PANOECONOMICUS, 2021, Vol. 68, Issue 5, pp. 587-623
Received: 26 October 2021.

UDC 330.101:[616.98:578.834
https://doi.org/10.2298/PAN2105587O
Original scientific paper

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Global Coronavirus Pandemic Crisis and Future Crisis Prevention

Summary: This paper undertakes an interdisciplinary analysis of the global coronavirus crisis of 2020-2021, its immediate aftermath and lessons learned, through the use of some core principles of institutional and evolutionary political economy. The principle of historical specificity and evolution (linked to uneven development) examines the background to the emergence of the crisis, plus its evolution and transformation through time. The principle of heterogeneous groups and agents scrutinizes the crisis through the various groups and individuals associated with gender, class, ethnicity, age and species. The principles of circular and cumulative causation (CCC) and contradiction investigate the multiple factors responsible for the crisis and how they interact in determining the depth and recovery from the crisis. The principle of uncertainty illustrates the changing expectations underlying the business climate and consumer confidence affecting socioeconomic performance, as well as current and future policies associated with health, regulation, budgets and money. A conclusion follows.

Paper by invitation

Acknowledgement: Dr Phillip O'Hara is Director of the Global Political Economy Research Unit, Perth, Australia. He wishes to thank Ian Kerr and Kosta Josifidis for comments and inspiration in the development of this research.

Keywords: Coronavirus pandemic crisis, Principles, Political economy, Historical specificity, Heterogeneous groups and agents, Circular and cumulative causation, Contradiction, Uncertainty.

JEL: B52, E2, H0, I12, I18.

The coronavirus crisis that beset the world during 2020 and 2021, and which has dragged on in different forms and degrees ever since, initially threatened to tear the whole world apart, impacting us deeply for years to come. Instead, it majorly affected most areas and nations during 2020, and to varying degrees through the early, middle and later months of 2021, but its impact has been very uneven throughout. The *principle of uneven development* states that the structures of power in the global political economy imbue especially core nations with several advantages with their production networks, commodity chains, policy structures, and financial dynamics, which put them in good stead to fight crises, even though they may not be initially ready for them. This is especially the case under current conditions in which, as the Economist (2021a) said, neoliberalism is "out of fashion", especially among certain economists if not commonly policy-makers. Semi-peripheral and especially peripheral areas have less structural power in the global political economy, which places grave limits on their ability to fight public health, climate change, and most other systemic crises.

All nations were mostly unprepared for a public health crisis that authorities had warned them of, leading to many millions of deaths and hundreds of millions of infections during 2020-2021. However, since the GFC of 2008-2010-ff was widely blamed on neoliberal's austerity, low regulation and speculative bubble crashes, this helped especially the advanced capitalist nations fight the coronavirus through crisis measures such as functional finance, widespread handouts to business and workers, massive injections of funds for public health and vaccinations, rental assistance, and low interest rates to stimulate credit multipliers. These crisis measures saw the deep recessions of 2020 reverse to high growth during 2021 in most advanced nations, even while infection rates remained high, as well as deaths in many places, as they opened up in especially those nations with high rates of vaccination. Officially, many peripheral and semi-peripheral areas underwent forms of "economic recovery" during 2021, but rates of infection and mortality remained high, yet likely if their citizens were vaccinated the death toll would have declined majorly.

This paper examines the coronavirus crisis through the lens of certain principles of institutional and evolutionary political economy, including lessons learned from the crisis to prevent another. The principles are methodological devices designed to assist in comprehending holistically ("as a whole") the nature of complex systems dynamics, including crises such as the coronavirus pandemic and potential future crises. The paper starts with a review of papers that have applied certain political economy principles to the coronavirus crisis. Then we scrutinize institutional and evolutionary principles, starting with historical specificity and evolution; which follows the background to the emergence of the virus, through to the international transmission of the pandemic, and the differential impact of the crisis throughout the world. This is followed by detail on the heterogeneous groups and agents of human beings, viruses and vaccines that contributed to the differential impact of the crisis and its resolution. We then study the multicausal factors responsible for the crisis and the anomalous dichotomies introducing conflict and instability through the principles of CCC and contradiction. Lastly, we apply the principle of uncertainty to the business climate and consumer confidence leading up to, during and after the immediate crises, and the way in which preparatory and ongoing policies affected the crisis and how such policies should be structured now and into the future. A conclusion follows.

1. Political Economy of the Coronavirus Pandemic

There have been numerous special issues of political economy journals about the coronavirus crisis, such as the *Journal of Australian Political Economy*, the *International Journal of Political Economy*, and the *Review of Political Economy.* There were also a number of conferences on the crisis; for instance, the 2021 conference of the European Association for Evolutionary Political Economy (EAEPE). These special issues and conferences have studied many aspects of the crisis, but none of them, that I have noticed, have investigate it within the framework of several principles of institutional and evolutionary political economy. Hence this paper. Elsewhere though, some papers have tried to study the crisis within the context of certain political economy concepts or principles, some of which may variously be called neoclassical or Austrian political economy, and others heterodox political economy. In this section we scrutinize the

results of five such full-length papers. We start with those that are well removed from the perspective taken up in this paper, and gradually get closer to those that have a modest resemblance to certain aspects of the perspective enunciated here.

The first is by Peter Boettke and Benjamin Powell (2021), who investigate the COVID-19 pandemic from the view of "traditional welfare economics". Using concepts such as markets, pricing mechanisms, costs and benefits, externalities, symmetry (representative agents), and re-selling vaccine rights (onward selling), this paper argues that governments around the world have not used standard welfare economics to deal with the pandemic. Instead, they argue that governments have typically used "command and control" mechanisms of "paternalistic socialism", looking after certain vested interests, overspending, and generally distorting the pattern of economic processes for no good purpose. In places the paper also uses a model of those who are old and those who are young, suggesting that we should enable the economy to function through the use of the young, since the net benefits will be greater than if we tried to protect the old despite the costs. This is a very strange paper, since it appears to be lacking in several key areas: a disregard for the common good, no coherent systemic morality, ignoring functional finance, overemphasising the micro over the meso, macro and global; generally allowing markets to operate irrespective of key areas of market failure and humanistic concerns.

The second paper by Mikayla Novak (2021) uses a strange combination of Austrian theory and practical good sense, which often appear to be in contradiction with each other, to come to conclusions that seem to want to be similar to the first paper discussed here (above), from which the practical good sense of the real world is quite different. The paper seeks to support voluntarist interaction, typical "liberal" institutions (markets), contractual freedom, property rights protections, freedom of economic entry and exit (p. 6), reducing rent seeking and self-sufficiency (p. 8), and especially inhibiting the centripetal power of the health authorities (p. 9). It also seeks to denigrate government support and regulation of health care services in favour of commercial and economic standards (p. 10) and to inhibit the growth of collective property and monocentric organisation. Eschewing representation agents, on the other hand, it argues that heterogeneous agents who respond quickly to change are a core part of a COVID-19 solution. The use of entrepreneurial action to quickly act on new opportunities such as COVID-19 is important, especially in their responses to the new private sector demands of commercial experimentation. Rather than subsidizing wage-earners to protect them from change, and instead of providing massive government injections of money to put a floor on the downturn, this paper argues that downturns are a good way of reorganising economic relations through agility and a recalibration of economic associations. An alternative policy should be implemented, it is argued, based on the provision of innovative medical treatments, competitive adjustments, more market relations in health care, decentralised community decision-making, and individual liberty.

The final three papers are more in tune with the approach of this current paper. The third such paper, by Scott Kaplan, Jacob Lefler, and David Zilberman (forthcoming), is a general paper, and mainly uses a pragmatic and straightforwardly intelligent use of stylized facts to explain aspects of the pandemic. Counter to the first two papers,

this one argues that overall there is no *systemic* trade-off between economic activity and public health, since nations that controlled the pandemic had less loss of employment and sales. It also recognises the crucial importance of controlling the disease through the principles of prevention, social distancing, personal protective measures, and international collaboration. It recognises that those who suffered most from the pandemic had pre-existing conditions, were elderly, minorities, and in lower socioeconomic categories. But rather than advocating simply opening up markets to allow the young to benefit *vis-à-vis* those with pre-existing conditions, it looked more to the common good by advocating more prevention and mitigation as the way forward.

The fourth and fifth political economy papers on the COVID-19 pandemic are *specifically* in synchrony, to some degree, with the principles of this current paper. The fourth, by Simon Mair (2020), posits an alternative set of principles to challenge neoliberalism in the setting out of solutions to health and ecological problems emerging through the 21st century. These principles include but going beyond exchange value to encompass the value of health and ecological sustainability. It also posits the principle that the social economy operates substantively through heterogeneous groups in the ecological community rather than just through markets. The protection of life is said to be a core aspect of an alternative political economy, along with the public provisioning of food, clothing and shelter. In this context, greater attention is said to be required in the provision of public health infrastructure, preventative services, safety nets, health capabilities and capacity, and where necessary imposing lockdowns to protect health value. It calls for multiple forms of value to embed economy within society through the protection of life in general and ecology in particular.

The fifth paper, by Roderick Condon (forthcoming), follows the contours of Jurgen Habermas's communication theory of society in describing the current legitimisation crisis of neoliberalism and the enfolding alternatives of radical pluralism (on the left) and reactionary populism-nationalism (on the right). The author develops a cultural analysis of the crisis of legitimacy and the pandemic, which accords to some degree with institutional and evolutionary political economy. Neoliberalism is said to have lost its legitimacy in the face of the GFC and the Pandemic, which has led to two alternative social movements being developed and progressing to condition human behaviour into the future. The first is the pluralistic-democratic movement being followed by the EU (but not all of its constituents) and some other nations, and the second is the developing nationalist-populist trends established by, for instance, former President Donald Trump; Jair Bolsonaro, President of Brazil; Narendra Modi, Prime Minister of India; and Alexander Lukashenko, President of Beluras. Clearly recommending the radical-pluralist movement, Condon outlines a new cultural model to confront the pandemic, including the assertion of collective responsibility for the common good, international cosmopolitanism, recovery funds such as that established with the EU, re-engagement with the WTO, and a global ethics as a countermovement to help solve health, ecology and other problems into the future.

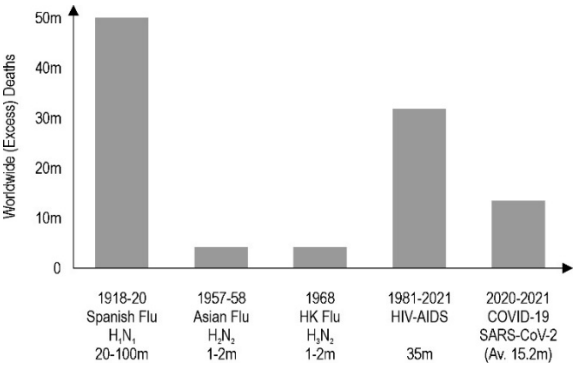
This review of political economy principles papers on COVID-19 has shown the diversity of approaches. The rest of this paper details core aspects of an institutional and evolutionary approach, especially principles (see Phillip Anthony O'Hara 2007a, forthcoming, forthcoming special issue; Bhimo Rizky Samudro, Harry Bloch, and

Salim Ruhil 2014; Andrew John Brennan and Jaslyn Kaur Kalsi 2015), as applied to the COVID-19 pandemic. The third, fourth and fifth papers have some key similarities with this current paper. But we are more specific in the use of the principles of historical specificity, CCC, heterogeneous groups and agents, contradiction and uncertainty.

2. Historical Evolution of the Global Coronavirus Crisis

The *principle of historical specificity and evolution* states that world problems and issues should be analysed historically as they evolve through time, and that there are many benefits from taking this point of view. Scrutinising the coronavirus crisis historically in general terms involves situating the coronacrisis within the context of history, and doing it specifically involves examining the factors that directly led to the emergence and evolution of the crisis. The general context deals with previous global pandemics and caronaviruses that have impacted the human population, and what we can and have learnt from these for dealing with the current pandemic. The specific context involves following the evolution of the coronavirus crisis, policy and measures to moderate the pandemic as it changes course from 2020 to 2021 and beyond.

Studies of the coronavirus pandemic must recognise previous pandemics over the past 100 years plus coronavirus infections of varying descriptions. Here we delimit scope to those pandemics that have killed at least one million people per year. Even then, there are finer points of disagreement, especially regarding the suddenness and prolonged nature of some diseases and their degree of globalness (e.g., malaria, TB). As shown in Figure 1, below, there have been at least five pandemics since 1918.



Source: Adapted and updated from Yen-Chin Liu, Rei-Lin Kuo, and Shin-Ru Shih (2020) and the Economist (2021b).

Figure 1 Some Major Pandemics: Past 100 Years - Death Estimates to 2021

A pandemic is best thought of as a transnational or more specifically a global infection that kills many more than the usual number of people from the so-called "common seasonal influenza" (typically 650,000 in today's terms) on a yearly basis. Five major pandemics have been especially deadly over the past 100 years or so. The mother of them all was the so-called "Spanish Flu", which, from all probability, emerged in the USA, potentially from a military base in Kansas (or North Carolina),

and eventually spread to most nations of the world, killing at least 20 million people and more likely 50 million, possibly up to 100 million. The first wave of this (Kansas) H1N1 virus was relatively mild during early 1918, but during late 1918 and into 1919 the second wave was most destructive as it swept across much of the world, especially the USA, Europe, Mexico, New Zealand, Iceland, Iran and Western Samoa (Daniel Flecknoe, Benjamin Wakefield, and Aldan Simmons 2018, p. 2). Major pandemic factors were the first world-war, especially the movement of military personnel, and the lower resistance of troops on the battle front and in hospitals, although many civilians were killed as well. Wartime secrecy was a core problem as it led to ignorance and inadequate information-sharing among the powers, and hence to the much greater spread throughout the world.

This "Kansas" pandemic incidence was not limited to the estimated 20-100m deaths and 500m infections, but should also include babies not born and not conceived due to dead mothers and fathers, survivors who died of other ailments later, and many who survived but were "much lower achievers" than they otherwise would have been. The 20-100m deaths also included many who would otherwise have likely died of TB. (Howard Phillips 2014) It is thus an open question how many were "excess deaths", over-and-above those who would have died in a normal period.

It is perhaps stretching the definition of Pandemic to include some of the well-known ones of the 1950s-1970s, since they typically "only" killed 1-2m people in the space of a couple of years, which is about the number killed from a typical common influenza in two years (in today's terms). For instance, the so-called pandemics of the 1950s and 1960s were also "flu" cases, including the so-called "1957-58 Influenza Pandemic" and the "1968-1970 Hong Kong Flu Pandemic". These two global pandemics were closely related as the 1957-1958 one emanated from the H2N2 type virus on mainland China while the 1968-1970 one was caused by H3N2, a co-variant of H2N2, also from China (HK or mainland). They both killed about the same number of people globally, and deaths from both were reduced markedly due to timely efforts to produce an effective vaccine, especially through the efforts of microbiologist Maurice Hilleman and his Team. H2N2 and H3N2 are both avian viruses which can be transmitted directly from birds to humans or through an intermediary[1].

The HIV-AIDS global pandemic (1981-present) and the Caronavirus-19 pandemic (2020-2021) are the most serious cases to have emerged since the "Kansas" pandemic of 1918-1920. The HIV-AIDS pandemic is an unusual one since there has historically been a large lag (of often 4-20 years) between infection with the HIV retrovirus and the onset of potentially morbid AIDS symptoms and death. Global yearly deaths from HIV-AIDS were approximately 350,000 in 1990, rising to just under 2m in 2005 and then declining to just under 1m in 2017 (Max Roser and Hannah Ritchie 2021). Now with effective drugs the annual toll is around 700,000 deaths with *cumulative* deaths of around 35 million. No effective vaccine has been developed, but with effective drugs a typical HIV carrier can live almost a normal life, especially in advanced nations (O'Hara 2007b, 2011a, b).

[1] The so-called "Russian Flu Pandemic" of 1977 (H1N1 viral strain started in Northern China) and the "Swine Flu Pandemic" of 2009 (H1N1 virus strain from Central Mexico) had a mortality about the same as the yearly common flu, so cannot reasonably be called a pandemic.

The latest pandemic, caused by infection with a coronavirus, is the most extreme influenza outbreak since the "Kansas" flu of 1918-1920. Coronaviruses have been around for centuries or even millions of years, spreading among bats, birds and rats. In the contemporary scene, some coronaviruses are known to produce mild symptoms in humans, while others are much more deadly. Three in particular stand out. The first is severe acute respiratory syndrome (SARS), coronavirus (CoV) – known as SARS-CoV – from the beta coronavirus subgroup (β; lineage B), which caused the influenza variety known as SARS in 2003, and killed 774 people worldwide. The second is Middle East respiratory syndrome coronavirus (MERS-CoV), also from the beta coronavirus subgroup (β; lineage A), which causes MERS influenza, emerging as it did in 2012; which has killed 858 people. (Ahmed Al-Qahtani 2020, p. 4). However the mortality rate of those with known MERS infections is around 35%. SARS and MERS patients typically experience mild upper respiratory symptoms, possibly leading to pneumonia, and in extreme cases acute respiratory distress syndrome (ARDS) and renal failure.

The third virus, causing the current global crisis, is also a member of the beta coronavirus subgroup (β; lineage B; as with SARS-CoV) and shares 80% of its genome lineage with SARS-CoV. This virus is the first global *coronavirus* pandemic in history, and became known as SARS Coronavirus-2 (SARS-CoV-2), with its accompanying disease termed Coronavirus disease 2019 (COVID-19), which is a type of influenza. It was first identified in Wuhan Province in China in late 2019, with typical symptoms initially including fever, dry cough and malaise, and when more extreme pneumonia, ARDS and potentially single or multifarious organ failures (e.g., pulmonary, renal). It started infecting people at or near the Huanan Seafood Wholesale Market, in Wuhan, China, and spreading nearby and later to other Chinese Provinces, then rapidly throughout the world. The WHO classed COVID-19 as a pandemic on 13 March 2020. During mid-March, Europe was considered the centre of the pandemic, but by late March the United States was cited as a centre of infection. At different times Italy was the "centre", and later Brazil, then India, followed by Indonesia; and later others that had coped well with the virus were majorly affected (e.g., Thailand, Vietnam).

There is some doubt about the origins of the COVID-19 disease, since there is no definitive evidence about whether it started in the Wuhan wet markets (where live, often exotic animals are sold), or close by in Wuhan Province, or perhaps in one of the nearby labs, or from scientists etc. investigating caves or catching bats in the area. Virulent microorganisms often leak from labs. Take the cases of, for instance, the leak of a smallpox virus from a British lab in 1978, the SARS-CoV virus from three separate labs in Asia during 2003-2004, and the H1N1 strain of influenza that spread rapidly in 1977 after leaking from a lab. Strangely, according to *The* Economist (2021c, p. 52), "Chinese authorities refused requests to provide key epidemiological data on the 174 earliest known cases of COVID-19 in (Wuhan) in December 2019", which prevented key research from being undertaken about the origins of COVID-19.

There is no evidence from the World Health Organization (2020) on Covid-19 and the World Health Organization (2021d) on SARS-CoV-2, alluding to informational anomalies about early cases. The first reports the original *clinical diagnosis* of COVID-19 in China was in Wuhan Province, 2 December 2019, but the first *confirmed*

case was diagnosed on 8 December 2019. Cases gradually and then rapidly grew, with a major spike on 1 February 2020 for Wuhan at approx. 2000 daily cases and China approx. 4000 daily cases. By 20 February 2020 national cases had dropped to single digits.

The 2020 Joint Report concluded that SARS-CoV-2 had a zoonotic origin, originally from bats, with intermediate host unknown, probably being contracted from the Huanan Wholesale Seafood Market in Wuhan where they sell live animals or closeby. Information on the (then) epidemic was said to have been passed on to the WHO on 3 January 2020, along with the total genome sequence of SARS-CoV-2 on 10 January 2020 (World Health Organization 2020, p. 6). The greatest daily number of confirmed cases overall in both Wuhan (1,000 approx.) and China (3,800 approx.) as a whole was for 1 February 2020. "Comprehensive Control measures" were implemented in Wuhan and elsewhere, including application of the core "principles" of: (1) "aggressive case and contact" tracing; (2) "isolation and management"; (3) "extreme social distancing" (p. 10), which led to the number of (official) confirmed cases falling to zero by late February 2020 throughout all of China. Meanwhile infections had spread to all continents and nations.

More recently, evidence is pointing to the Chinese authorities having unduly pressured the visiting team(s) into dismissing the need for further investigation of the origins of the virus. The Head of the WHO investigating team that visited Wuhan in early 2021, Peter Ben Embarek, as well as Tedros Adhanom Ghebreyesus, the Director-General of WHO, have both called for further work on the origins of COVID-19. As mentioned, key epidemiological data on the 174 earliest known cases of COVID-19 in Wuhan were said to have been withheld from the investigating team. Others have also called for more studies on the origins of COVID-19, including initially the Australian PM, and the US President who arranged (in May 2021) for a major report to be delivered to him by intelligence officials on its origins "within 90-days".

An "Unclassified Report" (Office of the Director of National Intelligence 2021), from the US Director of National Intelligence, issued on 27 August 2021, soon after the official report, based on scientific evidence, concludes that SARS-CoV-2 was not a biological weapon, nor was it genetically engineered, and that Chinese officials were not forewarned of the virus before the initial outbreak of COVID-19. The report put forward 3 hypotheses about its origins. The most likely, H1, supported by 5 sources within the Intelligence Community (IC), was that it was likely caused by natural exposure to an animal infected with the virus or a "close progenitor". The second hypothesis, H2, supported by one IC source, was that it was most likely the result of a laboratory-linked accident, including possibly experimentation, animal handling or sampling by the Wuhan Institute of Virology (WIV). The third Hypothesis, H3, supported by 3 IC sources, was that it was unable to decide whether it had a natural origin or was linked to the WIV, without further information from the Chinese. The global community lacks clinical samples and epidemiological data of the earliest cases of COVID-19. It would thus help prevent further pandemics if more knowledge on COVID-19 origins were available.

COVID-19 is estimated *officially* to have precipitated 4.54m deaths during 2019-2021 (to date), and therefore is likely to be the third most lethal pandemic this

century (if one discounts malaria and TB for not being truly global); with the prime one being the "Kansas" pandemic of 1918-2020, and the secondary one being AIDS. Table 1, below, summarizes global data for COVID-19 waves (major "ups" and "downs") of officially confirmed total cases and deaths, plus current wave status:

Table 1 Global COVID-19 Waves, Official Cases and Deaths, Vaccinations: Circa 23 October 2021

Region	Waves: cases	Cumulative cases OWID	Current wave phase: cases (weekly)	Waves: deaths	Cumulative deaths: OWID	Current wave: deaths (weekly)	Partial vaccination (% pop) OWID	Full vaccination (% pop) OWID
World	5	243.35m	Slight upwave	4	4.94m	Slight up	11	37
America	North: 5 South: 3	54.62m 38.23m	Downwave Major down	4 2	1.11m 1.17m	Mild down Major down	North: 9.9 South: 17	North: 50 South: 49
Europe	4	63.23m	Upwave	3	1.28m	Upwave	4.1	54
Asia	4	78.57m	Downwave	3	1.16m	Major down	15	41
Africa	3	8.46m	Major down	3	0.27m	Major down	2.9	5.3
Oceania	5	0.24m	Upwave	4	2,668	Upwave	10	45

Source: Adapted from raw figures of Our World in Data (OWID 2021) (see Edouard Mathieu et al. 2021).

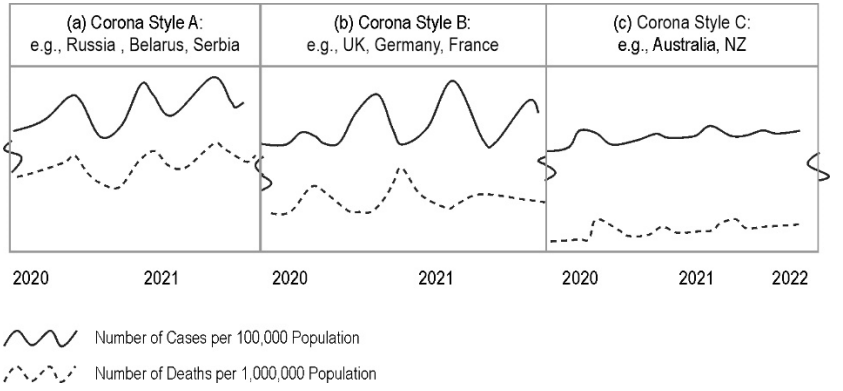
Current data *confirms* a cumulative 4.94 million official global deaths and 243 million global cases of COVID-19 over 2019-2021. Most cases initially spread to areas of strong tourism and business strength, notably America, Europe and Asia. The number of waves of cases and deaths differ from area to area, but typically deaths lag cases since people get infected before they die of COVID-19 complications. Waves occur due to many factors, such as new variants, vaccines (in some nations), and countries *recurringly* interspersing freedoms with lockdowns and freedoms (again) followed by more lockdowns. Following this lockdown-freedoms dynamic there are typically a surge of cases and then deaths. However, some areas, especially in advanced nations, have fewer waves of deaths than cases (though aggregate deaths may look high), mainly due to higher vaccinations rates, past immunity and better health infrastructure. The worst affected by COVID-19 are typically the unvaccinated and those with pre-established medical conditions.

At least three typical styles of COVID-19 waves have emerged in the world relative to confirmed *rates* of cases and deaths *per capita*, as shown below in Figure 2(a)(b)(c).

Case A shows how every wave upswing in cases is followed by a wave upswing in deaths, with a lag; and every wave downswing in cases is followed by a wave downswing in deaths. Examples include Russia, Belarus, and Serbia. The final wave for both cases and deaths follows each other in this pattern because efficient vaccination rates are low and hence deaths are still forthcoming at proportionate rates to those of cases (through time these nations may evolve into, e.g., Case B types.)

Case B illustrates nations whose final wave upswing of cases per 100,000 infections is not followed by a similarly intense upwave in deaths, because vaccination/immunity rates are relatively high and those who die of complications with COVID-19 tend to be those who are not vaccinated/have major pre-existing conditions. Examples include the UK, France and Germany.

Case C has both low rates of cases and deaths due to severe lockdowns and social distancing, but where waves of cases and deaths occur due to successive bouts of opening up, where eventually a new wave of cases is not followed by major deaths, perhaps due to some degree of natural immunity, vaccinations and good health-governance systems, especially for those most vulnerable. Examples include Australia and New Zealand.



Source: Own elaboration based on numerous data points on World Health Organization website.

Figure 2 Three Styles for Typical Waves of COVID-19 Cases and Deaths

These three typical cases likely change over time for specific nations involved. It is usually advanced nations that transition to the stage where case spikes fail to elicit major death spikes (except for those unvaccinated and with pre-existing medical conditions). Less developed nations of especially Africa, but also to some extent certain nations of South East Asia, South Asia, and the Caribbean, have administered few tests and have little capacity for widespread vaccination campaigns. Data for many such areas show far fewer cases/deaths than is likely in reality, as testing is minimal and often there is no data about testing levels. While most developed nations have much more than 100 tests per 100 persons, in Africa there is often less than 20 tests per 100 persons. Many African nations, such as Tanzania, Cameroon and the Central African Republic, have little data on SARS-CoV-2 tests per 100 population. Lacking tests means estimates of cases and deaths are much lower than reality for COVID-19 (World Health Organization 2021a).

This raises the core issue of *excess* deaths (D_{Ex}), defined as the number of deaths in an area during the COVID-19 pandemic (D_p) minus the number of deaths that usually occur in a typical year from all causes (D_{Typ}): $D_{Ex} = D_p - D_{Typ}$. The Economist, for instance, uses a model to regularly update estimates of excess deaths. Most nations of the world had official COVID-19 death estimates far lower than the excess deaths above those that usually die in a typical non-pandemic period (e.g., from seasonal influenzas, heart attacks, cancers, etc.). Reasons for this are lack of tests for SARS-CoV-2, inadequate official statistical networks and corruption of the data. Table 2, below, provides data on estimates of excess deaths (D_{Ex}) and official confirmed data on

COVID-19 deaths (D_{Of}) for the world and selected nations of the world (grouped into regions):

Table 2 Excess COVID-19 Deaths (Latest Data to 20/24 October 2021*) and Official COVID Deaths (Latest Data to 23 October 2021**), World and 23 Nations

Nation	Excess deaths (D_{Ex}) per 100,000* population mid-point estimate	Cumulative excess deaths* mid-point estimate	Cumulative official COVID deaths (D_{Of})**
World	185	16.2m (10m-19m~)	4.94m
Peru	588	196,040	200,019
Mexico	401	522,330	286,289
Brazil	296	633,520	605,457
Serbia	457	31,600	9,448
Russia	536	781,400	225,417
Hungary	309	29,740	30,492
Poland	339	128,060	76,434
South Africa	401	221,790	88,914
Egypt	186	194,260	18,242
Tunisia	54	6,500	25,139
Italy	249	150,400	131,802
USA	244	800,780	735,800
Britain	192	130,960	139,878 (UK)
France	126	85,360	118,396
Germany	92	77,260	95,105
Iran	286	243,230	125,052
Lebanon	164	11,070	8,449
Israel	76	6650	8,046
Oman	87	4,530	4,107
Thailand	53	37,040	18,699
Vietnam	97	58,752	21,620
Japan	4	4,720	18,199
Australia	–10	-2,670	1,637

Source: Adapted from the * Economist (2021b, d) and ** Our World in Data (2021).

This demonstrates five things. The first is that official global data for COVID-19 cases (4.94m) understate excess-deaths from the pandemic (16.2m) by over 11m (on average). The greater excess deaths are relative to official deaths the greater the undercounting through official figures. The second is that some nations have a close fit between official and excess figures (e.g., Peru, Brazil, Hungary, USA), indicating little undercounting. The third is that numerous nations had a core problem with official figures majorly understating deaths: excess deaths being far greater than official deaths (e.g., Russia, Poland, South Africa, Egypt, Iran; also many other African nations, not shown due to data inadequacies). The fourth is the lack of attention to distributing sufficient numbers of test kits, vaccines, and health infrastructures to nations that have few resources, especially in Africa: resulting in few (valid) figures. And the

fifth is that nations with the highest number of total deaths per capita have generally failed to vaccinate their peoples due to governance anomalies (such as Brazil, Russia, USA).

International organisations, including COVAX, WHO, plus the US government and others, have promised vaccines for especially African nations that are in financial and organisational difficulties in this respect. The crucial task is for this to be activated on the ground urgently before Delta and more virulent strains of SARS-CoV-2 take hold and mutate even further, before the whole world is able to get to above 95% (including children) herd immunity through vaccination and previous infection.

3. Heterogeneous Groups and Agents

The *principle of heterogeneous groups and agents* involves the existence of species of beings, individuals or agents, which engage in networks of groups and other social organisations. They also have specific genetics, norms, habits and/or tendencies. In the case of the coronavirus crisis they include viruses, other species such as bats and numerous groups of humans, as well as groups of vaccines.

The SARS-Coronavirus-2 generates numerous mutations some of which are more virulent than others. Human beings are distinguished *vis-á-vis* coronavirus infection according to their ethnicity, place of residence, gender, class, age, and other characteristics. Their ability to evade infection and major symptoms depends largely upon which classes they operate within. For instance, regardless of nation, on average those who are elderly, of minority ethnic membership, and of working or lumpen class, tend to have higher rates of infection, lower rates of vaccination, more extreme symptoms and higher rates of mortality than more privileged groups.

Breaking it into components; in terms of age, generally the intensity of symptoms is positively related to age, with successive tipping points coming into play for those who are above-60, above-70, above-80, and above-90. As one ages, the ability of the body to fight invading microorganisms tends to decline markedly as the immune system is often compromised, and the aged tend to have many more pre-existing conditions compared with those who are younger. Hence the original Wuhan-1 virus plus the Alpha, Beta and Delta critical variants generally impact older people much more than the young. But one variant of great concern (Gamma) and one of mere interest (Lambda) have been found to infect youth at a higher rate than the other variants.

This raises the second issue: that those – young and old – who have pre-existing conditions tend to be more severely impacted by the coronavirus than those who have no pre-existing conditions. This relates to all pre-existing conditions, the most common being associated with pulmonary, circulatory, psychological, neurological, digestive and reproductive diseases. As mentioned, pre-existing conditions are greater for the "aged" and lower classes; hence their typically higher rate of infection and mortality.

The third subcomponent of coronavirus influenza relates to "minorities": ethnic groups that have fewer opportunities and assets, tend to be subject to the more serious cases of COVID-19, such as serious pneumonia, pulmonary obstruction and organ failure. Such minorities generally have fewer/lower quality assets, knowledge, diet, and more barriers to getting ahead in life, as well as more serious medical conditions.

The fourth subgroup is gender. There is a tendency, overall, for men (*per capita* cohort) to be more severely affected by coronavirus-2 than women. The likely reasons for this are that men tend to die younger, they have more pre-existing conditions, drink and smoke more, and have worse diets and lifestyles, compared with women.

For instance, a study of 99 confirmed cases of COVID-19 from Wuhan Jinyintan Hospital, by Nanshan Chen et al. (forthcoming), from 1 January to 20 January 2020, found that 51% of these Wuhan inpatients had chronic diseases, but the first two deaths, a 61-year-old man ("patient 1") and a 69-year-old man ("patient 2") "had no previous chronic underlying disease but had a history of smoking" (p. 5). This is an issue often ignored: that smoking can be a major facilitator of COVID-19 symptoms and indeed mortality. Patient 1 developed severe pneumonia and ARDS and died of a sudden cardiac arrest, while Patient 2 died of pneumonia, septic shock and respiratory failure. Also, apart from generally having a better lifestyle and diet, and typically smoking and drinking less, this paper mentions another *possible* reason why women contract COVID-19 and die less often than men from COVID-19: "The reduced susceptibility of females to viral infections (may in part be due to) protection (given) by (the) X chromosome and sex hormones, which play an important role in innate and adaptive immunity" (p. 6).

Consider also the study by Hector Izurieta et al. (2021) that analysed risk factors for deaths (and hospitalisations) among more than 26 million US medicare beneficiaries. It found that "race, social disparities, old age, and underlying health conditions were associated with a higher risk of COVID-related severe outcomes, including … deaths" (p. 945). Pre-existing conditions that tend to heighten COVID-19 death rates include "hypertension, diabetes, obesity, frailty, …, respiratory diseases, …, cardiovascular diseases", as well as having a compromised immune system, cognitive impairment, paranoia, congestive heart failure, and pneumonia (p. 947). Native Americans were found to have the highest mortality rate, followed by Hispanics and then blacks; with Asians having the lowest risk along with whites (p. 952). Because women tend to live longer than men there were a greater proportion of them in the study (55.6% women, 44.4% men). The percentage of men in the cohort who died of COVID-19 was 51.5%, compared with women of 48.5% (p. 948). These results were said to be similar to other studies on the subject from the US and other countries.

Heterogeneous groups and agents also relates to microorganisms, other human groups/agents and vaccines. SARS-CoV, MERS-CoV, and SARS-CoV-2 all belong to the batacoronavirus subgroup. A key similarity between SARS-CoV and SARS-CoV-2 lies in the spike protein receptor binding domain, despite some key variations between them. SARS-Cov-2 has a greater reproductive multiplier than SARS-CoV, with elevated viral loads even when hosts are asymptomatic (Al-Qahtani 2020, p. 14); and a higher stimulation of cytokine inflammation in the host; which helps explain the far greater spread and mortality of the COVID-19 pandemic compared with the earlier SARS-CoV epidemic (Harapan Harapan forthcoming).

The longer the pandemic continued, the greater the spread throughout the world, and the higher the number of mortalities, the more critical was the threat of more virulent strains emerging. World Health Organization (2021b) has differentiated between "Variants of Concern" (VOC) and "Variants of Interest" (VOI). VOC such as Alpha,

Beta, Gamma and Delta are significantly more virulent than the original SARS-CoV-2 virus. VOI such as Eta, Iota, Kappa and Lambda are of some interest and in need of more research. Table 3, below, details core characteristics of the VOC.

Table 3 SARS-CoV-2 Variants of Concern: Major Characteristics *vis-à-vis* Original

WHO and pango categories	Nation 1st detected	1st detected	Spike protein mutations	Greater transmission
Wuhan- Hu-1 (Orig.)	China	Nov 2019	---	0.0%
Alpha (α) B.1.1.7	UK	Sept 2020	N501Y; P681H; A570D;	+82% (43-130%)
Beta (β) B.1.351	South Africa	Sept 2020	K417N; E484K; N501Y;	+50% (20-113%)
Gamma (γ) B.1.1.28.1 (P.1)	Brazil	Dec 2020	K417T; E484K; N501Y	+161% (145-176%)
Delta (δ) B.1.617.2	India	Dec 2020	L452R; T478K; D614G; E484Q	+198%

Source: Variously adapted from William Harvey et al. (2021), Elibabeth Mahase (2021), European Centre for Disease Prevention and Control (2021), Wikipedia (2021a), World Health Organization (2021b) and Weilin Zhou and Wei Wang (2021).

Viruses typically mutate through time, with an assessment indicating that SARS-CoV-2 makes "one or two mutations a month" (Jacqui Wise 2021, p. 2). Such mutations have been assessed as being relatively low, relative to, say, the typical influenza viruses, because of the "proof-reading activity of its replication machinery" (Yongfei Cai et al. 2021, p. 1). Some of these mutations quickly dissipate, others reproduce quickly. Some are harmless, while others may be highly virulent and lethal. The SARS-CoV-2 virus infects humans through the binding of the RBD (receptor binding domain) associated with the Spike protein of the virus to the ACE2 (angiotensin-converting enzyme 2) of the human cell. Most of the "variants of concern" involve mutations of Spike proteins of the virus to enable them to bind to the human ACE2 more effectively. Cai et al. (2021) points out that the four main variants of concern (Alpha, Beta, Gamma and Delta) have in aggregate become more significant than the original virus, Wuhan-Hu-1. This is because the variants are able to variously increase the transmission of the virus to humans, reduce the immune resistance of humans to infection, and promote greater mortality as a result.

The Alpha variant, originating from the UK and spreading throughout the world, involved mutations of the N501Y, P681H, and A570D spike proteins, along with mutations of other parts of the virus. Mutations A570D and P681H enable B.1.1.7 to bind the Spike receptor more effectively to human cells on the ACE2, while mutation N501Y likely enables B.1.1.7 to infect a further range of cells than usual (Cai et al. 2021, p. 4), thus enhancing transmission by around 82% (43-130%), relative to the original Wuhan virus.

The Beta variant, originating in South Africa and subsequently spreading further, is much more virulent than the Wuhan-Hu-1 variety, but less so than Alpha. It involved mutations of the K417N, E484K and N501Y spike proteins along with several others. Mutation E484K started with Beta and continued through to Gamma. It is a RBD mutation which enhances the ability of the virus to evade neutralising antibodies. Beta has a greater transmission of about 50%, compared with the original virus from Wuhan.

A core difference between Beta and Gamma lies in the K417T mutation of Gamma (instead of K417N). Gamma is of special interest re heterogeneous agents, as *it tends to infect both younger and older groups*, the first SARS-CoV-2 variant of

concern to have this characteristic. It is also able to generate about ten times more viral load than the Alpha version. As a result, it has a greater transmission rate than the original Wuhan virus strain of around 161% (145-176%).

Special emphasis has been given to the newer VOC strain of SARS-CoV-2, Delta or B.1.617.2, originating from India, which has about 200% greater transmission than the original Wuhan virus. This is of concern for all nations, but especially those lagging in vaccination rates, such as sub-Saharan Africa and parts of Latin America and Asia. Mutations E484Q and L452R enable it to evade core antibodies. The Delta period has been termed a "new phase" in the evolution of SARS-CoV-2 and COVID-19, mainly because so many millions have perished worldwide under its onslaught, especially where there are low rates of immunity and pre-established conditions (Kapi Kupferschmidt and Meredith Wadman 2021). More recently, other strains of the virus have appeared that are "variants of interest" but may become "variants of concern" sooner rather than later.

Other human agents and groups/organisations are of interest, especially those doing path-breaking research in virology, mass-manufacturing vaccines, vaccine supply coordination, health infrastructures and aggregate demand facilitation. Enormous investments in vaccine development have occurred since the genome for SARS-CoV-2 was isolated, leading to over one hundred potential vaccines being trialled, and over a dozen vaccines being authorized by at least one national regulatory agency. Table 4, below, provides summary information about the nature, origin and efficacy of some of the major vaccines currently being used worldwide:

Table 4 Major SARS-CoV-2 Vaccines: Use and Efficacy

Vaccine group/name	Type of vaccine	Nation(s) developing vaccine	Full course infection- and symptom-protection no major P.E.C.§	Death efficacy: no major P.E.C. §
Pfizer-BioNTech	mRNA vaccine	Germany/USA	95%	99-100%
Moderna	mRNA vaccine	USA	95%	99-100%
Oxford-AstraZenaca	Viral vector	UK/Italy	70%	98-99%
Johnson & Johnson	Viral vector	USA	66% single dose	97-99%
Sputnik V	Viral vector	Russia	91% (?)*	96-98%? (over-60s?)
Sinavac	Inactivated virals	China	50-91% (?)	95-98%? (over-60s?)

Notes: * Inconsistent clinical trial data; P.E.C. = pre-existing major medical conditions. § Within twelve weeks of inoculation.

Source: Adapted from parts of Mark Terry (2021).

There are four main types of SARS-CoV-2 vaccines (Wikipedia 2021b). Pfizer and Moderna both contain messenger ribonucleic acid (m*RNA*), designed around a crucial part of the coronavirus called the spike protein, which when injected into human tissue generates an adaptive immune response to seek and destroy the virus. AstraZenaka (AZ), Johnson & Johnson (J&J), and Sputnik are all *viral vector* vaccines, producing an antigen which creates an immune response to the pathogen. Sinavac and several others are *inactivated viral vaccines* grown in culture, killed and then promoting a safe immune response[2].

[2] There are numerous other types of vaccines, such as *subunit vaccines*, which introduce micro-unit antigens, or fragments of the pathogen, that are able to stimulate an immune response.

Evidence for the efficacy of different vaccines varies according to location of study, variant studied, methods used, plus the various age groups, ethnicities, classes, and genders scrutinised. In empirical studies it is often difficult to establish which variant corresponds with which vaccine. What does appear true is that a full course of most of the above vaccines will protect to some degree against hospitalization and more surely death if there are no major pre-existing conditions, especially within 12-16 weeks of inoculation. But since, as mentioned, especially the aged, ethnic minorities and disadvantaged classes have more pre-existing conditions than the young *per se*, they typically have less protection from vaccines.

Hence, the vaccines have differential average rates of efficacy, within 12-16 weeks of inoculation, even for those with no pre-established major conditions. For instance, a full course of Pfizer or Moderna has an efficacy rate for infection and symptom-protection of about 95%; with death prevention approximating 99-100%. A full course of AZ or J&J provide 66-70% efficacy against infection with significant symptoms and 97-99% of preventing death. There are evidential data limits for Sputnik and Sinavac jabs, but both have considerable efficacy against infection and symptoms, although the prevention of hospitalisation/death for the over-65s is unclear.

One empirical UK study attempted to compare the efficacy of the Pfizer, AZ and Moderna vaccines against the Alpha and Delta variants of SARS-CoV-2 (Koen Pouwels et al. 2021). They found they could do this comparison with Pfizer and AZ, but not Moderna, because Moderna wasn't developed when Alpha was a dominant strain. They thus compared Pfizer with AZ during the so-called "Alpha-dominant period" (1 December 2020 to 16 May 2021) and the "Delta-dominant period" (17 May to 1 August 2021).

Three main results surfaced. The first was that mean prevention of "Alpha-SARS-CoV-2" infection was quite high for adults after 14 days of injection with the second dose of Pfizer (78%) and AZ (79%). But for the Delta variety Pfizer (80%) was more effective than AZ (67%) on average. The second result was that, through time, Pfizer and AZ were less effective in preventing infection and symptoms, but still quite effective in preventing hospitalisation and death, unless there were major underlying conditions. The third result is that those vaccinated with Pfizer, AZ and Moderna who become infected have equal viral loads to those who are infected yet unvaccinated, suggesting that they could still pass the virus on to others, and hence pose some problems with the so-called potential herd immunity at 80% or 90% vaccination/immunity rates.

Since vaccines are less effective over time, especially 3-6 months, various nations have began to institute "booster-shots" beyond the respective "full dosages" (usually 2 jabs). A major study, results published in the *New England Journal of Medicine* (Yinon Bar-On et al. forthcoming), studied Israelis who had received the full 2 jabs of Pfizer vaccine; comprising 1,137,804 people who met the inclusion criteria, all 60 years of age or over who had all received a double dose of Pfizer at least five months earlier. Of these, one group had a booster-shot at least 12 days earlier (3rd dose; more men, slightly older) and the other group had not been given a booster (more women, slightly younger). The results were that the non-booster group included 4439 people who contracted SARS-Cov-2 and 294 people with severe illness, while the booster

group had 934 infections of COVID-19 and 29 cases of severe illness. In both booster and non-booster groups, many more men and the over-80s became infected and experienced major symptoms. The study concluded that having a Pfizer booster shot increased efficacy from 50% to 95%. The usual caveats applied: more research is needed, how long will efficacy last? Other studies have also supported the efficacy of booster-shots, especially for the elderly and those with established medical conditions (e.g., Philip Krause et al. forthcoming; Matan Levine-Tiefenbrun et al. forthcoming).

Especially the elderly and those with established conditions (and likely others) will probably need to keep taking booster shots into the foreseeable future, including remodelled vaccines for newer variants, and for *potential* (likely) variants, as the world tries to at least reduce the extent of hospitalisation and deaths if not infection and modest symptoms. If this is successful in the *very long-term* COVID-19 may be considered just another form of influenza (with different variants), with perhaps significant infections and symptoms but low levels of hospitalisation and death. But in the meantime worse strains are emerging; and indeed the condition called "Long COVID" seems to afflict around 10% of those infected (especially with Delta), with symptoms such as weakness, tiredness, muscle ache, difficulty concentrating and stress lasting into months and even years (New Scientist 2021).

4. Circular and Cumulative Causation and Contradictions of Coronacrisis

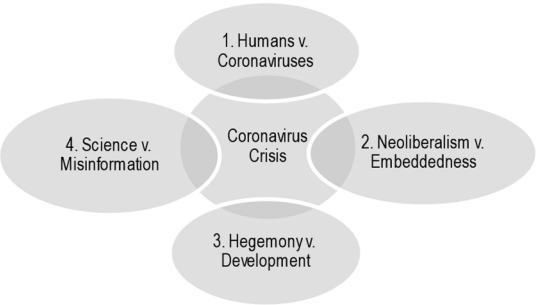
There are multiple processes leading to the coronacrisis, involving numerous endogenous contradictions that contribute to the transference and spread of the virus, including immunological contradictions propelling magnified results for human beings. These magnified and amplified processes are linked through the *principle of circular and cumulative causation* (CCC), developed by Gunnar Myrdal (1968) and Nicholas Kaldor (1972) (see O'Hara 2008); and the *principle of contradiction*, developed by scholars such as Karl Marx (1857-1858), O'Hara (2006, forthcoming) and David Harvey (2014).

CCC is a multifactor approach that analyses the realistic interdependencies and amplified effects of cofactors through historical time. It seeks to scrutinise processes, how these processes interlink, and how the interlinkages within and between the processes generate multiplier effects beyond the realm of the single variables. Being greater than the sum of the parts, CCC obviously involves complexity, including emergence, where the micro forces combine generating meso influences, while the meso forces multiply to propel macro and global dimensions to the processes. CCC can be viewed from the top down and from the bottom up, plus both in unison. Typically CCC is utilised for understanding and providing structural policy advice for alleviating critical world problems, such as the coronacrisis, climate change, corruption, world hunger and poverty, financial crises and business cycles, and a myriad of other anomalies.

Closely related to CCC is the *principle of contradiction*, which involves certain internally generated dual-interactive anomalies that potentially propel major degrees of instability, conflict and de-synchronization that inhibit socioeconomic performance. Contradictions involve dichotomous forces, some of which are systemic and some

macro, meso and micro in nature. The systemic contradictions can be worked up from the micro to the meso and macro through to global forces, and *vice versa*, with each level involving emergent, multiplied and amplified impacts as we move to more general levels. One such systemic contradiction is associated with Polanyi's concept of the disembedded economy (James Ronald Stanfield 1986); a closely related one is the notion of the vested interests *versus* the common good (Thorstein Bunde Veblen 1919); and another relates to the relative dominance of ceremonial versus instrumental functions of institutions (Marc Tool 2000). Other contradictions that feed into the systemic level include those between capital and labor; finance and industry; gender to gender; ethnic group versus ethnic group; urban and regional; monopoly and competition; and so on (O'Hara 2001, 2009).

Merging CCC with contradiction enables us to situate the contradiction factors as CCC processes, as illustrated in Figure 3, below.



Source: Author's creation.

Figure 3 Four Contradictory Processes Impacted by Circular and Cumulative Causation (CCC) Dynamics Promoting COVID-19

The *first* specific coronacrisis contradiction is that *between humans and coronaviruses*. Humans have been in a literal global battle against coronaviruses since possibly late 2019, which questions assumptions about humans being the dominant species on planet Earth. Humans have contributed majorly to declining biodiversity over the past 200 years, and especially over the past 50 years. For instance, the WWF has estimated a decline in the Living Planet Index (LPI), representing an index of the average abundance of 20,811 populations of 4,392 species, from 100% in 1970 to 32% in 2016 (World Wide Fund 2020, p. 16); a drop of 68%. Mostly this is done by a combination of destruction of habitat, consumption, invasive species, and climate change. However, viruses go against this trend since "they constitute the most abundant biological entities and a large reservoir of genetic diversity on Earth" (Daniel De Carcer et al. 2015, p. 1). Viruses have contributed to the death of likely many hundreds of millions of human beings over the past several hundred years. While the SARS-CoV-2 in a sense contributes to human immunity through activating it, and ensuring that it is capable of keeping the virus in check; especially for the aged, numerous minority groups, others suffering from multiple conditions and unable to fight off the

virus, it has contributed to up to 19 million (between 10-19m) "excess" human deaths over 2020-2021 (Economist 2021d).

Seriously dealing with this contradiction between humans and the SARS-CoV-2 virus involves the principles of public health such as social distancing, reduced travel, wearing of masks, testing for infection, contact tracing, isolating, hospitalisation, and successfully inventing and distributing good vaccines and drugs. Numerous advanced nations will likely have successfully vaccinated the vast majority of their populations by the end of 2021; but many underdeveloped and developing nations are unlikely to be fully vaccinated until perhaps the end of 2022 or later. Further virulent mutations will be of concern, as will the need for continual improvement of vaccinations, perhaps indefinitely, since they do not provide long-lasting protection; over time they become less effective. This contradiction is a prime one for humanity to overcome through time.

A core way this contradiction manifests is through the cytokine storm that typically occurs in people vulnerable to coronaviruses due to established medical ailments and immune compromises. These *tend* to include the elderly and others with major medical conditions, such as diabetes, heart and liver disease, circulatory obstruction, psychological anomalies, plus reproductive and respiratory problems. The cytokine storm involves inflammatory responses leading to pain, impaired performance, major disease, established maladies worsening, often leading to death due to organ failures. Inflammation is a normal process of reacting to infection, but it cumulates in the cytokine storm as causation multiplies and amplifies (Jujun Tang et al. 2020).

This cytokine storm is a classic CCC process involving potentially four dimensions of factors leading to acute inflammation for the aged and three dimensions for those with chronic disease per se. Both groups often share three dimensions of anomalies. The first is chronic disease (specifics mentioned above). The second is environmental risk factors, such as smoking, substance abuse, poor nutrition, insufficient vitamin D, and social deficits such as inadequate medical infrastructure. The third risk is SARS-CoV-2 specific factors, including, for instance, lower lymphocyte count, excessive C reactive protein, higher levels of cytokines such as interleukin 6, and overabundant chemokines such as CXCL10 and CCL2. Older persons additionally tend to experience a fourth risk, age-related biological changes (Lolita Nidadavolu and Jeremy Walston 2021). These aged-specific factors comprise a complex series of processes, including the production of numerous additional inflammatory cytokines, low grade activation of the innate immune system, insufficient clearance of damaged mitochondria, and increased inflammatory signalling (p. e15).

The clinical consequences of this array of multiple factors is often expressed in the COVID-19 cytokine storm, a typically "out of control", disequilibrium, chronic activation of the immune system, variously leading to clinical symptoms such as ARDS, delirium, anorexia, muscle wasting, fatigue, blood clotting, and death. Studies show that the elderly and those with established medical conditions (typically undergoing the cytokine storm) have a far higher mortality rate than the young and the healthy. For instance, as one UK study showed, those "over 65 years old (the group with most established medical conditions) represent 80% of the hospitalizations and have a 23 times higher risk of death than those under 65" (Adriana Pedreañez, Jesus

Mosquera-Sulbaran, and Nelson Muñoz 2021, p. 1567) (see also Rajkumar Chinnadurai et al. 2020).

The *second specific coronacrisis contradiction*, between *neoliberalism and more embedded political economy systems*, is an equally challenging conundrum. Neoliberalism includes the institutionalisation of austerity, privatisation, globalization, deregulation, free markets, and often a strong state to enable these processes to thrive (Miloš Šumonja 2021). The global financial crisis (GFC) of 2008-2011, and its continuation in various nations thereafter, as well as the coronavirus crisis, have dented the image and dominance of neoliberal policy and ideology (O'Hara 2010, 2014; Geoffrey Gertz and Homi Kharas 2019).

Policy responses to the GFC and the coronacrisis (CC), especially in advanced nations, took the form of functional finance (Max Lerner 1943), a major principle of embedded systems, which emphasises the results of policy actions in dealing with crises, rather than preconceptions such as balanced budgets and GDP percent limits on deficits. It includes a general proclivity for countercyclical fiscal and monetary policy, and in CC contexts include: (a) *ad hoc* handouts to citizens to encourage spending and reduce uncertainty; (b) more extensive unemployment benefit schemes and indeed "government wages" (furlough schemes) for those unable to be employed (fully) by business; (c) money supply providing finance for government, business and consumers, and lower interest rates, to maintain an adequate level of effective demand; and (d) taxation deductions for struggling companies, where taxes are seen not as sources of revenue but aggregate demand regulators. The historical time associated with the CC also saw the greater importance in many advanced nations for targeted public investment in infrastructure, health, education and climate change dynamics.

When the next major crisis emerges functional finance and other non-neoliberal institutions may be further embedded in the institutions of advanced capitalism, at least in dealing with potential crises. Some evidence supports the notion that key elements of the "economic profession" (if not the profession as a whole) have rejected neoliberalism (see Gertz and Kharas 2019). But elements of neoliberalism have typically often been maintained in many jurisdictions: such as restoring austerity after crises; privatising health, education, utilities and housing; and maintaining mostly free-wheeling financial systems and decentralised industrial relations systems (David Primrose, Robin Chang, and Rodney Loeppky 2020). Neoliberalism has been questioned and partially de-institutionalised, but not completely replaced by a more embedded system in the vast majority of nations. So this contradiction continues to be played out now and potentially into the immediate future.

A core element of neoliberalism is deregulated globalisation of money, trade and production, tourism, and the integration of corporate networks locally, regionally and internationally, to enable the quickest expansion of both trade, business, and tourism from country to country and from region to region, ultimately encompassing the whole world. The global spread of COVID-19 became rapid due to the institutionalised nature of these integrated economic relations, commodity chains and production networks. For instance, the KOF Globalisation Index (see Claudius Grabner 2021, p. 100), comprising trade and finance ("*de facto*"), for all nations, shows a major increase in the index from 34 to 62 between 1970 and 2016, with some temporary declines during

the mid-1980s, early 1990s, and the GFC. The degree of globalisation is positively related to the level of "complexity" of the economies. While several political forces have seen a decline in globalisation ideology, especially with the rise in extreme nationalism, this has not majorly affected the degree of globalisation at this stage.

However, several developing and underdeveloped nations have less space for policy movement due to path dependent processes, including pre-colonial, colonial, and post-colonial structural anomalies such as corruption, low levels of political capital, and unsophisticated technological, financial, and fiscal systems, that make it hard to compete with advanced nations in the efficiency with which they tackled the CC.

This leads to the *third specific coronacrisis contradiction* concerning *hegemonic power and (uneven) development*. Activities that typically dislocate the circular flow of economic activity include geopolitical conflict over trade, borders, airspace, and technology, as well as wars, terrorist attacks, pandemics, and lack of effective leadership. The WHO, for instance, had been attacked by Mr Trump for being slow to move on the pandemic crisis; as had China where the virus started at or near the Wuhan wet markets. There is an ongoing anomalous relationship between China and the USA and its allies, on several fronts, which has inhibited communication on issues of trade, industry, finance, pandemic and diplomacy. These factors tend to accelerate uncertainty in the global economy, which has been on the rise, recently since 2018 (see further below), partly because of these conflicts.

A major global contradiction has emerged whereby the advanced economies of Europe, America and parts of Asia have had the *ability* to inoculate the vast majority of their peoples with the major vaccines, and thereby potentially generating herd immunity. But the health and medical services response (not merely the supply of vaccines or tests) for lowly developing or underdeveloping nations of especially Africa, as well as some South Asian, Latin American, and small-island nations, have been dismal. Africa is especially subject not simply to inadequate testing for SARS-CoV-2 and inadequate supply of Covid-19 vaccinations, but a whole array of supply issues associated with hospital infrastructure, staffing, transport and finance, as well as much vaccine hesitancy, leading to major upwaves of infections, hospitalisations and deaths.

This persistent inequity of vaccines, test kits, infrastructure, transport and labor power is correlated with global wealth and income. This does highlight the gross inability of the international agencies and communities to supply infrastructure, services, vaccines and tests according to the principle of the global common good. The same goes for the distribution of COVID-19 drugs, such as casirivimab and indevimab. Most of the markets for such monoclonal antibody drugs emanate from North America and Europe, with very few in less-developed nations, mainly due to the huge expense (Economist 2021e). The advanced nations have prioritized their own needs and considered less developed nations when their vaccination rates are looking moderately good.

The international organisation, Covax, as well as many nations, especially China and the USA, have provided several hundred million vaccines for distribution to less developed nations. But, as mentioned, this ignores the total supply issue as well as the attitudinal context of the process. China has seen an opportunity to generate further *soft power* through major contributions to the health budgets of many such

nations, plus free or subsidized vaccines, hospital machines, masks and the like. Several studies have shown that China's potential hegemonic power has expanded partly due to its accelerated soft power through global assistance especially to developing and underdeveloped nations of Asia, Africa and Latin America (Priya Gauttan, Bawa Singh, and Jaspal Kaur 2021). China has also taken serious action to control the virus domestically, which provides them with considerable emulative power in policy and strategy (but not for research on the specific *origins* of the virus). These and other soft power initiatives, such as the Belt and Road Initiative (BRI), are enhancing China's potential hegemonic power (even if the BRI is generating debt problems for recipients in many instances).

This is closely linked with the *fourth specific coronacrisis contradiction,* concerning *science and technology versus disinformation and popular myth*. There seems to be a vast gulf in coronavirus policy and behaviour between groups that are keen on scientific evidence, and other groups that eschew science and evidence in favour of their own myths and conspiracy theories. For instance, much of especially Western Europe, Israel, China, Oceania and "liberals" in the US follow the science as much as feasible. But other groups, closely linked with Mr Trump, the Brazilian President, to a lesser extent the Indian Prime Minister, and others, often ignore the science. For instance, Mr Trump gave erroneous recommendations for treating the virus, and the Brazilian President seemed indifferent to hundreds of thousands dying, while the Indian Prime Minister failed to take vaccination seriously, which has led to estimates of over one million excess Indian deaths from the virus (Economist 2021d).

Disinformation anomalies include various lags, such as that between the first notification of the virus in Wuhan and the flow of data to national and international bodies and agencies. Other informational problems include the anti-science movement, libertarian elements, certain religious groups, Trump supporters, and leaders of other nations (e.g., Brazil, Belaras and India) who discourage mask-wearing, congregate in large masses, contradict the science, and spread conspiracy theories. Much has been documented about these forms of "misinformation", including specific time-series data on their recurrence through time (see e.g., Sarah Evanega et al. forthcoming), as well as numerous public demonstrations against lockdowns and mandatory vaccination rules.

These misinformation channels perpetuate certain social habits that have, in normal times, been institutionalised into the core aspects of the global, regional, national and local communities. They include shaking hands, hugging, social kissing, congregating in groups, openly coughing and sneezing, driving to friends and relatives places, using much facial expression to convey information, and passing around material objects including food, utensils and commodities. These factors led to the rapid spread of the virus from person to person and from group to group, including from young people to old people who have lower tolerance to the coronavirus. Hence, "safe COVID practices" usually mean drastic changes in these practices, and often complete cessation, and in extreme cases even between family members (see, e.g., World Health Organization 2021c), at least until core populations have been fully vaccinated/immune. Those who fail to get vaccinated due to misinformation constitute large

populations of those infected with Covid-19, hospitalised, and ultimately dying of the disease.

These four CCC contradictions - human beings v. coronaviruses, neoliberalism v. embeddedness, hegemony v. development, and science v. misinformation - which involve numerous subprocesses, plus related factors, become interlinked and result in multiplier and accelerator trajectories that led to the pandemic and the current estimated 10-19 million "excess deaths". The core point is that they operate *interdependently*; they are cofactors operating in tandem. The contradiction between humans and viruses created the basic dynamic of disease and death. The contradiction between neoliberalism and embeddedness generated an institutional apparatus more prone to disease and death versus that which protect people from harm. The contradiction between hegemony and development helped engender uneven development of Covid-19 throughout the world. And the contradiction between science and disinformation revealed another duality supporting amplified disease versus community health protection.

All four contradictions, where they promoted disease and death more than community health protection, became multiplied through CCC which led to greater uncertainty throughout the world, although the incidence of such uncertainty varied from place to place, and also through historical time. The nature and pattern of such uncertainty is examined in more detail below.

5. Uncertainty and the Pandemic

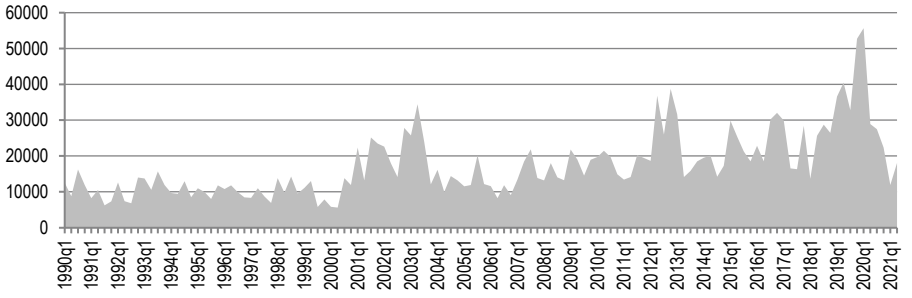
Political economy, following Frank Knight (1921), John Maynard Keynes (1936, 1937), and post-Keynesian institutionalists (PKI), such as Douglas Dillard and Wallace Peterson, *typically* differentiates between risk and uncertainty. Risk is associated with certain deterministic processes that are relatively easy to measure, such as stock-market volatility, insurance finance, and house price indices; while uncertainty looks to the future, especially concerning the business climate, and more obtuse calculative processes. Keynes himself saw the dominant contradiction of capitalism as being periodic bouts of extreme uncertainty in the light of "debt" financing of capital projects those lifecycles spread long into the future. While yields depend upon the current business climate, business expectations become periodically volatile due to the long/short time mismatch, speculative bubbles and supply price rises, causing a crash. Broader measures also impact uncertainty, such as the contradictions examined above.

These broader measures impact on aggregate demand, which is negatively correlated with uncertainty as to the future, rising and falling along with expectations of the current business climate. Few recent scholarly references on uncertainty make reference to the distinction between risk and uncertainty, and those that do have not provided uncertainty data, even if vague and indeterminate, that could be useful for empirics (see Sunanda Sen 2020). Those that have provided indeterminate data relevant to the pandemic fail to distinguish between risk and uncertainty, or deal much with the theory of uncertainly, but nevertheless they have tried to link uncertainty with the pandemic and economic activity.

For instance, surveys undertaken by scholars at the NBER, IMF, Atlanta Fed, Berkeley, and Stanford, have been prolific in generating uncertainty estimates for

many nations of the world, the world as a whole, and also for policy uncertainty. Hites Ahir, Nicholas Bloom, and Davide Furceri (2019) develop the broad theory and analysis which is then detailed by teams of researchers. They construct quarterly indices of economic uncertainty for 143 countries from 1996 onwards using frequency counts of "uncertainty" (and its variants) in the quarterly Economist Intelligence Unit (EIU) country reports.

For instance, Figure 4, below, provides estimates, through an index of global uncertainty, for the period 1990-2021.



Source: Adapted from the raw dataset developed by Ahir, Bloom, and Furceri (2019).

Figure 4 World Uncertainty Index, 1990-2021

Figure 4 illustrates[3] expansions in global uncertainty in the light of short term factors, such as the corporate crisis, internet crash, terrorist attacks, and associated inception of wars during 2000-2003; the subprime, GFC, and Euro-debt crisis aftermath of 2007-2013; the uncertainties linked to Brexit, the Trump era and other anomalies (including intensified wars in the Middle East and European immigration crises) of 2015-2019; plus the coronavirus crisis of 2020 and subsequent recovery in many nations during 2021. The coronacrisis became the biggest short-term socioeconomic disruption over the past 31 years[4], generating high levels of uncertainty that inhibit investment and consumption while necessitating government assistance to prevent depression.

[3] See raw data at https://policyuncertainty.com/wui_quarterly.html. The World Uncertainty Index (WUI) is developed by Ahir, Bloom, and Furceri (2019). The EIU reports discuss major political and economic developments in each country, along with analysis and forecasts of political, policy and economic conditions. They are created by country-specific teams of analysts and a central EIU editorial team. To make the WUI comparable across countries, the raw counts are scaled by the total number of words in each report. See also the work of David Atlig et al. (2020).

[4] Certain structural factors have increased global uncertainty during especially 1999-2021. One core factor is heightening party-political antithesis (and cultural wars) between liberals and populist-nationalist-conservative forces in most regions of the world. For instance, liberals tend to take seriously the science and prudential measures to limit the spread of COVID-19, while populist-nationalist-conservatives have been at the forefront of practices that have led to coronavirus upwaves and heightening deaths, as mentioned. Another structural factor is the heightening conflict between the US and China, which is impacting on numerous areas of the world, in different ways.

For most advanced nations, as economic and health policies have supported low interest rates, furlough schemes, massive injections of funds, extensive vaccination programs, periods of shutdown and opening up, so uncertainty has tended to decline for business, consumers and government as the 2020 crisis moved to upswing in 2021. For the world and its regions the pandemic during 2020 was the worst output reduction since the second-world war and/or the Great Depression of the 1930s. For the USA it was the "deepest recession" but also the "shortest recession" since the 1930s-1940s, due to the roaring recovery in late 2000 and 2021 (Economist 2021f).

Comparisons for the immediate impact of both the GFC and the coronacrisis on GDP growth are shown below for the World and its regions, in Table 5, below.

Table 5 Real GDP Growth Rate, 2008-2010, 2019-2021

	2008	2009GFC	2010	2019	2020CC	2021[p]
World	1.86	-1.67	4.31	2.34	-3.59	6.00
South Asia	3.24	7.13	7.70	4.02	-6.58	11.00
LAC	3.92	-1.87	5.84	0.95	-6.31	4.60
EU	0.64	-4.33	2.21	1.56	-6.20	4.40
Europe & Cent. Asia	1.05	-4.42	2.65	1.59	-5.70	3.90[b]
MENA	4.50	0.50	4.98	0.49	-3.66	2.50[c]
North America	-0.02	-2.58	2.61	2.13	-3.67	6.10
SSA	5.35	3.10	5.57	2.31	-2.45	3.40
East Asia & Pacific	3.54	1.39	7.07	3.61	3.66*	7.30[a]

Notes: p = projection (real GDP growth) (International Monetary Fund 2021); IDA & IBRD nations; SSA = sub-Saharan Africa; MENA = Middle East & North Africa; LAC = Latin America & Caribbean; a = Asia & Pacific; b = Eastern Europe.

Source: Adapted from the raw data at International Monetary Fund (2021, p. 4) and the World Bank (2021).

Three stylized facts emerge from this data. The first is that the initial impact of the coronacrisis (CC) during 2020 throughout the world was 115% worse for GDP growth than the initial global GDP impact of the GFC during 2009. Whereas many areas in the periphery and semi-periphery escaped a deep GFC crisis because they did not have sophisticated financial systems subject to large speculative bubbles and crashes, these areas were not so able to escape the deep impact of the CC on GDP. In this sense CC uncertainty was much more global than that of the GFC. Areas hit worst by the pandemic were small-island and coastal tourist states (and some tax havens) such as The Maldives, Fiji, Panama, Babados and the Bahamas, which were severed by the lockdowns and airline closures that were typical of the CC. South Asian and Latin American peripheral and semi-peripheral areas were the hardest hit of all the (sub)continents of the world during the coronacrisis of 2020.

Being a global pandemic, few major continents or specific areas could eschew the pandemic's 2020 initial negative impact on GDP. The CC hit the Americas, Europe, the Middle East, Central Asia and sub-Saharan Africa hard as lockdowns, travel bans, business closures and un(der)employment escalated in most areas. One crucial factor instigating the initial crisis and deepening of the Pandemic was the cavalier attitude of many of the politicians, as mentioned above, and the anti-masks and anti-lockdown groups that spread myths about the pandemic, the virus and the vaccines.

Secondly, the nations and areas that managed to evade recessions during the pandemic in 2020 were mainly in East Asia, an area that also eschewed many of the negative impacts of the GFC. Notably, China, and Vietnam (initially), were able to use their centralized power structure to institute early lockdowns, social isolation norms and masks to prevent major infections and fatalities long before vaccinations became available. Other nations that evaded recessions in 2020 were, for instance, Ireland, Ethiopia, Bangladesh, Turkey, Tajitstan and Egypt.

Thirdly, initial crisis recoveries during late 2020 and 2021 were robust and intense. While the vast majority of nations failed to control the virus and recessions during 2020, they were able to instigate economic and health policies that prevented, so far, the recessions from being depressions, as most also did during the aftermath of the GFC. A critical factor was, as the Economist (2021g) noted, that "neoliberalism has gone out of fashion", in the sense that functional finance, printing money to finance spending on business and workers, and reducing interest rates to low rates, have become the norm during crises. Use of Keynesian crisis-management policy has become institutionalised, and even financial experts appear to (unwittingly) think the economy operates according to aspects of modern monetary theory (MMT) (Economist 2021g).

Estimates for uncertainty for 2020 are higher for advanced nations and lower for emerging and lower-developed nations. These estimates also exhibit higher *volatility* for advanced nations as uncertainty declined majorly from the crisis of 2020 to recovery in late 2020 and 2021. But for numerous "underdeveloped" nations, especially in Africa, Latin America and South Asia, core elements of coronavirus uncertainty remains, if not for economic activity then for infections and fatalities. While global GDP growth has expanded majorly during 2021 (haltingly in many places), infections and deaths have increased or stayed high for numerous peripheral and semi-peripheral nations due to difficulties in getting enough quality vaccinations, tests, drugs, and health infrastructures. Advanced nations with *relatively high* immunity rates that have opened-up have seen major infection *rates*, as well as large *aggregates* of deaths for especially the unvaccinated and those with pre-established conditions. Over time in advanced nations infection rates and aggregate deaths may decline if no new major variants of concern impact, and if they inoculate the unsure and those with major ailments.

6. Preparedness Policies, Uncertainty and the Future

Here we look at uncertainty linked to lack of preparedness for the pandemic, and policies that can be instituted to reduce uncertainty by preparing adequately for the next socioeconomic-health crisis. Prior to the coronacrisis there were several specific policies and institutions used by authorities throughout the world to prepare for biological pandemics/attacks to reduce uncertainty and crises. These pre-established preparedness structures were critically scrutinised by the 3 year (2017-2019) global research initiative associated with the Global Health Security Index (GHSI), undertaken jointly by the Economist Intelligence Unit, the John Hopkins University Bloomberg School of Public Health, and the Nuclear Threat Initiative (Center for Health Security, Johns Hopkins Bloomberg School of Public Health 2019). The GHSI was finalised in late 2019 and sought to assess the potential for the world and its areas and nations to tackle

biological risks that are likely to impinge on areas in the near future, especially pandemics or epidemics, terrorist attacks and accidental (e.g., laboratory) leaks. The timing and nature of this GHSI exercise was perfect for assessing preparedness for the SARS-CoV-2/COVID-19 anomaly, given that it was done with an emphasis on the ability of areas to respond to a biological crisis, and was published a month or two before the first COVID-19 case was officially detected in China. The six areas studied include: (1) prevention of the release of a pathogen; (2) detection and reporting; (3) rapid response; (4) robust health system; (5) compliance with international norms; (6) overall risk environment (Center for Health Security, Johns Hopkins Bloomberg School of Public Health 2019, p. 65).

Table 6, below, summarises the resultant GHS Index for major areas of the world:

Table 6 195 Nations in Major Regions: Pandemic Preparedness Etc, 2019

GHS Index	Degree prepared	EU & NA	ASIA	MENA	Latin America	Sub-Saharan Africa	Oceania
0-50	Somewhat prepared	28	8	4	6	1	2
51-100	Not very prepared	15	11	10	11	7	0
101-150	Unprepared	4	9	4	14	17	2
151-195	Badly unprepared	1	3	6	6	17	11

Notes: NA = North America; EU = Europe; MENA = Middle East and North Africa.

Source: Based on the data in Center for Health Security, Johns Hopkins Bloomberg School of Public Health (2019, pp. 20-29).

A core result of the GHSI exercise was that the world as a whole was unprepared for a global catastrophic biological risk, since "at least 75% of countries received a low score in biosecurity, oversight for dual-use research, emergency response operations, linking of public health and security operations, and medical countermeasure dispensing" (Center for Health Security, Johns Hopkins Bloomberg School of Public Health 2019, p. 42). The average for all six indicators was 40.2 out of 100 for the 195 countries in aggregate (population weighted). Overall the GHSI group concluded that "national health security is fundamentally weak around the world. No country is fully prepared for epidemics or pandemics, and every country has important gaps to fill" (Center for Health Security, Johns Hopkins Bloomberg School of Public Health 2019, p. 12).

More specifically, as Table 6 indicates, the advanced capitalist economies of North America (NA), Europe (EU) and Oceania (Australia and New Zealand) were mostly "somewhat prepared", though many were "not very prepared". The countries of Asia were mostly "not very prepared", although some were "somewhat prepared" and "unprepared". Those from the Middle East and North Africa (MENA) were mostly "not very prepared", though others were "somewhat", "badly" and "unprepared". Latin American nations were usually "unprepared", though a lot were "not very prepared"; and a few "somewhat" and "badly" prepared. With some exceptions (such as South Africa), nations of Sub-Saharan Africa were mostly "unprepared" and "badly prepared", while those small island states in the Pacific, Oceania, were almost entirely "badly prepared" for the Pandemic.

Even for the advanced capitalist economies of North America and Europe, that were "somewhat prepared", major gaps existed, which led to much uncertainty. For instance, in the USA, which was top of the list (1/195) for preparedness, there was no exercise of rapid response plans, major defects in the emergency response operation, serious deficiencies in access to medical care for many citizens, and a low level of responsible science culture for many people (Center for Health Security, Johns Hopkins Bloomberg School of Public Health 2019, p. 303). The UK (2/195) was documented as having problems with biosafety prevention, detection and reporting, emergency response operations, and access to health care for numerous citizens.

China, the place where the virus first manifested itself, overall came 51/195 for the GHS Index, with a score of 48.2/100. This is higher than the average score of 40.2, but not epidemiologically optimistic for the future of COVID-19 once it became active in the human population. Indeed, China got abysmal results especially for dual use research and culture of responsible science; data integration between human, animal, and environmental health sectors; exercising rapid response plans; linking public health and security authorities; communication between healthcare workers during an emergency; aspects of compliance with international norms; and emergency rapid response operations (Center for Health Security, Johns Hopkins Bloomberg School of Public Health 2019, p. 152). It is thus not surprising that China failed to share epidemiological data on the very first cases of COVID-19, and to prevent the disease from ultimately becoming national and transnational in scope and transfer.

Although the Index has been criticised, it does appear to have calculated quite well the capabilities of certain nations to respond to an emergency. As mentioned, it documented several limitations, even for top-scoring nations, such as the US and UK; and what is a capability may not transfer to action if the politicians and administrators do not adequately activate and communicate properly with health care workers and citizens. Indeed, critics of the index often centred on these differences between technical preparedness and the broader political and social determinants of pandemic response, especially for the leading nations (e.g., see Manjari Mahagan 2021).

Critics have also attacked the GHSI (as well as the Economic Preparedness Index, and the National Health Security Preparedness Index) for failing to predict *specific national rates* of COVID-19 mortality (Fran Baum et al. 2021: Mark Keim and Alex Lovallo 2021). These critiques argue that, now and into the future, we need broader social and political indicators of how policies and institutions adequately deal with pandemics. For instance, Baum et al. (2021) put forward eight such factors necessary to consider for adequate pandemic preparation and prevention dynamics, which should assist policymakers dealing with present and potential future such crises. The first is the need to consider globalisation, geography and global governance. For instance, larger island states, such as Australia and New Zealand, were able to isolate from global forces, for a long time, instituting lockdowns, social distancing, contract tracing, limits on overseas (and domestic) arrivals, facemasks, and the like, and reduce deaths to a minimum, even before vaccines became widespread. The second is participatory rather than just authoritarian governance: they argue it is necessary to include civil society groups and decentralised factors to ensure community participation in governance. This helps explain some individuals and groups attacking government

mandates and rules where communities required integrating into policy. The third is the need for universal, publically well-funded health systems that are not privately outsourced; which they say help to explain some of the *initial* success of policy in Thailand and Vietnam; plus Australia and New Zealand more generally.

The fourth factor is political leadership and ideology, which helps explain why populist forces underlying nations, such as the US, Brazilian, Indian and UK responses led to high rates of mortality in these nations. Fifthly, the importance of *context*, including the unevenness of sub-national structures, help explain some regional differences in Federations such as the US, India, South Africa, Belgium and Australia. The sixth factor critiques the indices' obsession with GDP levels being (indirectly) a major determinant of pandemic preparation and performance. They point to, for instance, the effectiveness of the Rwandan and Vietnamese (initially) solid pandemic response despite being poor nations. The seventh factor is heterogeneous agents and groups, as marginalised groups within nations have tended to suffer most from the pandemic, yet this inequality was not analysed in the indices (at least not directly).

The eighth factor required for pandemic preparedness and low levels of uncertainty in the present and future is the use of government support for households and business in the form of furlough schemes, unemployment benefits, income support schemes, interest rate decreases, *ad hoc* handouts to people, business lockdown payments, accelerated investment depreciation schemes, extended sick leave allowances, and the like. These schemes have been accelerated majorly, especially in the advanced nations of the EU, USA, UK, Australia, Japan, Canada and New Zealand, primarily because they have sophisticated financial and budget systems. Neoliberalism is also declining majorly in these nations, especially in the light of the GFC and the Pandemic, which helps to explain the quick implementation of functional finance, handouts and monetary easing. The least developed nations are generally unable to utilise these schemes effectively due to their underdeveloped technological, financial and budget systems. It is also important for policies not to revert back to neoliberal priorities so as to inhibit proper preparation for the next major crisis, as has often happened in the past.

One core additional factor for reducing uncertainty now and into the future is the ongoing role of vaccinations, in the defence of the population from COVID-19 and other infections. Many advanced nations, while not *consistently* emphasising lockdowns, social distancing, facemasks, and so on, have managed to institute an effective global system of science and manufacturing, for the production and distribution of effective vaccines. They are pinning their hopes on opening up the economy while having a large proportion of their population with sufficient antibodies through vaccinations and previous infection to achieve herd immunity. The US, UK, EU and others are likely to eventually have such immunity but at the cost of large numbers of infections and substantial numbers of deaths.

As mentioned, most less developed economies have difficulty getting access to vaccines to reach 80-90% immunity and activating sophisticated functional finance and discretionary fiscal and monetary policies to prevent major dislocation, if recovery fails to become sustained. Two other anomalies may generate renewed uncertainty and dislocate global and national political economies in light of the coronacrisis. The first is the emergence of *newer strains of the virus* that are even more capable of evading

immune system/vaccine protection, some of which are already in motion. And the second is *major inflationary/stagflationary forces* precipitating higher interest rates that dislocate the circuits of capital, in the light of high levels of international debt, supply-side anomalies and demand forces. Both factors operating forcefully may lead to another global or regional crisis, perhaps being worse than that of 2020.

Overall, the Pandemic has had some crucial political and health impacts, which will affect the world majorly into the future. For instance, it led to the creation in a short period of several effective vaccines, sharpened the scientific edifice of virology and immunology, and laid the policy foundations of potential pandemic reactions, that will likely put the world (or at least certain areas) in good stead for future such crises. Secondly, it led to Donald Trump's defeat in the US Presidential election, and reduced majorly the popularity of several other populist-nationalist politicians, especially in Brazil, India and some other nations. Thirdly, it taught and is still teaching the world about the limitations of austerity and neoliberalism, and also about the need to speed up reactions to potential pandemics, and for assistance to the poorest nations to make available sufficient vaccines through global assistance.

Also, one cannot ignore climate change in the context of the coronacrisis as well as future policies and practices (Samuel Sarkodie and Phebe Asantewaa Owusu 2000; Dieter Helm forthcoming). The pandemic crisis led to moderated carbon emissions during the 2020 recession phase while the 2021 recovery increased emissions. The pandemic crisis also crowded-out climate change endeavours to some degree as the world concentrated on the "immediate pandemic tasks", even while extreme events such as wildfires, floods and droughts become ever-more evident in reality. All this as the Intergovernmental Panel on Climate Change (2021) documented the greater speed and intensity of climate events now and into the future. Multiple simultaneous crises can lead to some of them, such as climate change, being underplayed, which happened during both the GFC and the coronacrisis. Also, it was found that coronacrisis demand policies that focussed on labor-intensive green projects were good for the environment, employment and recovery, while those green policies that were capital-intensive and largescale helped climate change but not so much employment and recovery (Gustav Engstrom et al. forthcoming). Whether or not the coronacrisis descends into history sooner rather than later, climate change policies should be kept in full view and deepened now and into the future.

7. Conclusion

The purpose of this paper has been to investigate the coronavirus pandemic crisis through the prism of some core principles of institutional and evolutionary political economy. We started with the principle of historical specificity and evolution, as the pandemics of the last 100 years were surveyed and the coronavirus crisis was situated as critical but not as major as the "Kansas flu" of 1918-2021 or the AIDS-HIV malady. We surveyed the evolution of the crisis from its origins in Wuhan to the international spread around the world and its impact. Then we scrutinized the principle of heterogeneous groups and agents, noting the peculiarities of gender, class, age and ethnic group with respect to infections and deaths; as well as the key viral agents and vaccines that have impacted on the whole process. Next we explored the principles of circular and

cumulative causation and contradiction, paying special attention to viral-human antimony, neoliberal-embedded double movements, hegemony-development conflicts, and science/technology *versus* disinformation trends. The principle of uncertainty explained how the circular and cumulative contradictions manifested in varying levels of uncertainty regarding the future, which closely tracked demand and growth anomalies. The paper then examines how preparedness for pandemic-type events was anomalous in all nations and areas as the pandemic started, leading to substantial uncertainty in the global political economy, especially during 2020, although there was significant unevenness between core, periphery and semi-periphery. Further investment in preparedness and prevention is one way of reducing uncertainty and providing a degree of insurance from such crises now and into the future.

The principles were useful for gaining information about the nature and evolution of the coronavirus crisis and for providing insights into how it has been dampened and hopefully contained as the world tentatively survives yet another major global crisis. We have collectively learned some important lessons. Major ones are preparedness and prevention, especially the need for more developed health care systems that cope quickly with such bio-emergencies in the future. We have also learned the core role of functional finance, whereby government policy reacts positively to potential simultaneous crises, be they financial, economic, health, climate, war, and other forms of major instability. We also focussed on the need to protect the global common good, which means ensuring protection and adequate policy responses to assist the less developed and not just the emerging and advanced nations. Certain microorganisms have major power over humans and hence someday humanity may disappear from the Universe in the same way that they have destroyed other species, if we don't learn and act on governance lessons to improve our preparation, prevention and responses to crises into the future.

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