human lives lost), they represent a way to rethink the local socio-economic structure and possibly change the future development path for the better. All the papers in this special issue share a more positive understanding on disasters showing that there might be a “silver lining”. However, it is also clear that the resilience of regions to extreme events depends heavily not only on their initial socio-economic characteristics, but also, crucially, on their ability to coordinate and cooperate with other local and national administrations in a multi-governance perspective.

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