Nudged into lockdown?

Behavioural Economics, Uncertainty and Covid-19

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Le sens commun n'est pas si commun.
(Common sense is not so common)
François-Marie Arouet (Voltaire),Writer, historian and philosopher
21 November 1694 – 30 May 1778

Chapter 1

Prologue

In December 2019, a new coronavirus (SARS-CoV-2) emerged in Wuhan, China. The virus caused an acute respiratory disease, Covid-19. Within a few months, the disease had spread around the world. On March 11, 2020, the World Health Organization (WHO) declared Covid-19 to be a pandemic. With cases and deaths rising, public health systems under pressure, and no effective anti-viral treatment, most countries in the world resorted to non-pharmaceutical interventions in an attempt to suppress/mitigate the disease.

Almost all of these measures across the world took the form of extreme physical (or social) distancing; often referred to as "lockdowns". Such lockdowns included some or all of the following measures: border closures and cancellation of international flights, restrictions on large gatherings (typically more than 10, 50 or 100 people) leading to cancellation of games, concerts, weddings, funerals, conferences and closure of schools, movies, theaters, bars, restaurants, churches, gyms and other such places that see large congregations of people at one time; work place closures with people asked to work from home as far as practicable; and often even restrictions on internal mobility including suspension of domestic travel. By April 2020, some countries, like my home country of New Zealand, adopted harsher lockdowns in the form of shutting down everything other than what were deemed essential services such as supermarkets and hospitals. Even industries like construction, where physical distancing came naturally and did not pose a serious constraint, were shut down. India and Israel also adopted similar draconian mitigation policies.[1]

In most cases, people were effectively shut-in; they were discouraged from venturing out of their homes except for essential work or to get exercise. And if and when they ventured out, people were encouraged to behave as if they had Covid-19, wear protective equipment like masks and gloves, and always stay within their "bubble" that included only people that were resident in the same household at the time the lockdown was announced. This also implied that often members of the same household were caught out if they were in different places at the time and had to essentially shelter in place till such time that the lockdowns were lifted. Not surprisingly,

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[1] The Coronavirus Government Response Tracker at the Blavatnik School of Government of the University of Oxford provides measures of lockdown stringency depending on the exact form of the restrictions. According to the tracker, the countries that adopted the most stringent measures in early 2020 included India, Israel and New Zealand. https://www.bsg.ox.ac.uk/research/research-projects/coronavirus-government-response-tracker. Of course, there were countries that never implemented much in the way of lockdowns. This smaller list of countries includes Sweden, Iceland, Japan and Taiwan. Sweden's response was, of course, the subject of much heated debate. In the case of Japan, it is likely that a long culture of limited physical contact (such as bowing rather than handshaking) and being comfortable with mask-wearing as a matter of practice made a big difference. Iceland and Taiwan set up extensive testing and contact tracing mechanisms reasonably quickly. As always, sceptics may well ask, why did something work in one place and not in another? I am sure there will be a lot of research forthcoming on the epidemiological and public health aspects of Covid-19. I am going to side-step much of this debate as being beyond the scope of this volume since I am less concerned about the response per se and more concerned about the thought processes that lay behind those policy responses and the near unanimity around the world about the need for lockdowns.

allusions to the famous Albert Camus novel "The Plague" (La Peste) about a plague sweeping through the city of Oran were invoked repeatedly.

The strong support for lockdowns was surprising, since prior to this, the consensus in the epidemiological community seemed to be that large scale lockdowns or quarantine were not effective nor desirable in combating infectious diseases. Thomas Inglesby is Professor and Director of the Center for Health Security at Johns Hopkins University's Bloomberg School of Public Health. In the aftermath of the H5N1 (Avian flu) pandemic, Inglesby and his co-authors wrote in a 2006 journal article:

> "There are no historical observations or scientific studies that support the confinement by quarantine of groups of possibly infected people for extended periods in order to slow the spread of influenza. A World Health Organization (WHO) Writing Group, after reviewing the literature and considering contemporary international experience, concluded that "forced isolation and quarantine are ineffective and impractical." Despite this recommendation by experts, mandatory large-scale quarantine continues to be considered as an option by some authorities and government officials.
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> The interest in quarantine reflects the views and conditions prevalent more than 50 years ago, when much less was known about the epidemiology of infectious diseases and when there was far less international and domestic travel in a less densely populated world. It is difficult to identify circumstances in the past half-century when large-scale quarantine has been effectively used in the control of any disease. The negative consequences of large-scale quarantine are so extreme (forced confinement of sick people with the well; complete restriction of movement of large populations; difficulty in getting critical supplies, medicines, and food to people inside the quarantine zone) that this mitigation measure should be eliminated from serious consideration."[2]

While reasonable people may disagree on whether large-scale lockdowns may or may not be the panacea, there was something about the uniformity of responses across different countries that was striking. Fairly early on in 2020, it became clear that the lockdowns had little impact on Covid-19 mortality. This was true if one compared across countries at a point in time[3], across

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[2] Inglesby, T.V., Nuzzo, J.B., O'Toole, T., & Henderson, D.A. (2006). Disease mitigation measures in the control of pandemic influenza. *Biosecurity and Bioterrorism: Biodefense Strategy, Practice, and Science*, *4*(4), 366-375. doi:10.1089/bsp.2006.4.366. PubMed PMID: 17238820.

[3] Chaudhry, R., Dranitsaris, G., Mubashir, T., Bartoszko, J., & Riazia, S. (2020). A country level analysis measuring the impact of government actions, country preparedness and socioeconomic factors on COVID-19 mortality and related health outcomes. *EClinicalMedicine*, *25*, 100464. https://doi.org/10.1016/j.eclinm.2020.100464.

counties in the United States[4] and within the same country over a span of time.[5] It was also clear early on that the main drivers of Covid-19 mortality had little to do with such non-pharmaceutical interventions in the form of lockdowns. The main factors included: (i) population and population density (countries with higher populations and/or higher population densities reported more deaths; countries whose citizens were on average older reported more deaths;), (ii) number of hospital beds per thousand of population (more hospital beds meant fewer deaths) and (iii) whether a country had a land border or not (islands like Australia, Iceland, Japan, New Zealand and Taiwan fared much better in terms of fewer deaths per million).[6]

This meant that short-term policy responses such as lockdowns were not going to have a huge impact and we needed to look for alternatives. Most importantly, it seemed to make sense to adopt an empirical approach by looking around the world and taking lessons from various countries as to what was working and what was not. A skeptical reader may well interject at this point that time was of the essence. But, while this may have justified the early lockdowns in March and April of 2020, it is hard to understand how the support for lockdowns remained unwavering even in November-December of 2020, when the UK enacted strict lockdowns yet again.

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I was in Cambridge, USA in early 2020 teaching at Harvard Kennedy School. But once Harvard shut down its campus and all teaching moved online, I returned home to New Zealand and finished teaching remotely. Two things happened at this time that eventually led me to contemplate writing this book. First, one of my Harvard students asked me to talk about decision making in pandemics through the lens of some of the things we were studying. This led to the first of many articles I wrote at the time in the popular media.[7] Second, this article and the associated discussion led to my becoming a member of a loose group of academics called Covid Plan B, which started asking questions about the sagacity of the lockdowns that were being implemented

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[4] Gibson, J. (2020a). Government mandated lockdowns do not reduce Covid-19 deaths: Implications for evaluating the stringent New Zealand response. Forthcoming, *New Zealand Economic Papers* (In Press). doi:10.1080/00779954.2020.1844786.

[5] Meunier, T. A. (2020). Full lockdown policies in Western Europe countries have no evident impacts on the COVID-19 epidemic. *MedRxiv*. doi:https://doi.org/10.1101/2020.04.24.20078717. (Not peer reviewed at the time of writing.)

[6] Gibson, J. (2020b). Hard, not early: Putting the New Zealand Covid-19 response in context. Forthcoming, *New Zealand Economic Papers* (In Press). doi:10.1080/00779954.2020.1842796.

[7] Chaudhuri, A. (2020a). A different perspective on Covid-19. *Newsroom*, April 8, 2020.
https://www.newsroom.co.nz/ideasroom/2020/04/08/1119994/a-different-perspective-on-covid-19.

by countries around the world in an attempt to combat Covid-19. The reaction on social media to the questions being posed by Covid Plan B was swift and unpleasant; the calumny wide-spread.

But, as I engaged in this debate deeper, I began to understand that while there were big gaps in my understanding of epidemiology and public health issues, there were equally yawning gaps on the other side regarding basic economic and psychological concepts. Worldwide, there was tremendous emphasis on calling upon epidemiological expertise without an adequate appreciation that Covid-19 was not merely an epidemiological crisis; it was an economic, social and moral crisis that required multi-disciplinary expertise to assess and address different facets of the pandemic.

Covid Plan B was certainly not the only group of people asking questions; though we were clearly in a minority, which gained us some degree of fame or notoriety; mostly the latter. In any event, our arguments were not all that novel since many other scientists around the world were asking similar questions as well. In late 2020, some of these same people (including Jay Bhattacharya of Stanford, Sunetra Gupta of Oxford and Martin Kulldorff of Harvard) went on to publish the Great Barrington Declaration[8] opposing lockdowns, which in turn found strong opposition from the signatories of the John Snow Memorandum[9], that strongly advocated the continued use of lockdowns as a means of combating this disease.

We, at Covid Plan B (and a few members of the group were original signatories of the Great Barrington declaration) thought that the point we were making was quite intuitive: the lockdowns may be necessary or not, but regardless, the lockdowns came with an *opportunity cost*; as we diverted scarce resources from other uses toward fighting Covid-19, there will be losses elsewhere in the economy, in the form of lower gross domestic product, job losses, lowered life expectancy, loneliness due to reduced social interactions, inadequate treatment and screening of other diseases, delayed or abandoned vaccinations for children, mental health problems and self-harm, and adverse academic and social impacts on children shut in their homes and unable to go to school. To an economist like me, who is trained to look for such trade-offs, this seemed evident. But clearly, this was not obvious to everyone and the vilification people asking such questions

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[8] The declaration is so named since some of the original signatories gathered in Great Barrington, Massachusetts, USA. https://gbdeclaration.org/.

[9] In case you are wondering, this is not named after the character in "Game of Thrones". John Snow (1813 – 1858) was an English physician and is considered one of the founders of modern epidemiology. He is credited with the adoption of anaesthesia in surgeries as well as fundamental changes in the water and waste systems of London, which led to similar changes in other cities, and a significant improvement in general public health around the world. https://www.johnsnowmemo.com/.

experienced was unexpected, to say the least. We argued that in formulating policy, it was essential to consider the costs and benefits. What do we sacrifice by locking down? What do we sacrifice if we don't?

For instance, if tomorrow we all stopped driving (or shut down all heavy industries, which, after all, are the largest source of greenhouse gases), then this would lead to a massive reduction in pollution as well as pollution-related respiratory diseases. But no one seriously suggests this as an option. So, what we do is utilize tools such as carbon taxes or emissions trading permits to equate the social costs of pollution to the social benefits of driving or heavy industries. Factories or businesses that emit larger amounts of pollutants typically have to pay more than those who emit less. The ones who pollute more end up subsidizing those who pollute less. This provides an incentive for everyone to reduce as much of their pollution as possible till they equate the costs of pollution to the benefit from the pollution generating activities.

Our argument was based on the simple idea that, as humans, we tend to focus excessively on the losses we can see in front of us, but tend to ignore losses that are more diffuse and happen in a more dispersed manner in the background even if those latter losses are far larger. In attempting to combat the immediate losses right in front of us, we often divert resources to preventing those losses implying taking resources away from other areas leading to losses in the latter.

Lockdown proponents have often justified their support by making arguments about excess mortality; i.e., that there were many more deaths in 2020 than in other years (thereby defying historical trends) and this excess is due to the deaths resulting from Covid-19. This debate will continue for a while since it will take time before we have reliable data to accurately assess this. But evidence suggests that in numerous Western countries, excess mortality spiked **immediately after** the imposition of lockdowns. This could be explained via the standard epidemiological models , given a time-lag between the onset of infection and death. I will have more to say on this shortly. Alternately, it could be argued that some of these additional deaths were those denied proper treatment for other ailments. It does seem strangely coincidental that in most countries, the spike is happening virtually immediately after the imposition of lockdowns, which would require a very high degree of prescience on the parts of those respective governments.[10]

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[10] This is true of most Western countries like the UK, Spain, Belgium, the Netherlands and others. In each of these cases, the spike in deaths happened shortly after the imposition of lockdowns. Pospichal, J. (2020). Questions for lockdown apologists. *The Medium*, May 24, 2020. https://medium.com/@JohnPospichal/questions-for-lockdown-apologists-32a9bbf2e247.

For instance, on May 22, 2020, WHO announced that around the world, at least 80 million children under the age of one were at risk of diseases such as diphtheria, measles and polio as Covid-19 restrictions disrupted vaccination efforts[11], and on the same day, the New York Times wrote that the result of this disruption was going to lead to a surge in polio and measles.[12] In September 2020, The Telegraph of London reported that data from the UK's Office for National Statistics (ONS) shows:

> "…more than 6,700 extra deaths in homes across the UK in the past two months – of which just 203 involved coronavirus. The statistics show deaths from other causes are soaring, amid concern that millions of patients went untreated for killer diseases during lockdown. Among those under 65, the number of deaths caused by high blood pressure is up by one third, with the same rise seen in deaths caused by cardiac arrhythmias. Deaths from diabetes in this group have risen by one quarter. In older groups, deaths linked to high blood pressure rose by 15 per cent, while diabetes deaths were up by 14 per cent, the figures from May 8 to July 10 show."[13]

In late 2020, the International Monetary Fund predicted that the lockdowns and consequent job losses, coupled with the massive expansion of government spending in New Zealand, would imply that New Zealand's per capita GDP in 2025 will be lower than that in 2019.[14] This was not unique to New Zealand. During the second quarter of 2020 (April-June), India's GDP shrank by 25% and the UK's by 20%. In that same quarter, New Zealand's GDP shrunk by 12%, about the same as extremely hard-hit Italy. Both the drops for New Zealand and Italy were higher than the average for OECD countries.[15]

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[11] "At least 80 million children under one at risk of diseases such as diphtheria, measles and polio as COVID-19 disrupts routine vaccination efforts, warn Gavi, WHO and UNICEF." World Health Organization Press Release, May 22, 2020. https://www.who.int/news/item/22-05-2020-at-least-80-million-children-under-one-at-risk-of-diseases-such-as-diphtheria-measles-and-polio-as-covid-19-disrupts-routine-vaccination-efforts-warn-gavi-who-and-unicef.

[12] Hoffman, J. (2020). Polio and measles could surge after disruption of vaccine programs. *New York Times*, May 22, 2020. https://www.nytimes.com/2020/05/22/health/coronavirus-polio-measles-immunizations.html.

[13] Donnelly, L., & Gibert, D. (2020). Non-virus deaths at home behind surge in excess fatalities, figures show. *The Telegraph*, September 2, 2020. https://www.telegraph.co.uk/news/2020/09/02/patients-dying-home-causes-covid-19-fuelling-excess-uk-deaths/.

[14] Wilkinson, B. (2020). IMF's fiscal forecasts make for grim reading for New Zealand. *New Zealand Herald*, October 21, 2020. https://www.nzherald.co.nz/business/bryce-wilkinson-imfs-fiscal-forecasts-make-grim-reading-for-nz/JVUUSP2JUIJBGBTJGVTJTSHTRQ/

[15] OECD stands for Organization for Economic Cooperation and Development. Loosely, this is the group of rich countries of the world that include most of the industrialized nations of Western Europe along with others like Australia, Japan, New Zealand, South Korea and USA.

This is not to suggest that the lockdowns could not be of some value early on. At times, it was certainly the case that the lockdowns helped in recovery rates by "flattening the curve" and thereby reducing pressure on over-extended public health systems. But it is important to understand that even if one flattens the curve, the area under that curve remains unchanged, meaning that the total number of infections (or cases) will remain unchanged. All that flattening the curve achieves is that it pushes the timing of those infections to a date in the future. Furthermore, given the presence of the disease within the community and given the widely acknowledged asymptomatic transmission potential of Covid-19, it was inevitable that once the lockdowns were lifted, disease transmission would resume.

Nevertheless, one could conceivably make a case along the following lines: yes, lockdowns do impose costs elsewhere but unchecked community transmission of the disease would also lead to social and economic harm. So, it makes sense to lock-down temporarily, upgrade and bolster health facilities, particularly the ability to undertake contact tracing. If and when such upgrades to existing systems happen, there should be no need to continue to employ any further lockdowns in the future. What was not necessarily acknowledged was that this course of action may mean one of two things: either a lockdown of significant duration[16] or shorter lockdowns with periods of freedom but reinstatement of lockdowns once community transmission resumes. It seemed to me that there was an insufficient recognition of the fact that if and when governments tried to implement such repeated lockdowns, they were going to face massive protests and unrest among citizens.[17] It was also the case that the lockdown proponents were necessarily hanging their hat on the invention of a vaccine. But, they seemed to be severely over-estimating the probability of getting a vaccine in short order *and* that vaccine providing effective immunity not only from the current strain of SARS-CoV-2 but also from any future mutated form of the virus, which is common with coronaviruses. I will discuss this issue of over-estimating small probabilities in greater detail in Chapter 3.

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[16] Indeed, Neil Ferguson of Imperial College, London and his collaborators who undertook early mathematical modelling of Covid-19 transmission and deaths suggested that countries may need to implement some form of lockdown for extended periods of up to 18 months or 2 years in order to reduce the spread of the disease and to allow time for a vaccine to be produced. See Landler, M., & Castle, S. (2020). Behind the virus report that jarred the U.S. and the U.K. to action. *New York Times*, April 2, 2020.
https://www.nytimes.com/2020/03/17/world/europe/coronavirus-imperial-college-johnson.html.

[17] Henley, J. (2020). Latest coronavirus lockdowns spark protest around Europe. *The Guardian*, November 2, 2020.
https://www.theguardian.com/world/2020/nov/02/latest-coronavirus-lockdowns-spark-protests-across-europe.

How unique is SARS-CoV-2?

SARS-CoV-2 is the name of the virus that causes the respiratory disease Covid-19. Could it be that SARS-CoV-2 (or Covid-19) was, in the words of Nassim Nicholas Taleb, a "black swan" event? A highly unlikely event that still came to pass and if left unchecked, community transmission will ravage communities? This possibility is worth considering. As Tyler Cowen of George Mason pointed out, at the end of the probabilistic computations and mathematical modelling, the question came down to: whether we were "base-raters" or "exponential growthers"; whether we took the view that the trajectory of Covid-19 will follow that of other coronavirus-caused diseases such as Severe Acute Respiratory Syndrome (SARS) or Middle Eastern Respiratory Syndrome (MERS). This would be the "base-rate" view, which says that we can be reasonably certain how Covid-19 will play out since we can rely on the evidence from the prior coronavirus outbreaks. I will explain in the following pages in more detail about the idea of "base rates". The "exponential growth" view argues that, on the contrary, this is indeed a "black swan" event and the old rule-book does not apply.[18]

In her article "Why Did The World Shut Down For COVID-19 But Not Ebola, SARS Or Swine Flu?", Kaleigh Rogers of FiveThirtyEight expanded on this "black swan" view of Covid-19.[19] The argument is that while those other diseases may be far more deadly, they are not as contagious as Covid-19. Covid-19 spreads more quickly, particularly given its potential for asymptomatic transmission, and can be deadly for a large number of people who contract the disease and even otherwise has the potential to quickly overwhelm public health facilities. This is what makes social (physical) distancing essential. (In what follows I will often use the terms "social distancing" and "physical distancing" as synonymous.) At the expense of reiterating my points, remember that social distancing does not eradicate the disease. It simply keeps it suppressed for it to reappear in the future. The necessity of social distancing is also predicated on other assumptions that I address at various points in the book. A key incorrect assumption is that even when faced with a deadly pathogen, human beings will go about their business as usual and not adopt any preventive measures unless compelled by the authorities to do so. As I hope to convince you in the following pages, this view is misguided. As I will also show you, the support for social

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[18] Cowen, T. (2020). Bill Gates is really worried about the coronavirus: Here's why. *Bloomberg*, March 4, 2020. https://www.bloomberg.com/opinion/articles/2020-03-03/how-fast-will-the-new-coronavirus-spread-two-sides-of-the-debate.

[19] Rogers, K. (2020). Why did the world shut down for COVID-19 but not Ebola, SARS or swine flu?. *FiveThirtyEight*, April 14, 2020. https://fivethirtyeight.com/features/why-did-the-world-shut-down-for-covid-19-but-not-ebola-sars-or-swine-flu/.

distancing was based on mistaken assumptions of how long the lockdowns needed to be and the probability of quickly finding an effective vaccine and distributing it around the world. I will address the comparative contagiousness issue in the last chapter.

I felt reasonably confident that the "base-rate" view or something close to it was true. This was because the early estimates by WHO suggested that Covid-19 had a *case fatality ratio* (CFR) of 3.4%. (This compares with a CFR of about 50% for MERS and about 35% for SARS.) This means that out of every 100 people who contracted the disease, around 3.5 would die, or 7 out of every 200 people who caught Covid-19 would die. This is a reasonably high probability. But the difficulty with this measure is that here, the denominator is the number of known cases. Let us say that we know of 200 cases, and of those, 7 died. But suppose there are another 500 people who also contracted the disease and did not die, but we were not aware of those other 500 since they did not show any symptoms or were never tested. Now, we have 700 people who have or have had Covid-19; we know about 200 of these but do not know about the other 500. Of these, 7 people died. In this case, the actual ratio (or to use jargon, the *infection fatality ratio* or IFR) becomes 7 out of 700, or 1 in 100, which is about a third of the CFR of 3.5 out of every 100. So, what we really care about is not the *case fatality ratio* (CFR), but rather, the *infection fatality ratio* (IFR); how many people contracted Covid-19 and how many of those died?

To answer this latter question, we needed to carry out serological tests for Covid-19 antibodies to see what proportion of a particular population may have been infected (without having been tested) and what proportion died. By September 2020, the US Centre for Disease Control and Prevention (CDC) had downgraded this ratio, the IFR, to 0.65% with a range of 0.2% (2 out of 1000) to 0.8% (8 out of 1000).[20] This means that out of every 100 people who contracted Covid-19, less than 1 person will die. Since 0.65 of a person does not make sense, a better way to think of this is that 1 out of 153 (or 6.5, say 7, out of 1000) people will die. To put this differently, and I will show you soon that the way an issue is framed makes a huge difference, this means that out of 153 people who contract Covid-19, 152 will survive. Out of 1000 people who contract Covid-19, 993 will be okay.[21] People may well disagree as to whether this is a large or small number,

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[20] Readers should bear in mind that like any other average, this number masks variances among different age groups. The mortality risk of people over 70 or 80 is much higher, say 1 in 100; and the mortality risk of those in that age group with other underlying health conditions is even higher, say 1 in 20. But conversely, the mortality risk of the younger is much lower. For those below 40, it may be as low as 1 in 1000. These are approximate numbers but generally representative of what we know about Covid-19 mortality. This data was available from a number of sources including the US CDC website by the at least August-September of 2020 if not earlier

[21] At the time of writing, there is controversy about the long-term neurological effects of Covid-19. There is no conclusive evidence regarding this since other either virus- or bacteria-borne respiratory diseases such as pneumonia

but the fact is that this is much less than 7 in 200, and a risk of 1 in 153 is not dramatically different from many of the risks we take in our day to day lives. For instance, as John Ioannidis of Stanford and his collaborators have pointed out (and I will have more to say on this in a later chapter), this risk is comparable to driving between 13 and 101 miles per day across a number of countries or across many states in the US. I doubt I need to mention that a vast majority of people routinely drive long distances to and from work every day.

But nevertheless, I was still quite willing to concede that those who were calling for lockdowns may have a point. But to an economist like me, it seemed that the actual policy choice must depend on a consideration of the trade-offs. What are the potential number of deaths from Covid-19? What are the potential number of deaths that may result from locking down? Or in other words, how many lives will we lose to Covid-19? Alternately, how many lives will we lose elsewhere in trying to prevent the loss of lives from Covid-19? There is no denying that once the Covid-19 virus started spreading, it was going to cause output and employment around the world to drop. But, it was clear that for the countries that enacted stringent lockdowns, the drop would be much larger. So, these countries would suffer additional damage due to the severe restrictions on economic activity over and above any damage they may have suffered from the virus. It is well-known that declining output and employment lead to not only a loss of livelihoods but to a loss of lives as well. E.g., it is well known that unemployment leads to decreased life expectancy. According to a 2018 report by the Associated Press, "An increase of 10 percentage points in the unemployment rate in a neighborhood translated to a loss of roughly a year and a half of life expectancy".[22]

But the response to questions about the potential costs and benefits was along the following lines: How can you be so crass as to put a dollar value on human lives? In fact, New Zealand's Minister for Health and Education at the time said the same thing: "Generally it's not something we would do. We don't put a dollar value on people's lives.".[23] But we do! All the time! This is what every tort lawyer who sues for wrongful death does: ask for financial reparation for the lives lost. If a man in his 40s, a non-smoker, in good health, with a high income and two young

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can also cause similar damage. It is possible that in future, the infection consequences of Covid-19 may need to be reassessed. I will re-visit this debate in the last chapter.

[22] Forster, N. (2018). Unemployment, income affect life expectancy. *Associated Press*, December 15, 2018. https://apnews.com/article/ea3be7fb82bf4bec90a00d75957f833b.

[23] MacNamara, K. (2020b). Can we put a cost on a human life? *New Zealand Herald*, September 14, 2020. https://www.nzherald.co.nz/business/kate-macnamara-can-we-put-a-cost-on-a-human-life/AP7GDUZRSHVNXFG723OTA2ECQ4/.

kids died in a car crash tomorrow and it could be ascertained beyond doubt that this was due to an equipment malfunction (the air-bag did not inflate), it is highly likely that this man's family will be awarded much greater damages than the family of a sixty-year-old with no children and a long history of smoking and health complications such as obesity and diabetes. This is what actuaries and insurance companies do: set a price on how much a life is worth. In fact, even the Ministry of Health in New Zealand has detailed guidelines on the value of a life, which guides policy making on, say, which drugs should be funded by the country's public health system and which should not.

> My former colleague Martin Berka wrote at the time:
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> "We rightfully feel repulsed by the notion of putting a price tag on life. But every government uses estimates of a "value of statistical life" in designing its health care policies and decisions about which life-saving drugs to fund. There are hundreds of such estimates in the academic and policy literature. For example, the US Environmental Protection Agency uses a value estimate of around US$10 million per life, the Australian government indicates A$3.5 million, and the European Commission estimates €1-2 million. If we assume value of statistical life of NZ$5 million (similar to the estimates in this report for the New Zealand Fire Service Commission), a back-of-the-envelope calculation suggests the policies in the tougher Treasury scenario outlined above – of staying at level 4 lockdown for six months – would need to save at least 16,800 lives, statistically speaking, to have been worth it. These unpalatable "trade-offs" are nevertheless what government officials consider when deciding when to open up the economy, aware that moving to level 3 will likely cost lives."[24]

By November 2020, New Zealand had experienced only 25 deaths or 5 deaths per million. According to Our World in Data's Covid-19 pandemic page[25], Japan, without much of a lockdown, had reported 15 deaths per million while suffering far less economically. It is impossible to compare across countries, but I felt that it was reasonable to ask that policy decisions be made on the basis of weighing up the alternatives. For instance, suppose we did what Japan did. Given a

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[24] Berka, M. (2020). Protecting lives and livelihoods: The data on why New Zealand should relax its coronavirus lockdown from Thursday. *The Conversation*, April 17. 2020. https://theconversation.com/protecting-lives-and-livelihoods-the-data-on-why-new-zealand-should-relax-its-coronavirus-lockdown-from-thursday-136242. In New Zealand, level 4 implied the most stringent form of lockdown with everything other than essential services shut. Level 3 allowed for greater economic activity; for instance, industries that could safely distance workers such as construction were allowed. Restaurants could open for take-out service. There was also greater freedom of movement in terms of people being allowed to socialize outside of their bubble.

[25] https://ourworldindata.org/coronavirus. Founder and Director: Max Roser.

population of 5 million, this would mean approximately 75 deaths in New Zealand from Covid-19 but far fewer deaths from non-Covid-related causes. What if the total non-Covid-related deaths from locking down far exceeded the Covid-19 deaths prevented? Would this still be a worthwhile trade-off? It turned out, I was completely mistaken that people will pay attention to such questions. The approach was: *We will minimize the loss of lives from Covid-19 regardless of the cost.* In most cases, no cost benefit analyses were undertaken[26], and when they were, it appeared that the cost of the lockdowns far exceeded any potential benefits[27], at times by large magnitudes.[28]

I hasten to reiterate that while many of my citations come from New Zealand, it is not the case that this lack of cost-benefit calculations was confined to my country. This was true of most other countries as well, where epidemiological experts kept insisting on locking down regardless of the potential cost with this insistence on disregarding the opportunity cost becoming embarrassing at times.[29] The use of New Zealand as a case study is also justified since the country was lauded around the world for its success.[30]

What was also striking was the uniformity of the response across the world in terms of the measures implemented. With the exception of Sweden, Japan, Iceland and Taiwan, which imposed fairly minimal restrictions, the vast majority of countries moved to impose strict lockdowns. These included rich countries and poor, advanced countries and backward ones, landlocked countries and islands. What was striking was the degree of "mimicry" in the extent to which countries followed one another in imposing such lockdowns. According to a group of Swedish researchers, 4 out of 5 countries in the Organization for Economic Cooperation and Development (OECD) adopted very similar measures within a period of two weeks in March 2020. Needless to mention,

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[26] MacNamara, K. (2020a). Why productivity at the Productivity Commission seems to be a low ebb. *New Zealand Herald*, September 11, 2020. https://www.nzherald.co.nz/business/kate-macnamara-why-productivity-at-the-productivity-commission-seems-to-be-at-a-low-ebb/XR7PNKKLTZ5N4FV7YMUOHKO3R4/.

[27] Miles, D., Stedman, M., & Heald, A. (2020). Living with Covid-19: Balancing costs against benefits in the face of the virus. *National Institute Economic Review*, 253, R60-R76. doi:https://doi.org/10.1017/nie.2020.30. Published online by Cambridge University Press: 28 July 2020.

[28] Heatley, D. (2020). *A cost benefit analysis of 5 extra days at COVID-19 alert level 4* (Research Note 2020/02). New Zealand Productivity Commission. https://www.productivity.govt.nz/research/cost-benefit-analysis-covid-alert-4/.

[29] E.g., see interview of Professor Gabriel Scally of Independent SAGE (a strong proponent of a nation-wide lockdown in England in November 2020) with Maajid Nawaz. https://www.lbc.co.uk/radio/presenters/maajid-nawaz/epidemiologist-on-cost-of-second-lockdown-coronavirus/. Maajid Nawaz hosts a radio show on LBC (formerly London Broadcasting Corporation), a London-based national phone-in and talk radio station.

[30] In awe of NZ: How world media reacted to New Zealand eliminating Covid-19. New Zealand Herald, June 9, 2020. (No byline). https://www.nzherald.co.nz/nz/in-awe-of-nz-how-world-media-reacted-to-new-zealand-eliminating-covid-19/MMOWHK3HHQCYU3TWV7G3TSJJK4/.

developing countries that rely on the developed ones for guidance in terms of science and policy soon followed suit. According to this group of researchers:

> "Given the heterogeneity among these countries in terms of the preparedness of their health care systems, their population demography, and the degree to which the pandemic had taken hold in each country at this time, the homogeneity in timing of adoption is striking."[31]

As the process played out across the world, it got to a point where even questioning the efficacy and rationale of lockdowns were tantamount to heresy and people who did so were dismissed as being "contrarian"[32] or offering "fringe" viewpoints.[33] There was scant recognition of the fact that those opposing lockdowns were not saying that the Covid-19 threat should be minimized or that we should do nothing to fight it. Rather, they were simply pointing out that locking down whole countries in order to fight a virus that had a more than 99% recovery rate[34] was overkill. If we consider an IFR of 0.2% (the lower limit of CDC estimates), then the recovery rate is 99.8%, while if we take the upper limit of 0.8%, then the recovery rate is 99.2%.[35]

In the meantime, what was not reported as widely is that a New Zealand High Court ruled that the first nine days of the country's lockdown was "unlawful" but "justified". Exactly how something that is "unlawful" can be "justified" was not clarified, and in any event, the public was happy and no one asked too many questions.[36] Two legal experts wrote at the time, that the lockdown:

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[31] Sebhatu, A., Wennberg, K., Arora-Jonsson, S., & Lindberg, S. (2020). Explaining the homogeneous diffusion of Covid-19 nonpharmaceutical interventions across heterogenous countries. *Proceedings of the National Academy of Sciences*, *117*(35), 21201-21208.

[32] Daaldar, M. (2020). "Contrarian" academics oppose lockdown. *Newsroom*, April 14, 2020. https://www.newsroom.co.nz/contrarian-academics-oppose-nz-lockdown.

[33] Sample, S. (2020). Why herd immunity strategy is regarded as fringe viewpoint. *The Guardian*, October 7, 2020. https://www.theguardian.com/world/2020/oct/07/why-herd-immunity-strategy-is-regarded-as-fringe-viewpoint.

[34] Coronavirus recovery. WebMD. The website states: "Scientists and researchers are constantly tracking infections and recoveries. But they have data only on confirmed cases, so they can't count people who don't get COVID-19 tests. Experts also don't have information about the outcome of every infection. However, early estimates predict that the overall COVID-19 recovery rate is between 97% and 99.75%." WebMD has been accused of being funded by big pharma, and hence, may or may not be a credible source of information. In this case though, one would expect WebMD to suggest lower recovery rates, thereby creating greater urgency for vaccines and other medicines. In any event, the main point here is that the recovery rates for Coronavirus are high. https://www.webmd.com/lung/covid-recovery-overview#1.

[35] Katz, D. L. (2020). Is our fight against coronavirus worse than the disease? *New York Times*, March 20, 2020. https://www.nytimes.com/2020/03/20/opinion/coronavirus-pandemic-social-distancing.html.

[36] Nightingale, M. (2020). Coronavirus lockdown unlawful for first nine days high court finds but says action was justified. *New Zealand Herald*, August 19, 2020. https://www.nzherald.co.nz/nz/covid-19-coronavirus-lockdown-

"…imposes the most extensive restrictions on New Zealanders' lives seen for at least 70 years; perhaps ever. No matter how 'necessary' these may be, we should expect such restrictions to have a clear, certain basis in law and be imposed through a transparent and accountable process."[37]

New Zealand's left-of-center government brushed off such questions, including requests under the Official Information Act, ostensibly on the grounds that the government enjoyed public support and therefore there was no need to engage with anyone offering contrarian views. The New Zealand Ombudsman Peter Boshier commented that he was "horrified" to learn that in the aftermath of the pandemic, the government had considered suspending the Official Information Act, before backing down.[38]

Soon after, the government passed "under urgency" the Covid-19 Public Health Response Bill. According to one report: "the bill went through Parliament in less than two days and with no select committee hearings (and) grants police warrantless entry to premises if they reasonably believe virus-related orders are being breached." In doing this, the government had broad support across the political spectrum, including the main right-of-center opposition.[39]

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The limitations of epidemiological models

As Covid-19 spread through the world, we were repeatedly told to trust the science and the experts. The experts in this case were epidemiologists whose job is to model how infectious diseases propagate through the population. The problem with this view is two-fold. First, at the end of the day, some of the questions involved are not ones that epidemiologists could feasibly answer. This issue was raised recently by the New York Times columnist Ross Douthat.[40] For instance, suppose an epidemiologist says that the infection fatality ratio is 7 out of 1000. It is now a job for our

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unlawful-for-first-nine-days-high-court-finds-but-says-action-was-justified/AI2WQ3PZ5QYEWUYGSTS3MNKE6Q/.

[37] Geddis, A., & Geiringer, C. (2020). The legal basis for the lockdown may not be as solid as we've been led to believe. *The Spinoff*. https://thespinoff.co.nz/covid-19/28-04-2020/the-legal-basis-for-the-lockdown-may-not-be-as-solid-as-weve-been-led-to-believe/.

[38] Sachdeva, S. (2020a). Coronavirus: Officials pitched OIA suspension during Covid-19 lockdown. *Newsroom*, April 24, 2020. https://www.stuff.co.nz/national/politics/121237698/coronavirus-officials-pitched-oia-suspension-during-covid19-lockdown.

[39] Sachdeva, S. (2020b). Covid-19 powers approved under urgency. *Newsroom*, May 13, 2020. https://www.newsroom.co.nz/2020/05/13/1171049/covid-19-powers-approved-under-urgency.

[40] Douthat, R. (2020). When you can't just "trust the science". *New York Times*, December 19, 2020. https://www.nytimes.com/2020/12/19/opinion/sunday/coronavirus-science.html.

elected representatives to figure out what to do with this number. Is this high or low? How does it compare to other risks that we face in our day to day lives?[41] What and how much are we willing to sacrifice to reduce this number further, knowing fully well that it is impossible to get this number down to zero; that the number does not need to be driven down to zero; that it is costly to try and drive this risk down and that those costs rise exponentially as we try?[42]

Second, the epidemiological models that were being used to predict rates of infection or mortality rates were seriously incomplete. People undertaking mathematical models of disease propagation, such as Neil Ferguson of Imperial College, are primarily relying on the SIR model proposed by William Kermack and Anderson McKendrick in 1927. SIR stands for "susceptible", "infected" and "recovered" (where in the earliest formulation, "recovered" could mean "recovered live or dead"). In some cases, people refer to a SIRD model where the "R" is for recovered and "D" is for dead. One assumption here is that "recovered" is an "absorptive" state; once someone has recovered, he/she is immune.[43]

At the risk of gross simplification, here is how these models operate. On day one, you have a population of people who are all susceptible to a disease. These people then go about their lives. On day two, a proportion of these people become infected, while others do not. Some of the infected recover, while others die. But those who are infected go on to infect others, and so the disease propagates within the community. Over time, the proportion of those who are susceptible decreases, and the proportion of those who are infected (and either recovered or died) increases.

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[41] I recently had an extended debate with a colleague who is an internationally renowned scientist. He is very much in favor of lockdowns since he believes that the cost of community infection is very high and he obviously assigns a large probability to the risk of Covid-19 getting out into the community. So, when it comes to Covid-19, he appears to be extremely risk-averse; yet, his passion is rock climbing, an inherently risky sport! Clearly there is some cognitive dissonance here, where he is risk averse in one sphere and risk loving in another. My point is that these are no longer epidemiological questions, but rather, relates to intrinsic individual and social preferences that lie beyond the expertise of epidemiologists.

[42] According to an October 2020 report from the Imperial College London, there is a striking difference in the mortality rates between high-income countries with generally older populations and low-income countries where the population tends to skew younger. The underlying risk may be as high as 1% (1 in 100) in richer countries with older populations but as low as 0.2% or 2 in 1000 among low-income countries where the median age is much lower. https://www.imperial.ac.uk/news/207273/covid-19-deaths-infection-fatality-ratio-about/. So, even if it makes sense to enact stringent lockdowns in high-income countries, does it make so in low-income ones? In low-income countries, there are myriad other easily preventable diseases that claim more lives than Covid-19. Many of these such as Malaria, Dengue or Cholera claim the lives of many children and young. Should these countries be devoting scarce resources to fight Covid-19 when these resources could be used to fight other diseases? These are no longer questions for epidemiologists but pose significant moral and ethical debates.

[43] This assumption is currently up for debate. A recent (non-peer reviewed study from New Zealand) suggests that certain antibodies against Covid-19 stay in the blood for up to 8 months following mild to moderate infection. Whitcombe, A. et al. (2020). Comprehensive analysis of SARS-CoV-2 antibody dynamics in New Zealand. *MedRxiv*. doi:https://doi.org/10.1101/2020.12.10.20246751.

The process continues till a large enough proportion of the population is infected and the disease cannot find any new hosts. When this happens, we say that the population has acquired "herd immunity". But models like these depend crucially on assumptions. What is the reproduction rate; meaning how quickly does the infection spread? How frequently are people meeting each other and what is the probability that any meeting between an infected and a non-infected person will result in the latter being infected? And so on.

So far so good; the problem starts with the fact that in the SIR model, these probabilities are considered fixed. So the rate at which people get infected or the rate at which they recover is unchanging over time. But this is not quite accurate. As people get to hear about the disease and change their behavior to some extent, as some wear masks, some self-isolate, some wash their hands more frequently, some work from home, some stay away from visiting elderly relatives, the probabilities change continually.

Now, even if you make appropriate adjustments to the probabilities, most SIR models were essentially comparing two binary benchmarks: locking down or letting it rip. But in reality, we have a continuum of choices available. In order to accommodate those choices, one needs more elaborate models; models that incorporate theories of human decision making into the standard SIR models. Once we do that, the limitations of the simplistic lockdown approach becomes obvious. A number of people have undertaken such comparisons to show that when one accounts for a variety of intermediate interventions, the outcomes are far better than either complete lockdown or complete lack of intervention.

A group led by Martin Eichenbaum at Northwestern University were one of the early ones undertaking such work. By their very nature, this type of work tends to be quite mathematical, and therefore, complex. So, I am going to try and provide a sketch of the underlying ideas. Here is where models incorporating human decision-making start to deviate from standard SIR models. Even though people understand the health risks associated with market activity, behavior in pandemics generate a collective action problem much like pollution. Collectively, we are all better off if we all stay home, but if everyone else stays home, then it does not make a big difference if one person goes out and about in order to engage in social and/or commercial activities. But this person's activities actually increases the risk of infection for everyone else. But, if it is individually rational for one person to do so, then it must be individually rational for everyone else to do so as well. In this case, we get unabated infection transmission.

So, the primary focus of policy needs to be on reducing this negative externality of individual behavior. Most governments have proceeded as if the only way to do so is to implement

lockdowns. The problem of course is that these lockdowns may need to be long lasting and cause significant economic damage.

Eichenbaum and colleagues suggest that one natural intermediate step is testing people for their health status and then quarantining the infected. At any point in time, the population consists of people who are either infected or not. But the problem is that neither the government nor the people themselves know for sure who is infected and who is not. Those who are already infected have less of an incentive to remove themselves from the population compared to those who are not infected and therefore susceptible.

Now suppose that test results are used to implement the following simple-quarantine policy: infected people are not allowed to work and receive temporary benefits from government but they are allowed to engage in non-economic social interactions. Eichenbaum and colleagues refer to these policies as "smart containment". One could go a step farther and have "strict containment" which restricts infected people from non-economic social interactions too.

These are mere examples and there may be other options. The point to note is that Eichenbaum and his colleagues show that such selective containment techniques do much better on the aggregate compared to either indiscriminate lockdowns or no intervention at all. Countries like Taiwan and South Korea followed policies along these lines based on rapid testing and contact tracing. Like all models, the Eichenbaum et al. approach has drawbacks. Their results also depend crucially on assumptions underlying different values. But the big advantage to their model is that they are a step ahead of the more simplistic SIR models since they embed models of human behavior within the SIR framework.

One major conclusion from Eichenbaum et al.'s work is that the returns to improving testing and contact tracing abilities are massive. It is also the case that work such as this or that carried out recently by V.V. Chari of Minnesota and colleagues are providing nuanced and sophisticated alternatives to lockdowns that go a long way towards total harm minimization without having to resort to indiscriminate lockdowns.[44]

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[44] In New Zealand, early in 2020, Sam Morgan, the founder of Trade Me (New Zealand's version of eBay) suggested something along these lines when he recommended that the government invest resources in rapidly developing blue-tooth enabled Covid Cards that would make it a lot easier to undertake contact tracing. However, this did not happen. In September 2020, Morgan stepped down from the government's Covid-19 response team and expressed frustration at the lack of action in this area. The Minister in charge at that point commented that mandatory Covid Cards of this type would be "the last resort". It was not quite clear why indiscriminate lockdowns were considered acceptable but universal Covid Cards a bridge too far by the government. See Pullar-Strecker, T. (2020). Sam Morgan gives up on CovidCard in frustration with Ministry of Health. *Stuff*, September 1, 2020.
https://www.stuff.co.nz/business/122626522/sam-morgan-gives-up-on-covidcard-in-frustration-with-ministry-of-health.

This type of analysis is based on the recognition of trade-offs and opportunity cost; yes Covid-19 is a threat that needs to be dealt with. But focusing on this exclusively and diverting all our physical, human and cognitive resources to tackling Covid-19 means that we would necessarily have to take those resources away from alternative uses. Surprisingly, or maybe not surprisingly, while making this argument was often tantamount to heresy in many places, this was not the case in and around economists. Economists as a clan may have their flaws, but trade-offs, scarcity and opportunity costs are their bread-and-butter. Economists realize that resources are finite and devoting them to one area means taking them away from another; so even when economists disagreed on policy prescriptions or in their risk assessments of how deadly Covid-19 was (some were "base-raters" while others were "exponential growthers"), by and large they all conceded the opportunity cost argument; they all appreciated the distinction between identified lives and statistical lives.

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Finally, a discerning reader will be well within his or her rights to ask: It is easy for you to pontificate at length. If you are so opposed to lockdowns, then what would you have done, while making decision in the midst of the whirlwind. My response is two-fold. First, as noted above, my position is based on minimizing total costs. It might take time and resources to get effective contact tracing systems in place; though I note that Taiwan and South Korea seem to have achieved this quite expeditiously. My reading of the evidence suggested that most countries around the world could have responded with restrictions on large gatherings, along with good hygiene and mask wearing. This strategy seems to have succeeded quite well for Japan, which, of course, like Taiwan, has the benefit of being an island. This would have almost certainly meant more lives lost to Covid-19 in some countries, but the total cost in terms of lives lost to Covid-19 plus lives and livelihoods lost to other causes would have been the smallest. I wrote this in April 2020 and so this is not based on hind-sight.[45]

My second response is that I was more open to lockdowns than might appear. All I wanted was for someone to crunch the numbers and show me when the net benefit of such policies exceeded the cost; under what assumptions? Why was there such insistence on two binary options: lockdown or let it rip? Why was there such little willingness to concede that there is a continuum of responses and that it makes sense to examine which one is better in a particular context? Is the optimal response for islands like Japan and New Zealand the same as that for land-locked countries

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[45] Chaudhuri, A. (2020a). A different perspective on Covid-19. *Newsroom*, April 8, 2020.
https://www.newsroom.co.nz/ideasroom/2020/04/08/1119994/a-different-perspective-on-covid-19.

like Switzerland or other European countries with open land borders and a high degree of mobility among residents? Is the optimal policy the same for high-income and low-income countries? Should developing countries like India, Pakistan or Bangladesh, with a younger population on average and no effective social safety net implement similar lockdowns like the more developed countries? Why did lockdowns receive so much support from across the political spectrum, from liberals to conservatives, from policy makers to members of the public? This is what I intend to explore in this book. But along the way, I need to tell some stories and build a scaffolding in order to show how decision-making biases influenced our response to Covid-19.

No one expects governments to get this exactly right. But one does expect moderation. When the potential costs of a particular policy grossly exceed the potential benefits, one expects course correction, not the continued single-minded pursuit of the same misguided policy. Such cost benefit analysis is part and parcel of all policy making. When doctors decide who on the waiting list gets the next available kidney, they are much more likely to give it to a 35-year-old mother of two than a 55-year-old with grown children and a long-term history of smoking. We do this when we decide which of many potential life-saving drugs to fund and which ones not, based on expected costs and expected benefits. This is not a difficult calculation and the few undertaken suggest that the costs of the lockdowns exceed the benefits. But, the problem was, anyone who dared ask the question needed his or her own security detail.

But these questions need to be asked. Are lockdowns the panacea they have been made out to be? Why the uniformity in response across countries with very different circumstances and demographics? If the benefits do outweigh the costs, then why the reluctance to undertake such cost benefit analysis? Why not crunch the numbers? Why not convince the skeptics? Why shut down all such questions as being heretical and such questioners as being delusional fanatics? That does not seem appropriate to me. Does it to you? If it does, then this book is not for you. You would do well to bail now before the pillars underpinning your beliefs start to shake and rattle. For the rest of you intrepid souls who may be willing to engage in debate or are up for having some predispositions questioned and probed, why don't we get started?