Editorial
Editorial: A Systemic Recovery

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1. Introduction

This Special Issue is about how we learn and apply the lessons of the COVID-19 pandemic. Here, we will outline the general problems and indicate the particular contributions made in the articles in this Special Issue. One lesson is that crises, like storms, can lose their identity, but, in this case, not because calm returned, but because the original crisis fed on other instabilities to expand and change in nature. Just as the financial crisis caused an economic recession that evolved to become a social crisis and ultimately a political one too, COVID-19 has triggered a cost-of-living crisis, a supply chain crisis, and ultimately a more fractured world economy of geopolitical competition.

What is now needed is a systemic recovery, one that addresses long-term structural problems and short-term turbulence; finds a better balance between states and markets; promotes a recovery in OECD countries that is sensitive to its effects on development and emerging economies; and promotes a more resilient approach to policy. In addition to a systemic recovery of the global economy and society, the analysis underlying policy also requires a systemic recovery as the limitations of many frameworks and models has been exposed. This requires more real-time analytics to address crises in real time (Rigobon et al. 2022), more inter-disciplinary analysis and in particular the integration of economics and epidemiology (Lipton and Lopez de Prado 2022), understanding the impacts of the pandemic in developing countries (Chukwudi and Victor 2022), and the drivers of policies to limit the spread of COVID-19 (Bourdin et al. 2022). Finally, it requires an agenda for implementing and communicating resilience (Betts and Buzzanell 2022).

The Fields Institute and the OECD New Approaches to Economic Challenges (NAEC) initiative worked together on promoting a systemic recovery agenda. We held events in April 2021, involving students, inter-disciplinary experts, academics, and senior policymakers, which came to one clear conclusion. The disruption was not due to any exogenous shock. It emerged from within as a result of the way in which natural systems and the whole socio-economic system interacted and self-organised.

This implies that it will not be enough to try to move the system back to what had previously been considered as an ideal state. A systemic recovery involves a new framework for understanding the system as a whole and the sort of policies that will be needed to influence its evolution. NAEC had previously warned that "a new crisis could emerge suddenly, from many different sources, and with potentially harmful effects". This was a conclusion of a 2019 conference called "Averting Systemic Collapse", and in 2020 the collapse came. Its ramifications are far from being worked out. Those who say but the disruption was due to an exogenous and unpredictable shock and that we should take the necessary measures to bring the system back to its "optimal" state miss the fundamental lesson that we should have learned from past upheavals. There is a common recognition that what we need is a system, which is resilient, one that can adjust and adapt to "shocks" both from within and without. However, the evidence is clear that the system even when

functioning well, and perhaps particularly, when functioning well, did not self-organise to do this effectively.

The current threat may have been contained, but the scale and scope of the existential problems we are facing are weakening the ability of our civilisation to produce what it needs and to both satisfy its wants and to modify those wants to make them consistent with our long run goals. Our economic systems are exacerbating inequality and other social challenges along pre-existing fault lines, creating negative feedback loops back into the economic system, as unequal societies tend to be less dynamic, less stable, and, even serve to make most of their citizens less well off. The marked increase in inequalities has engendered perceptions of a rigged system, which have in some cases helped to fracture societies, undermine democratic processes and institutions, as well as erode post-WWII international institutions and the spirit of multilateralism.

Addressing such issues requires bold policy action based on a realistic theory of how society works and the role of the economy in relation to the other social and physical components of the overall system. This Special Issue offers some elements for a systemic recovery our analysis, policies and ultimately society.

2. Lessons from the COVID-19 Crisis

The COVID-19 crisis highlighted how integrated the global economy has become. The epidemic took advantage of globalization forces to spread to the most economically integrated metropolitan areas (Bourdin et al. 2022). Understanding the diffusion of the pandemic is an important starting point in determining the policies and their impacts on different groups. Governments attempted to slow the pandemic and flatten the curve with non-medical responses at various scales. Measures included travel restrictions, bans on public gatherings, school closures, interruption of non-essential services, and widespread containment.

Lipton and Lopez de Prado (2022) deployed a detailed epidemiological multi-factor model to examine the impact of COVID-19 on different population groups, and interactions within and between groups. They show that in countries with well-developed healthcare systems and a population willing to abide by suitable containment and mitigation procedures, the sheltering in place of the entire community is excessive and harmful when considered holistically. At the same time, sealing nursing homes as thoroughly as possible to avoid high infection and mortality rates is an absolute necessity.

Using a COVID-19 stringency index, Bourdin et al. (2022) highlighted a positive effect of the incidence rate on the stringency level. Patient capacity in intensive care units was a key variable. On the one hand, this is indicative of the capacity of countries to have a sufficient and appropriate health system to absorb such pandemics. On the other hand, the authors show that epidemiological data regarding the risk of excess mortality (diabetes, cancer, and cardiovascular pathologies) had a negative effect on the health system. They conclude by recalling the importance of policy coordination between countries when it comes to lowering the stringency levels of measures, in order to avoid a resurgence of the epidemic.

Wang et al. (2022) argue that differences in countries' performances during the first year of the pandemic can be traced back both to policy responses to COVID-19 and structural conditions. Three relevant structural conditions emerge from the results: trade reliance on services, corruption, and the size of the vulnerable population (elderly, low-income, smoking, or cardiovascular failing). Policies such as large-scale open public testing and additional fiscal stimulus in non-health could help reduce excess mortality, which might lead to lower economic losses.

Developing countries faced particular challenges in responding to the pandemic although were spared the worst impacts despite weaker health care systems and lower budgetary resources. Chukwudi and Victor (2022) examine the response in South Africa and Nigeria through budget revisions. Both countries adjusted their budgets, but South Africa allocated more funds to government agencies in charge of COVID-19 and various

relief packages than Nigeria. The paper indicates that despite some differences in approach, the swift budgetary adjustment by both countries partly aided a rapid government response that progressively flattened the curve and, in the end, partly contributed to recovery.

3. New Models

After the 2008 crisis, analytical frameworks were broadened to better assess the nexus between economic growth and inequality on the one hand (inclusive growth), and between environment and growth on the other (green growth). However, this approach of managing trade-offs between competing objectives is still based on the linear reasoning of the pre-crisis economic model. The traditional school of economic thought based on general equilibrium theory essentially sees the economy as a totally understandable machine, almost always operating at optimal speed, churning out outputs in a predictable linear way, guided by policy levers. Occasionally, the machine is knocked off balance, or out of equilibrium, and needs some resetting.

However, the economy is not a self-stabilising machine. It is a complex, adaptive system, with massive interdependencies among its parts and the potential for highly non-linear outcomes. Using linear neoclassical models for economics and climate change for example leads to models where there is only one stable equilibrium, regardless of what happens with the climate. That is why, according to Nordhaus, even a 4C temperature increase will lead to only imperceptible decline in GDP over a long-time span. In contrast, using either agent-based models (ABM) or stock-flow consistent models (SFC) models to integrate the economy with climate allows for output dynamics in which economic variables behave in a way that is compatible with climate variables, including runaway dynamics, unbounded oscillations, and convergence to undesirable equilibria.

This will not happen in standard general equilibrium models, where even the introduction of a representative agent with strict rational expectations does not guarantee stable and unique equilibria. Kirman (1992) outlines reasons why this recourse to a representative agent does not improve model outcomes in reality. First, there is no evidence that agents at macro level behave like a maximizing individual, so the reactions of the representative agent to shocks or parameter changes may not coincide with the aggregate reactions of the agents being represented. In a situation of choice between two situations, a and b, the representative agent may prefer a, even if all the represented individuals prefer b (Jerison 2006). The basic characteristic of complex systems whereby macro behaviour cannot be extrapolated from micro behaviour implies that agents have to be modelled as heterogeneous.

Some areas of economics are already applying ABM approaches to overcome the very tight restrictions required of models based on general equilibrium and rational, representative agents, including the relatively new field of econophysics, which uses insights from statistical physics to study complex economic phenomena such as financial markets. Markets display very similar intermittent dynamics to complex physical systems, for example velocity fluctuations in turbulent flows (Bouchaud 2020). While the exogenous driving force is regular and steady, the resulting endogenous dynamics is complex and jittery. Economically inspired models that exhibit these features include a transposition of the Random Field Ising Model (RFIM) that describes situations where there is a conflict between personal opinions, public information, and social pressure, for example among traders in financial markets.

Another weakness with general equilibrium approaches is that fail to determine whether a shock will remain constrained or propagate to a 'giant' component of the network. The standard approaches propagate shocks in a linear way, so to have a very big effect the shock itself needs to be very big, whereas major crises such as the 2008 crisis or COVID-19 start with small shocks to one system that are transmitted and amplified by interconnectedness to provoke cascading failures. One can for example "calibrate" the model with exogenous shocks large enough to generate the type of oscillations in employment and output seen after the 2008 crisis, but then one needs to explain what made

these shocks change so dramatically exactly at the moment of the crisis. With network theory, by contrast, the network can evolve from a resilient to a fragile configuration, so that essentially the same shock can have very different effects (Acemoglu et al. 2013).

Betts and Buzzanell (2022) distinguish between risk mitigation, systemic recovery, and economic resilience. They argue that current approaches to understanding resilience in academic economics have failed to address ongoing and emergent disruptions in the economic and social world. A view shared by Hynes et al. (2022) who describe a framework for understanding the factors that underpin economic resilience and identify the basic tools for implementing it. This principally involves examining resilience by design, which promotes endogenous reorganisation in the economy, and by intervention, which includes exogenous measures such as bailouts, stockpiles and building buffers.

In response, Betts and Buzzanell (ibid) also reviews a possible synthesis of economic and communication frameworks. This review places the economic resilience framework, inspired by the communication theory of resilience, in conversation with extant literature in economics, communication studies, and other disciplines and concludes with an outline for further theoretical, methodological, and practical development.

Albani et al. (2022) developed a combined economic–epidemiological model to investigate the effects of the COVID-19 pandemic in Canada. Such models are useful for policymakers and the model can be run under a variety of plausible parameter values and policy scenarios (e.g., vaccination intervals) to obtain the range of outcomes for the variables of interest, notably deaths and unemployed individuals.

4. A Systemic Approach

Thinking of policymaking as linear or complex changes how effective it will be. In traditional policymaking, models are such that an action produces a predictable reaction that can be forecast with a good level of accuracy. In reality, such an approach often fails, or produces unintended consequences because of several complex features of the socio-economic system in addition to the multiple scales discussed above.

First, the parts of a complex system are constantly changing through their interactions with each other. Even the basic definitions related to objects under study can evolve rapidly. A second feature, particularly difficult to comprehend in traditional approaches, is that the subjective can be even more powerful than the objective as economists might define it. Rationality and utility can sometimes carry the argument, but so too can hopes, fears, culture, politics, history, prejudice, immediate gratification, desire for revenge, and a host of other traits, desirable and undesirable, that make us human.

A third feature, is that the economic system is not closed, as is predominantly assumed in economic models. It is deeply integrated with other social systems such as politics, gender, technology, and higher education, all ultimately depending on the environment. In making the case against the maximisation of shareholder value as a guiding principle, William Lazonick argues that it is wrong to assume that the firm is a closed system where only shareholders make investments in the productive assets without a guaranteed return, and hence only they have a claim on profits. Taxpayers, through the government agencies they fund, and workers, through the firms to which they supply effort, also make risky investments in firms' productive capabilities. It follows that the state and labour have a claim on profits if and when they occur.

To deal with complex realities, we need new data and indicators as well as new models. Joseph Stiglitz shows how over-reliance on GDP meant that policymakers did not see the 2008 crisis coming (Stiglitz et al. 2018) and made poor choices in response to the crisis. GDP is not a measure of well-being since production can increase while leaving most people no better off. Simon Kuznets, who invented the measure, insisted that it was quantitative and not intended to describe the quality of growth. We need indicators that reveal who is benefitting from growth, whether growth is environmentally sustainable, indicate people's feelings, and show what factors contribute to an individual's or a country's success.

5. New Policymaking

We need to change the way we think about the economy, from a linear and mechanistic model whose outcomes can be altered in a straightforward manner by policy levers, to a systems approach. This necessarily considers high degrees of interconnectedness, systemic risks, tipping points and feedback loops from the wider environmental and social system in which the economy is embedded and has far-reaching implications for economy policy and the theories it calls upon. We need to move analysis away from linear neoclassical growth models to frameworks that reflect complexities, interconnections, impact of scale (not just economies of scale), adaptive behaviours, emergent outcomes, etc. Policies need to be coordinated across different branches within national economies, including social, environment, education, health, R&D, and other policies. Policies also need to be coordinated internationally given the global nature of many challenges.

Policies have to be as adaptive as the systems they are supposed to guide and recognise that the features of a complex system can be both positive and negative (see Colander and Kupers 2014). Interconnectedness for example spreads knowledge, but it also spreads viruses. We need to think of policies in relation to the other factors that influence them, and not just their immediate domain. COVID-19 provides a number of examples. The UK seems to have been hit so hard by the pandemic because of a high degree of social and economic inequality, implying that income and wealth inequality are intrinsically linked to the state of public health. Hence, to avoid a health problem caused by another pandemic becoming a crisis, we need to reduce economic inequality. The pandemic has also shown that simply improving liquidity of the banking system is not enough to keep credit flowing to companies and households if the banks withdraw from their role as lenders when they are most needed.

Like the characteristics of a complex system, policies too can have a dual nature. Many policies that were seen as harmless or beneficial (e.g., optimized supply chains, streamlined hospitals with no "waste" in capacity) were in fact harmful and dangerous. On the other hand, the policy responses showed that much that was thought to be impossible or undesirable was possible and needed (e.g., large increases in government spending, monetary policy targeted well beyond banks). A systemic recovery must not forget these lessons. Optimization, market discipline, austerity, and other harmful dogmas should not be allowed to make a comeback once the emergency of the pandemic is over, because the next health emergency is just around the corner, and the ultimate climate emergency is coming too. If this means having permanently over-capacity hospitals with empty beds far outnumbering day-to-day cases because we might have to use them in the new pandemic, then so be it.

In planning the post-COVID-19 recovery, systems thinking and acting provides a methodology to achieve a better understanding of the behaviour of complex systems and to improve the assessment of the consequences of policy interventions (Hynes et al. 2022). This includes thinking through the tipping points, positive feedbacks, and cascading failures. However, the focus on economic recovery from the effects of COVID-19 should not blind us to the opportunity to build more resilient systems to protect ourselves from such events in the future by repairing the damage to the natural environment and the climate system and weaving a new social fabric to replace the one we have allowed to fray and which has destabilized the socio-political system.

Systems thinking cannot, however, provide a roadmap to a desired future. Indeed, such a concept is contrary to the approach we are arguing for. In a complex system, there is no equivalent to a map that shows that following a road gets you to a town without having to physically travel the road first. In the socio-economic system, the terrain is constantly changing as people's behaviour and circumstances change and you have to adapt, adopt or abandon policies as the situation evolves. You may have to follow William Faulkner's advice to writers to "kill your darlings" if your cherished dogmas are not taking you where you want to go.

6. Conclusions: We Need a Renaissance, Not Just a Recovery

The COVID-19 crisis gave way to new crises—cost of living, Ukraine crisis, climate and environmental emergencies, value chain disruption, and potentially global economic recession. Even in terms of global health, the emergence of Monkeypox suggests lessons from not learned and a manageable problem where testing and vaccines were available went unchecked for decades and became what the WHO declared a "public health emergency of international concern" (WHO 2022). Yet, the extent to which these crises are connected remains part of the problem.

This Special Issue suggests we cannot just aim to incrementally address failures as they emerge. Instead, we need to rethink the underlying framework. There is no universal model and trying to find one by making incremental improvements to the existing one will not lead to a systemic recovery. Yet, the economics profession has engaged in efforts to improve the neoclassical model—incorporating behavioural economics, integrating institutional economics, giving more weight to inequalities and environmental issues, and more experimental approaches combined with big and smart data.

Trying to predict and estimate the costs and benefits of taking measures in an effort to influence the evolution of our overall system, requires a collective effort to examine the system as a whole. This cannot be conducted within the framework of one overarching model. The potential trajectories that our system may take are too numerous and too different to permit some simple calculation of "expected values". Rather than contemplate a world in which all the actors understand the world in which they live and function, we should change our focus to one of concentrating on which trajectories to avoid and accept that resilience is more important than putative optimality. Ben Bernanke, recent winner of the Nobel Prize in economics said, in 2010,

> "I just think it is not realistic to think that human beings can fully anticipate all possible interactions and complex developments. The best approach for dealing with this uncertainty is to make sure that the system is fundamentally resilient and that we have as many fail-safes and back-up arrangements as possible".

Interview with the International Herald Tribune 17 May 2010

This conclusion extends to the whole system and not just to the economy and the events of the last decade argue for an approach which will depend on computation and simulation and the extensive use of data rather than on "solving" highly simplified models. Taking conclusions from those models and then adjusting them in the light of "judgement and experience" is surely not the best answer to the major problems with which we are faced. We argue that a new framework heavily inspired and informed by other disciplines is necessary. What is needed, is not a recovery—but a renaissance.

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