1. The COVID-19 pandemic in the disaster and economic discourses

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Abstract

Purpose: The chapter aims to compare how the disciplines of economics and disaster research use terminology related to the long-term impacts of disasters and crises and particularly to discuss the overlaps in the use of the concepts "economic scarring" and hysteresis from the economics literature with the concepts of resilience, "bouncing back" or "bouncing forward" from the disaster discourse.

Design/methodology/approach: By using a comparative literature review, the chapter compares the terms used in the economic literature with those used in the disaster literature and applies these concepts to the context of the COVID-19 pandemic, considering it a global disaster with significant economic implications.

Findings: While earlier literature showed similarities in the use of the terms hysteresis, scarring, resilience, and bouncing back, a comparison of COVID-19 studies reveals divergences in operational definitions. The economic discourse still uses single indicators like GDP, output or unemployment to measure economic scarring and hysteresis, while the disaster discourse utilises more often multi-indicator operational definitions or indices, which demonstrate the multi-dimensional characteristics of the concept of resilience.

Originality and value: This chapter seeks to identify potential differences in how two disciplines approach the study of disasters, crises, or shocks and aims to foster interdisciplinary dialogue and understanding. The chapter provides a resource for scholars in disaster and crisis research, helping to frame the concepts and relevant literature into groupings and assists a better selection of concepts for research in the field.

Keywords: disasters, resilience, bouncing back, economic hysteresis, economic scarring.

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Introduction

Natural disasters, when they occur, affect almost all aspects of our lives. These horizontal effects of disasters also translate into the academia, where disasters are studied across different disciplines and analysed from different angles. Discourses on natural disasters in different fields create many parallel terms and notions, each reflecting a certain facet of the phenomenon or its effects. As natural disasters have become a multidisciplinary field of study, and more so following the onset of the COVID-19 pandemic, which was caused by the SARS-CoV-2 virus, the terms used by different scholars to describe the effects of the pandemic on national economies have raised a simple question: do the terms used in different disciplines to describe the long-term impacts of natural disasters on the economy have similarities? Other subsequent questions are: How do the terms relate to one another and whether there are any overlaps in relation to their meaning or uses?

The chapter aims to compare how two academic disciplines view and use terminology on the long-term impacts of natural disasters. These long-term impacts will be discussed, on the one hand, from an economic point of view, specifically with reference to the terms "economic scarring" and hysteresis, and on the other hand, from the point of view of the disaster research, which focuses on terms such as resilience and "bouncing back" or "bouncing forward" (Tierney, 1997).[1] In recent years there has been a certain convergence between the disciplines and several scholars have addressed and studied the relationship between the economic and disaster discourses, which will be discussed in this chapter as well.

One may ask why we compare terms such as "resilience" and "hysteresis", as the former addresses a property of a certain entity, i.e. a firm or country can have resilient properties, and the later refers to a state or condition which will be defined below, i.e. depicting the persistence of a phenomenon (Boukraine, 2021). In addition, resilience is considered a positive property (Palekiene et al., 2015), while hysteresis is viewed, at least in economic terms, as a negative condition (Martin, 2012). It would be more logical to relate hysteresis with vulnerability, as one may suggest that the more vulnerable a country's economy is, the more probable it is that the economy will experience adverse negative effects such as hysteresis. The literature on the relationship and the differences between resilience and vulnerability is extensive and there is no clear answer which notion is more relevant to discuss the properties of a system or entity following a disaster (Beesley et al., 2023; Briguglio, 2014; Noy & Yonson, 2016, 2018; Yellman & Murry, 2013).

[1] It should be noted that while the disaster discourse uses the terms *disasters* and *hazards*, the economic discourse tends to focus on terms such as *crisis* or *shocks*, regardless of their sources (natural or others). This issue will be discussed later.

Given the fact that this chapter aims to illustrate how two disciplines use the terminology on the long-term impacts of natural disasters, resilience as a concept was chosen here mostly because it is used to a greater extent in the economic dialogue than the concept of vulnerability.

Another introductory question would be why it is of interest to apply these concepts to the COVID-19 pandemic. Under the definition of the International Federation of Red Cross and Red Crescent Societies (IFRC),[2] biological hazards such as diseases and viruses can lead to natural disasters (Mohamed Shaluf, 2007) and the case of COVID-19 is one example of such a disaster on a global scale. The COVID-19 pandemic has been viewed by Peleg et al. (2021) as both qualitatively and quantitatively different from other disaster types, given its global scope and the number of people affected. Already at the beginning of the COVID-19 pandemic, Barua (2020) recognised its potential to shock the global economy through the channels of supply and demand, the supply chain, trade and investments, prices, exchange rates, the financial stability and financial risks associated with the pandemic, economic growth as well as international cooperation. Eventually, the effects of COVID-19 were so widespread that scholars (e.g., Ahmad et al., 2021; Antipova, 2021; Phan & Wood, 2020) have debated whether it can be considered a black swan event, which, according to Taleb (2007), is an unanticipated event that has significant and widespread consequences. Alcántara-Ayala et al. (2021) refer to the COVID-19 pandemic in essence as a global disaster which transcended ecological regions, national borders, economies and societies. As such, COVID-19 has been addressed by scholars in numerous academic fields, reflecting different perspectives and notions. However, despite the division into different disciplines, sometimes these disciplines have overlapping concepts and rationales.

It is at this exact junction of overlapping concepts that the chapter seeks to review whether the economic and disaster discourses are considerably different when investigating a certain disaster, crisis or shock. Such an exercise can facilitate a mutual dialogue between these different academic fields and allow better interdisciplinary understanding and research of natural disasters. In addition, scholars seeking to study the field of disaster will find this chapter useful, as it may help them select the most relevant concepts for their research needs and interests.

For these purposes, the remainder of the text is divided into three parts. The first section will introduce the economic discourse on the long-term impacts of natural disasters, or disasters in general, by creating economic downturns, economic depressions, and what is known as economic scarring and hysteresis. The second section will focus on the concept of macro-economic resilience, which by some definitions, is measured by the ability of the economy to bounce back, or bounce

[2] https://www.ifrc.org/our-work/disasters-climate-and-crises/what-disaster

forward, relatively to the situation prior to the disaster. The third section will present how these notions from the two disciplines have been used in the academic literature to describe the long-term effects of the COVID-19 pandemic on the economy.[3]

1.1. Economic discourse on the long-term impacts of disasters—hysteresis and scarring

In the economic discourse, disasters, including natural disasters, are characterised by extreme adverse impacts on the economy. They are mostly referred to as shocks or crises, which are caused by some sort of a triggering event. Such disasters are sometimes also labelled as economic depressions when they are more long-term (Eslake, 2009), economic collapses, breakdowns, crashes or meltdowns (Oliynyk & Shevchenko, 2016). According to Cerra et al. (2021), these are caused by various triggering events, including exogenous shocks to the economic system, such as financial, political or health-related triggers like COVID-19. In the immediate aftermath of the shock, there is usually a sharp decline in the economic activity, as measured in terms of income or hours of work. One can discuss either the short-term or long-term effects of these shocks; yet, when one wants to discuss the persistent effects of an economic shock, there is one particular strand of literature that focuses on these enduring consequences and it utilises the concepts of hysteresis and scarring.

Boukraine (2021) explains that hysteresis refers to the persistence of a phenomenon even though the factors that have led to it have already disappeared. The concept of hysteresis in economics is used to describe conditions that can occur in every market (Göcke, 2002). Phelps (1972), Blanchard and Summers (1986) and Sachs (1986) used the term in the field of labour economics to describe conditions related to employment and unemployment. Bell et al. (2020) refer to scarring effects as the "long lasting negative future labour market consequences directly related to the impact of economic crises". Others use hysteresis or economic scarring to describe the persistence of recessional effects on GDP and output (Michl, 2021), total factor productivity (TFP) (Tervala & Watson, 2022), capital accumulation, R&D and innovation as well as international trade (Denadai & Teles, 2016; Kemp & Wan, 1974). Baldwin and Lyons (1994) addressed the issue of exchange rate hysteresis which is linked to hysteresis in the trade balance.

[3] This is despite the fact that our perspective today cannot fully detail or analyse the long-term effects of COVID-19 on the economy. This is because the time that has passed since the decline of COVID-19 following the introduction of large-scale vaccinations in 2021 does not allow a long-term retrospect.

Before describing the channels through which economic hysteresis manifests itself, it is useful to mention that the theoretical and applied usages of economic hysteresis stem from the field of economic growth and business cycles. Cerra et al. (2020) focus on the business cycle aspects of hysteresis and explain that the period of high inflation in the 1970s brought about the development of macroeconomic models which emphasised the distinction between the long-run trends of economic growth and the business cycle. Dosi et al. (2018) explains that the persistence in these deviations from the equilibrium paths is what constitutes situations of hysteresis. According to standard economic theory and conventional business cycle models, which do not take hysteresis into consideration, the long-term linear trend is determined by components of the supply side, such as technological advances, labour supply and human capital (Amador, 2022). Based on this perspective, business cycles are short-term fluctuations that are considered as temporary deviations from the upward long-term stable growth path. While the upward trend is determined particularly by supply-side variables, the business cycles or short-term fluctuation are influenced mainly by demand shocks and monetary policy (Amador, 2022).

Other scholars believe that there are also supply-side determinants of hysteresis, which can include sunk adjustment costs of changing the market access or the supply quantity (Göcke, 2002). In short, hysteresis can be viewed as a phenomenon stemming both from supply-side and demand-side factors.

Cerra et al. (2021) describe the channels through which economic hysteresis can manifest itself: unemployment in the labour market, slowdown of investment in capital, technology or R&D, all of which cause permanent reduced productivity. Furthermore, in unique circumstances, trade patterns and international supply chains can also have a permanent hysteresis effect. Diggle and Bartholomew (2021) add some other hysteresis transmission channels in addition to labour market scarring and hysteresis. This includes policy errors caused when there are insufficient stimulative demand-side policies or insufficient responsive supply-side policies aimed to improve the ability of markets to react and the ability of workers to acquire necessary skills. They also add belief scarring and psychological damage, balance sheet repair and "zombification", as well as structural repair momentum as other transmission channels through which long-term damage can occur following a large negative shock.

The interconnectedness of markets suggests that hysteresis or scarring in the labour market can spill over to hysteresis in output and productivity (Arulampalam et al., 2001; Bell et al., 2020; Brownbridge & Canagarajah, 2021). Yet even without any spillover effects, as mentioned above by Cerra et al. (2021), the second channel through which economic hysteresis can manifest itself is through a reduction in production and economic growth, halt of investments in

general, and particularly in R&D, as companies may delay or reduce spending on R&D (Irons, 2009). Barišić and Kovač (2022) discuss how shocks can have scarring effects on the economy since fluctuations in GDP can be persistent and address the need to counteract low aggregate demand to return the economy to full working capacity.

Table 1.1. Use of hysteresis and economic scarring following shocks in economic literature

Hysteresis and scarring in labour markets	Hysteresis and scarring in GDP, output, TFP, productivity	Hysteresis and scarring in trade, R&D and innovation	Studies which address two or more of the channels listed to the left
Blanchard and Summers (1986) Boukraine (2021) Phelps (1972) Sachs (1986) Bell et al. (2020) Amable et al. (1995) Gustavsson and Österholm (2007) Gustavsson and Österholm (2010) Akdoğan (2017) Arulampalam et al. (2001) Stockhammer and Sturn (2012)	Michl (2021) Tervala and Watson (2022) Cerra and Saxena (2008, 2018) Ball (2014) Suphaphiphat and Shi (2022) Amador (2022)	Kemp and Wan (1974) Denadai and Teles (2016) Baldwin and Lyons (1994) McClausland (2000) Göcke (2001) Baldwin (1990) Campa (2004) Dixit (1992)	Göcke (2002) Cerra et al. (2020, 2021) Dosi et al. (2018) Reifschneider et al. (2015) Diggle and Bartholomew (2021)

Source: own work.

The third channel through which economic hysteresis is demonstrated is international trade and supply chains. Göcke (2001) defines hysteresis in foreign trade as "the persisting consequences of temporary exchange rate shocks on the quantities and prices in foreign trade". Baldwin (1990) explains that there are sunk market entry costs associated with foreign trade, which affect the ability of foreign firms to adjust to changes in the exchange rate. Table 1.1 summarises different approaches in studies on hysteresis and economic scarring. In addition, it is worth mentioning Irons (2009) who addresses the economic scarring of recessions in several fields. He mentions the effects of unemployment and income losses on educational achievements and on the opportunities of individuals and families. Recessions can also affect private investments and entrepreneurial activities, as they hamper new business formation, innovation, R&D and new start-ups.

1.2. Disaster discourse on the long-term impacts of disasters—economic resilience and bouncing back

The literature on resilience has evolved and widened immensely in recent decades and has taken diverse meanings. This is even more so true if one considers the use of the term in the different scientific disciplines, such as ecology, physics, engineering (Holling, 1973; and more recently, Ganin et al., 2016) and many fields of the social sciences, such as economics, psychology, sociology, anthropology, public health, geography, organisational studies and disaster management (Demiroz & Haase, 2019; Shim & Kim, 2015; Tierney, 2003). Today, as it is used in different disciplines, resilience is put into practice to describe a desirable property of both materials and natural systems (Manyena et al., 2011). Rubber, e.g., is a popular example of a material with extremely high modulus of resilience, as it is flexible and capable of recovering from various stresses back to its original shape or form. Human systems like communities, organisations and countries have also been subject to the question whether they possess resilient properties (Klein et al., 2003; McAslan, 2010).

Some scholars consider resilience as a fuzzy concept which lacks a clear definition and is difficult to operationalise (Davidson et al., 2016). Pozhidaev (2021) describes resilience as an essentially contested concept (ECC) which suffers from the "catch-all syndrome" (ESCAP, 2019). This is most probably due to its transfer from the ecological science to social contexts. Nevertheless, despite the many definitions of the term, resilience can be generally defined as the capacity of a system to cope or bounce back from an unanticipated danger (Wildavsky, 1988). Martin (2012) uses the plucking model of economic fluctuations (Friedman, 1993) to visualise the bouncing back concept of resilience. Other scholars have emphasised the circumstances allowing a system to be resilient. For instance, in Dovers and Handmer's (1992) view, the circumstances are not only external to the system but also internal. They discuss three types of resilience: 1) resistance to change and maintenance of the status quo, 2) adjustment or change at the margins, and 3) flexibility and openness in response to change. They suggest that societies that rely on the first two types of resilience may find it difficult to adapt to totally different circumstances, as reactive measures are not always enough. Therefore, rather proactive measures and the use of planning ahead to confront hazards is necessary. Rose (2004, 2007) and later Cutter et al. (2008) stress the variance that exists between inherent resilience, which refers to the existing ability to deal with crises, and adaptive resilience, which refers to the ability during a crisis to make the changes required to absorb the impacts of an extreme event. This view has also been put forward by Tierney and Bruneau (2007) who mention the issue of disaster resistance and stress the need to practice pre-disaster mitigation measures to reduce the losses of an ensuing disaster.

According to Rus et al. (2018), there are two dominant theoretical perspectives on the issue of resilience with respect to urban systems and in the context of natural disasters: either the socio-ecological perspective, which considers resilience as a process-oriented phenomenon (a dynamic concept), or the engineering perspective, which views resilience as a result-oriented concept (a static premise). This distinction is important when considering the ways to enhance resilience, as the socio-ecological perspective represents the ability to achieve adaptive resilience; one can recover and adapt to new conditions. In the engineering approach, resilience is the ability to bounce back to the same condition before the adverse event.

A much-used definition of the term resilience is that of the 2009 UNISDR Terminology on Disaster Risk Reduction (UNISDR, 2009), which defines resilience as "the ability of a system, community or society exposed to hazards to resist, absorb, accommodate to and recover from the effects of a hazard in a timely and efficient manner, including through the preservation and restoration of its essential basic structures and functions". The use of definitions that incorporate both adaptation actions (Comfort, 1999) and vulnerability have been developed as well (Paton & Johnson, 2001). Other researchers have described resilience as the opposite or the other side of vulnerability (Graveline & Grémont, 2017) or have described resilience and vulnerability as opposite sides of the same coin (Twigg, 2007). Manyena (2006) describes both concepts as two sides of the same equation on one continuum. Sheffi and Rice (2005) explain that by reducing vulnerability, a business can reduce the likelihood of a disruption and can increase its resilience.[4]

The theme of "bouncing back" with reference to resilience is understandably a positive characteristic which a system should have following extreme events or shocks. The question is: What does "bouncing back" mean in economic terms in the disaster literature? To answer this question, one must address the meaning of "economic resilience". Scholars such as Rose (2004), Rose and Liao (2005), Briguglio et al. (2009), Graveline and Grémont (2017), Rose and Krausmann (2013), and Hallegatte (2014) have all addressed this issue. The research on economic resilience aims to quantify the economic impact of a disaster on a system, either before a disaster strikes, by simulating the impacts with modelling, or following a disaster, to calculate the system's resilience. The emphasis is on the economic indicators of the system, i.e. costs of damage and revenue losses due to business interruption.

Rose (2004) defines economic resilience as "the inherent and adaptive responses to disasters that enable individuals and communities to avoid some potential losses". Rose (2004, p. 482) also explains that in economic terms, resilience

[4] For further elaboration on the evolution of the term resilience and its different definitions see Manyena (2006), de Bruijne et al. (2010), Bhamra et al. (2011), Hosseini et al. (2016), and Bergström et al. (2015).

can take place either at the microeconomic level (i.e. households and firms), the mesoeconomic level (specific economic sectors or industries); and the macroeconomic level (i.e. aggregate total of the economy). McAslan (2010) also addresses the issue of how resilience is different for each level of analysis. For an individual, resilience relates to a person's mental or physical health state; for communities resilience is "dependent on social interaction and collective action based on networks of relationships, reciprocity, trust and social norms"; for organisations, resilience involves having the ability to adapt supply chains, products and workers to different circumstances while retaining agile organisational structures; and lastly, for countries, McAslan suggests that resilience relates to the notion of national security, but departs from the concept to include other characteristics as well.

According to Tierney (2003), economic resilience refers to the capacity of both firms and local, regional and national economies to "absorb, contain or reduce both direct and indirect economic losses resulting from disasters". Hynes, Trump, Kirman et al. (2022) propose to strengthen the capacity of systems to "anticipate, absorb, recover from and adapt to a wide array of systemic threats". They term this capacity as the systemic resilience of economies, which is achieved by balancing between systemic resilience by design (RBD) and systemic resilience by intervention (RBI). Hynes, Trump, Kirman et al. (2022) suggest that an effective recovery from the COVID-19 pandemic requires not only promoting systemic resilience in economies but also promoting systemic resilience in underlying subsystems and connected human and environmental systems, as the economy is a system of interconnected institutions and markets where small perturbations in one area can have cascading effects on other parts of the system.

Noy et al. (2020) discuss how to measure the economic risk of COVID-19, which includes the four components of risk: hazard, exposure, vulnerability and resilience. In their study, resilience is an index of several components which allow the economy to bounce back from the initial shock of the pandemic. They conceptualise and quantify resilience as the ability of the economy to bounce back, given the magnitude of the shock and taking into consideration the hazard, exposure and vulnerability of the situation. They state that the degree of resilience in an economy is a function of the speed at which the recovery process occurs and the system returns to its pre-shock level. Jiang, Wang et al. (2022) also agree that the speed at which an economic system recovers from a severe shock to an ideal state indicates its degree of economic resilience. With regards to the literature on regional economics, Di Pietro et al. (2021) also point out that the speed of the recovery to the pre-shock steady state equilibrium is what defines how resilient a region is, relatively to other regions which have experienced the same external disturbance.

Martin and Sunley (2015) in their discussion on the notion of regional economic resilience usefully differentiate between three types of resilience as they appear

in the literature on the subject. The first type of resilience is defined as bouncing back from a shock. This definition is interpretated as a rebound or return of the system to the pre-shock state or path, and the emphasis is on the speed and extent of the recovery. The second type of resilience is the ability of the system to absorb the shock, which focuses on the stability of the system to face and tolerate the shock. The last type of resilience is what is known as "positive adaptive resilience" which suggests that, given the capacity to do so, a system can not only bounce back to its pre-shock state but it can also bounce forward to a better path.

To compare the concepts of economic resilience and bouncing back with hysteresis and economic scarring, it is important to address the issue of how scholars measure economic resilience. Table 1.2 presents different indices identified in the literature. The next part of the chapter will introduce different studies that have been conducted in both the disaster discourse and the economic discourse on the long-term effects of COVID-19.

Table 1.2. Operationalisation of economic resilience and bouncing back/forward in disaster literature

Labor market indicators for economic resilience and bouncing back	Output or growth indicators for economic resilience and bouncing back	Models and indices with several indicators
Martin (2012) Faggian et al. (2018) Fingleton et al. (2012) Augustine et al. (2013)	Cellini and Torrisi (2014)	Rose (2004, 2007, 2017) Rose and Krausmann (2013) Hallegatte (2014) Briguglio et al. (2009) Noy et al. (2020) Pozhidaev (2021) Xie et al. (2018) Martin and Sunley (2015)

Source: own work.

1.3. Use of disaster and economic discourses in the context of COVID-19 pandemic

The COVID-19 pandemic has been both a global supply and demand shock. According to Barišić and Kovač (2022), the COVID-19 pandemic affected both supply and demand at the same time. It started as a supply shock where essentially, to contain the spread of the virus, drastic measures, such as strict lockdowns and a halt in the economic activity, were required simultaneously around the world. These measures created disruptions in production and supply chains

and drastically reduced demand, especially in sectors reliant on the movement of people, like tourism, travel and hospitality services (IMF, 2020). Once aggregate demand fell, output was also down, causing a rise in unemployment. Barišić and Kovač (2022) also explain that as aggregate demand falls and forecasts of lower long-term growth of output become overly pessimistic, this can potentially have a negative impact on the economy through underinvestment or loss of innovation potential. This is because once demand decreases, firms have less capital to spend on investments; therefore, they tend to cut back on their investment (Fornaro & Wolf, 2020). This, in turn, generates an endogenous drop in productivity growth and future potential output, which sequentially induces another drop in demand, which spirals again to reduce investment and growth. Fornaro and Wolf (2020) call this phenomenon a supply-demand doom loop. Benigno and Fornaro (2018) refer to situations of protracted periods with low growth and high unemployment as stagnation traps. These traps are caused by low aggregate demand that generates low profits for firms, hence limiting their investment in innovation.

Several studies have confirmed this potential negative effect for COVID-19. In a study on Chinese firms, Shen et al. (2021) found that that COVID-19 has had a significant negative effect on the performance of listed Chinese companies by decreasing their investment scales and reducing their total revenue. In another study on listed Chinese firms, Jiang et al. (2021) confirmed the hypothesis that the COVID-19 outbreak has caused a significant reduction in investment, which was more pronounced geographically in the large, state-owned firms located in eastern China. Pessimistic sentiments regarding the duration of the COVID-19 shutdowns were also found to be a factor influencing firm behaviour. Buchheim et al. (2022), who discussed how sentiment-driven expectations affect firms' business decisions, used a large panel of German firms to illustrate how firms that anticipated the shutdown to last longer were more likely to implement strong measures like layoffs or cancelling investments.

If we look at the use of the concepts of economic scarring and hysteresis with reference to the COVID-19 pandemic, Barrett et al. (2022) discuss possible scarring effects from the COVID-19 pandemic where scarring is defined as persistent output losses. They suggest there are several channels (capital, labour and productivity) through which scarring can occur on the supply side. Similarly, Bodnár et al. (2020) discuss the impact of the COVID-19 pandemic on the euro area potential output and illustrate how the pandemic had negatively affected output by comparing the euro area potential growth following the shock with pre-crisis output estimates. Their article shows that the level of euro area potential output is expected to remain below the path suggested by the pre-crisis projections. Another study which analysed the effects of COVID-19 in the EU in terms of growth potential or the level of potential output is that of Halmai (2021). Furthermore, Barrett

et al. (2022) also explained how, during the COVID-19 pandemic, the supply-side components of output can potentially cause scarring by leading to persistent output losses. Cerra et al. (2021) also address the economic implications of COVID-19 pandemic and explain that the lockdowns have caused a large and sudden decrease in employment, while travel bans, apprehension about person-to-person contact and stay-at-home orders have all slowed down the labour market recovery. This situation has also left workers unemployed for relatively longer periods of time, which is exactly what constitutes hysteresis in employment. They reiterate that the longer it takes the economy to return to pre-crisis levels, the more likely it is that the pandemic will have long-lasting impacts. Long-term unemployment due to the decrease in employment during lockdowns can cause hysteresis. These consequences can become persistent; therefore, the authors suggest several ways how fiscal and monetary policies can minimise the scarring effects of COVID-19. Cerra et al. (2021) have a similar view on the subject to Syverson and Mauro (2020) who emphasise how job detachments and long protracted periods of unemployment may erode workers' skills and lead to deterioration of job matches.

Portes (2020) claims that during COVID-19 the term "scarring" was used many times in the economic literature to refer to several different ways in which "transitory economic conditions can negatively affect the long-run level or growth of output". He distinguishes between several scarring channels through which COVID-19 can potentially impact GDP, including unemployment, capital, investment and education.

Lockett-Morse (2021) presents several indicators that can determine the long-term scarring effects of the COVID-19 pandemic on an economy. By monitoring key recession indicators such as the Yield Curve, the Consumer Confidence Index (CCI), employment data, Leading Economic Index (LEI) and GDP, one can assess whether an economy has the potential of falling into a recession due to the pandemic.

Barišić and Kovač (2022) address possible hysteresis effects of COVID-19. They present their assessment of the economic damage that the ongoing COVID-19 crisis has done and test whether the fiscal measures taken by the governments of 26 EU countries (they exclude Luxembourg) have been effective in minimising possible hysteresis effects in the long-run. The study presents possible implications of the fiscal measures on potential output and GDP growth from 2021 to 2023 and suggests possible hysteresis effects if policymakers do not undertake the necessary fiscal measures. In such an instance, cyclical fluctuations of GDP could have a negative and permanent effect on the growth of potential GDP. In a similar manner, in their study, Caporale et al. (2022) assess the degree of unemployment persistence in the 27 European Union (EU) member states and try to address the question of whether the COVID-19 pandemic had affected it. The results of their analysis, which used fractional integration methods on figures from

the first quarter of 2000 to the fourth quarter of 2020, overall, point to high levels of persistence in the unemployment rates of all the 27 EU economies following the initial COVID-19 shock, hence supporting the hysteresis hypothesis. Caporale et al. (2022) suggest that there is also a divergence in the adjustment towards the long-run equilibrium, and some countries like Belgium, Luxembourg and Malta recover faster than the EU average.

Not knowing what we know today regarding the COVID-19 pandemic, when writing their article in the summer of 2021, Diggle and Bartholomew (2021) presented several channels of long-term damage from the crisis. They suggested labour market scarring and hysteresis, mentioning that the labour market had experienced a very meaningful shock in almost all economies. They stressed that the characteristics of the European labour market presented a challenge, as skill depreciation could occur during extended periods of furlough or reduced hours, where jobs simply would not reappear as the economy re-opened. Structural changes or firm defaults may very well lead to an eventual increase in unemployment and the associated labour market hysteresis. Other factors mentioned by Diggle and Bartholomew influencing how bad the effects of COVID-19 on the economy could be included: policy errors, belief scarring balance sheet repair and "zombification" as well as structural reform momentum.

Zhang et al. (2021) tested the validity of employment hysteresis, as opposed to unemployment hysteresis, in the United States in the onset of the COVID-19 crisis, using daily employment data between January 8, 2020, and May 30, 2020. Using nonlinear unit root test models, the study observed significant evidence of the validity of the employment hysteresis hypothesis during COVID-19, as employment in the United States was significantly influenced by the COVID-19 shock. It would be useful to note that despite these conclusions, as explained earlier in this article, hysteresis usually refers to long-term outcomes following a shock. As Zhang et al. (2021) test their hypothesis on a five-month span in the beginning stages of the pandemic, it is highly doubtful this study can reach conclusions regarding any permanent effects of COVID-19.

Another study, which has a longer view of the effects of the pandemic on the US economy (as of mid-2022) is that of Fernald and Li (2022). They assert that before COVID-19, the US economy was on a slow-growth path, and that according to their forecast, the longer-run GDP growth prospects following the COVID-19 crisis will not be very different from the pre-pandemic pace. In addition, they suggest that the behaviour of aggregate labour productivity is "in line with pre-pandemic cyclical patterns". The trends of both productivity and output indicate that COVID-19 has had limited aggregate scarring effects on the US economy.

Tervala and Watson (2022) state that the COVID-19 pandemic has initiated a global recession. As recessions can lead to total factor productivity (TFP)

hysteresis and output hysteresis, which is defined by the two authors as "a permanent or highly persistent fall in the levels of output relative to pre-recession trends", it is important to place the correct macroeconomic policy measures to respond to the crisis. They analyse the output and welfare consequences of the recession caused by COVID-19 and suggest that in such a situation, timely fiscal stimulus can help limit the negative consequences of recessions on TFP and potential output.

Before looking into the academic literature on economic resilience with reference to the COVID-19 pandemic, it would be interesting to point out a note by Highkin and van Leemput (2022) from the Federal Reserve, who address the economic resilience to the COVID-19 pandemic in terms of economic activity, and specifically changes in real GDP. Both Kim et al. (2022) and Papaioannou (2023) assess whether economies with better information and communication technology (ICT) infrastructure were more economically resilient in the face of COVID-19. The former authors define economic resilience in terms of economic (GDP) growth while the latter uses output losses in terms of cyclical GDP to measure economic resilience.

Another reference to economic resilience using an indicator which has not yet been suggested above was found in the urban resilience literature. Urban resilience includes several components, one of which is economic resilience. In the urban setting, Chen and Quan (2021) decide to measure economic resilience with seven indicators, one of which is the proportion of tertiary industry in GDP. They explain that cities with an insufficient economic base need to rely on the tertiary industry to maintain a certain level of activities and services for the inhabitants. As COVID-19 affected the tertiary industry harder than most other sectors, the greater the proportion of tertiary industry is in a certain city, the greater the impact caused by the pandemic. Therefore, Chen and Quan (2021) used the proportion of tertiary industry in GDP to represent a negative effect on economic resilience as part of their urban resilience indicator. Since this definition is part of another composite, it will not be included in the discussion later in the chapter.

The rest of the academic studies reviewed below in this chapter have not used a single indicator to operationalise economic resilience following the COVID-19 pandemic. These studies measured economic resilience by using an index or several variables. There have been several studies to date which discuss economic resilience in the light of COVID-19 using a composite of indicators. For instance, Lee et al. (2022) assessed the economic resilience of 52 economies in the early stage of the COVID-19 pandemic. The authors constructed an overall indicator for economic resilience using 16 indicators in the dimensions of government, enterprises and the public, and applied an output-oriented data envelopment analysis (DEA) model to measure and compare the economic resilience scores across

economies. For the government dimension, sub-indicators of fiscal policy, transparency, efficiency, news media and public participation were taken, while for the enterprise dimension, the issues of finance, financial services, financial stability, digital transformation, reaction and flexibility were taken as sub-indices. For the public dimension, savings, mobile communication, education and use of internet were utilised. Lee et al. (2022) found that 23 of the economies included in their study were situated at the efficiency point, meaning they had no room for further improvement in the overall economic resilience performance at the beginning of the pandemic, relative to the other economies. As this study was relevant for the very early stages of the COVID-19 pandemic, it would be interesting to see how resilient the economies were according to their model in later stages of the pandemic.

In addition, Asongu et al. (2021) also write about the difference between countries with a focus on the relationship between health vulnerability and economic resilience. They claim such a link can shed light on which countries are more exposed to the effects of COVID-19 and which are able to face the pandemic with some effectiveness. For this purpose, Asongu et al. (2021) develop a health vulnerability index (HVI) using ten variables, and for operationalising economic resilience they use an existing economic resilience index (ERI) which includes the following nine variables: agriculture, forestry and fishing, value-added; government effectiveness; regulatory quality; control of corruption; external debt stocks; consumer price index; unemployment; fiscal deficit; the Human Development Index (HDI). Four scenarios were formulated to illustrate different outcome possibilities: "low HVI-low ERI", "high HVI-low ERI", "high HVI-high ERI" and "low HVI-high ERI". Asongu et al. (2021) suggest that the countries in the 'low HVI-high ERI' category have robustly fought the pandemic. Their study found that most European countries, along with Rwanda, Japan, China, South Korea, Thailand, USA, Canada, Uruguay, Panama, Argentina and Costa Rica are placed in the low HVI-high ERI quadrant, making them more resilient and less vulnerable, hence better able to hedge the pandemic shock.

Noy et al. (2020), in their attempt to measure the economic risks from COVID-19, utilise a conceptual disaster risk model which includes the exposure, vulnerability and resilience of the local economy to the shock caused by the pandemic. Resilience is defined here as "the ability of the economy to bounce back [*sic*] given the magnitude of the shock that is generated by the intersection of the hazard, exposure and vulnerability". When operationalising resilience in their study of economic risks of COVID-19, Noy et al. (2020) include such indicators which enable the economy to bounce back from the initial shock of the pandemic. They use the following indicators: internet access, cellular use, public and private debt, government expenditure as well as socio-cultural disparity. Faggian and Modica (2020) also take note of the four components of risk (hazard, socio-economic

exposure, vulnerability and resilience) and explain that on the regional level, the ability of sub-national actors to absorb, bounce back and adapt to shocks shapes the region's outcomes and prospects to recover.

Diop et al. (2021) discuss the development of economic vulnerability and economic resilience indexes with regards to the COVID-19 pandemic. They use Noy and Yonson's (2018) definition of resilience, i.e. the capacity of a country to recover quickly from the effects of a shock, and propose several variables to include in both the economic vulnerability and economic resilience indexes. In the economic resilience index alone they include nine variables: agriculture, forestry and fishing, value added (per cent of GDP), government effectiveness, regulatory quality, control of corruption, external debt stocks (per cent of GNI), consumer price index (CPI), total unemployment (per cent of total labour force), fiscal deficit (per cent of GDP), and the Human Development Index (HDI). The results of their regression analysis of 150 countries confirms their hypothesis that a higher degree of resilience is synonymous to a low economic impact by the COVID-19 pandemic. The study operationalises the economic impact of the pandemic as the difference between macroeconomic projections made before the COVID-19 pandemic and the revised 2020 macroeconomic projections provided by the IMF.

Jiang, Wang et al. (2022) use a macroeconomic "Resilience Index" to check China's economic recovery following the COVID-19 shock. Their conclusion is that though the Chinese economy was highly affected by COVID-19, the speed at which the economy recovered from the initial shock illustrates how China is economically resilient. Hynes, Trump, Lovel et al. (2020) also suggest a resilience approach to dealing with COVID-19 and future shocks. They discuss the impact of COVID-19 on socioeconomic systems while focusing on resilience and suggest that there is a need to move from the "bouncing back" aspect of resilience to the concept of "bouncing forward".

Though not focusing specifically on economic resilience, another study worth mentioning because of its use and different categorisation of variables is that of Pileggi (2022), who built a national holistic resilience index to measure the expected resilience of different countries to a global pandemic like COVID-19. The study combined 11 different indicators grouped in five categories, one of which is the economy. The other categories included in the index were healthcare infrastructure, health, demography and society. Unemployment was included as an indicator for society, while the economic variables included GDP per capita and the GINI Index for inequality.

Table 1.3 summarises the use of different indicators in the economic and disaster literature, specifically with reference to the COVID-19 pandemic, according to three divisions: single indicators focusing on the labour market or on growth and output as well as several indicators used in models or in indices.

Table 1.3. Summary of the use of indicators in economic and disaster literature with reference to COVID-19

	Labor market indicators	GDP, output or TFP, growth indicators	Models and indices with several indicators
Literature on hysteresis and economic scarring	Cerra et al. (2021) Syverson and Mauro (2020) Lockett-Morse (2021) Caporale et al. (2022) Zhang et al. (2021)	Barrett et al. (2022) Barišić and Kovač (2022) Fernald and Li (2022) Tervala and Watson (2022) Moder and Martin Fuertes (2021) Bodnár et al. (2020) Portes (2020) Halmai (2021)	
Literature on economic resilience and bouncing back		Kim et al. (2022) Papaioannou (2023)	Lee et al. (2022) Noy et al. (2020) Asongu et al. (2021) Diop et al. (2021) Jiang, Wang et al. (2022)

Source: own work.

It is likely that the studies included in Table 1.3 do not reflect all the studies conducted in the field in recent years. However, given the studies included, the table seems to depict a clear picture of the issue. While in the theoretical literature on hysteresis, scarring, resilience and bouncing back the concepts have been in some cases operationalised with the same variables, when looking at COVID-19 studies as an example, it is quite clear that there is a distinction between the operationalisation of the concepts. There are two studies (Kim et al., 2022; Papaioannou, 2023), which operationalise economic resilience as a singular variable focusing on GDP. Their studies focus on whether information and communication technology (ICT) infrastructure has influenced the economic resilience of countries during the COVID-19 pandemic. Other than that, the operational definitions of economic resilience and bouncing back in studies conducted on COVID-19 have adopted more complex models or indices, which departs from the definitions of hysteresis and economic scarring.

The measurement of economic resilience has evolved in recent years from an end-result to a process which expresses the multidimensional characteristics of the term resilience. As Martin and Sunley (2015) state, "Resilience is not an either/or feature or outcome, but a complex process that admits of many possible

combinations of change and continuity". This might explain the evolution of the literature on economic resilience, transitioning from singular indicators, as illustrated in Table 1.2, to the increased utilisation of indices and models in recent years. Resilience today is seen as a wider term which encompasses not only true economic indicators but also general attributes to the economic system, such as the variables included in the economic resilience index used by Diop et al. (2021) (government effectiveness, regulatory quality, control of corruption, CPI, HDI, etc.).

Conclusions

This chapter has discussed the terms used in two academic disciplines to describe the long-term impacts of natural disasters on the economy. The economic literature focuses on the concepts of hysteresis and scarring while the disasters literature revolves around terms such as resilience and bouncing back. Given the fact that both disciplines draw their attention to large-scale disasters, such as COVID-19, and try to shed some light on their effects, the question which arose was how the terms relate to one another and whether there are any overlaps in relation to their meaning or uses.

In the theoretical literature and studies conducted in earlier years, there seemed to be similarities between how the two disciplines used the terms hysteresis, economic scarring, economic resilience and bouncing back. However, a simple and initial comparison between the use of the concepts in studies on COVID-19 found divergence between the operational definitions. The divergence found in this chapter is of importance for several target audiences: (1) illustrating which indicators have been used in the COVID-19 literature can help scholars in both the fields of economics and disaster research choose in future studies their terminology according to the purposes of their research; (2) the studies reviewed in this chapter illustrate the evolution in the operationalisation of economic resilience and can help refine the indicators used in the discipline to articulate what it means to have or attain economic resilience; and (3) in the field of economics, where economic scarring and hysteresis are still seen in terms of a singular indicator, this review can raise the question of whether the indicators used are sufficient to encompass correctly the long-term effects of natural disasters on an economy.

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