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Cullerne Bown, William

Independent

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Thresholds of unhealthiness: Governing in the time of COVID-19

William Cullerne Bown†

COVID-19 has left many governments facing questions of priority for which there is no obvious conceptual framework. When questions of politics, economics and health are so intertwined that one cannot be properly discussed without the others then neither political economy nor public health offer an adequate basis. Here I draw on principles of measurement to distil from epidemiology and economics the foundational concepts required in the current circumstances for governing. For governments determined to control their epidemic, I conclude they cannot avoid subordinating all other principles to a threshold of unhealthiness, and that these thresholds can be ordered. A corollary is a new and enduring uncertainty in all questions of policy. I illustrate different thresholds with examples from the United Kingdom, Hong Kong and New Zealand.

Keywords: COVID-19, Political economy, Public health, Measurement, Utility function, Pandemic, Epidemic, Epidemiology, United Kingdom, Hong Kong, New Zealand

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In their influential analysis of options for governments facing COVID-19, the Imperial College public health team outlined a strategy of *suppression* (Ferguson et al., 2020). Suppression “aims to reverse epidemic growth, reducing case numbers to low levels and maintaining that situation indefinitely.” It thus combines a response to an incipient epidemic with a prescription for its ongoing management, a conflation which from a purely analytical perspective is unhelpful.

Focussing solely on the first aspect and remembering the context in the UK when Ferguson et al were writing, we can define the concept of *domination*. A country is capable of dominating its epidemic if it can reverse epidemic growth, reducing case numbers to low levels even when: i) the disease has become so widespread that its locality cannot be defined; ii) tracking and tracing individual cases has become impractical; and iii) the proportion of the population with immunity is very small. That is, even from a very challenging starting point the reproduction number, R_t , has to be pushed below 1 and kept there for a sustained period of weeks or months.

The concept of domination is helpful because it defines the minimum capacity that a state requires in order to be sure of being able to take control of its epidemic. Many countries have now demonstrated it but it is not necessarily permanent. Exhaustion – of economic resources, of a public willing to comply with intrusive control measures (currently limited to non-pharmaceutical forms of intervention, NPIs) or of political will – may lead to its collapse. There are fears that many poor countries lack this capacity from the outset (Goldin, 2020).

Domination marks a fundamental shift in the character of an epidemic. It has been tamed and ceases to be a natural phenomenon like the weather that we must simply endure. The natural force itself becomes a problem to be managed. The need for management continues until some reasonable degree of herd immunity is achieved so that outbreaks become self-limiting. Most likely this means waiting for either a vaccine or a sufficient number of people to become infected, acquire immunity and retain it.

In the current circumstances, the need for management could last for many years. If we assume a basic reproduction number, R_0 , of 3, the mid-point of the range recently allowed for in the European context by Flaxman et al, then herd immunity arises when two thirds of the population have acquired immunity. In the UK, as at 28 March, just 2.7 per cent of the UK population had been infected (Flaxman et al., 2020).

The characteristics of the virus itself, the physical and social environment in which it is transmitted, the resources of the state and the quality of technology available all make a material difference to the challenge facing the government. Nonetheless, whenever the virus should spring back and begin to spread through the country, the government of a domination-capable country has the capacity to contain and then diminish the epidemic. Ultimately, if it chooses to seal its borders and keeps R_t below 1, then a country will eventually eliminate the virus, as New Zealand recently has (“Coronavirus ‘currently eliminated’ in New Zealand,” 2020). Mortality ceases to be in essence a consequence of a natural phenomenon and becomes dependant also on choices made in government.

Since there are competing policy goals, most obviously for “healthiness” and restoring social and economic “normality”, the key question at the policy level is how the competing demands are to be reconciled. The basis for such decisions we can call a *paradigm*. In the second part of the idea of suppression, Ferguson et al set out one paradigm: after reducing case numbers to low levels, the government commits to “maintaining that situation indefinitely”.

Although a much overused word, paradigm is the right one precisely because it is so slippery. The paradigm might be explicitly articulated by a government, denied or buried. It might be steady, changeable or even whimsical. It might be disputed, including by the very people who are supposed to be coordinating the government’s policies. It might lurk in the subconscious and only be discernible to historians many years later. Despite all this, since choices between policies are made all the time, we can say that a paradigm of some kind certainly exists. In political unions with several component parts – as in the states of the United States, the members of the European Union or the nations of the United Kingdom –

there may be a variety of bodies at both the supreme and component levels that adopt distinct paradigms.

Thanks to its powerful political and economic implications this paradigm cannot be conceived as one of public health. But its consequences for mortality, and the way it affects the distribution of the risk of mortality across different subpopulations, means it also is not contained within the concept of political economy. We have entered a novel period in which the central question of government, the choice of paradigm, is intrinsically three-pronged – one of politics, economics and health. The corresponding scholarly discipline does not exist, there are no journals.

What are the possible paradigms? In particular, to get a grip on all that slipperiness, can we establish a quantitative formalisation of the current situation that allows us to enumerate the possible paradigms that are in some sense cogent? The basic need is to be able to identify some policies as better than others, which implies we should draw on concepts of measurement.

Let us restrict our attention to the simplest case with two goals. One goal is the reduction in infection and mortality from the epidemic, which we can contemplate measuring along a scale of unhealthiness. Most simply this would count the number of deaths each day from the virus. The other goal is harder to pin down in a way that would make sense to a government. We can say “economic activity” and make that notion precise but it’s clearly not just economic activity that concerns us. It is also, for example, the ability of people to simply enjoy their daily lives. This points up the inadequacy of the two-goal scenario.

Still, let us stick with unhealthiness vs economic activity for now as we cannot hope to resolve more complex scenarios if we cannot handle the simplest one. Then a kind of paradigm, loosely defined for now and expressed in words, intended to reflect a sentiment often expressed by politicians, is Economy First (EF). In order to restore economic activity quickly, the government relaxes non-pharmaceutical interventions to an extent constrained only by the level of infection that the healthcare system can reasonably handle. R_t , will vary,

with interventions bringing it down whenever the epidemic appears to be getting out of control.

Hong Kong suggests another paradigm. A feature of its response to the epidemic is that it has never allowed its individual outbreaks to run out of control. At the same time, it has not sought to eliminate either community transmission or imported cases, instead maintaining R_t at about 1. (Cowling et al., 2020) This can be described as a Health First approach (HF).

The New Zealand paradigm we could describe as Crush and Watch. Under CW, first community transmission is eliminated and then measures that make it easy to spot and contain any new outbreaks are maintained.

With HF and CW, rates of infection are so low that relief from the epidemic, the widely discussed “exit”, is expected to come from elsewhere, most obviously from a vaccine, at some uncertain point in the future. Like an interest-only mortgage, the day-to-day arrangements do not attempt to resolve the underlying problem. With EF the picture is murkier; if “reasonably” is interpreted loosely, there is scope for a government to aim to achieve herd immunity within this paradigm.

All three of these paradigms operate by establishing a threshold of unhealthiness that will be tolerated. The threshold is expressed as a principle, compliance with which can be readily observed. Under EF the assessment of what is “reasonable” pressure on the healthcare system can vary widely and until this parameter is clarified it is not truly well-defined. Similarly, the degree of community transmission to be tolerated under HF could vary. Still, paradigms can be ordered: EF is chosen only to allow a higher threshold than HF, which in turn is higher than CW; within EF and HF we can expect different specifications of what is acceptable to enable ordering.

An alternative would be to choose a threshold of economic activity. However, given the lack of understanding of the interplay between the two goals and the character of the virus, a threshold of economic activity comes with no guarantee as to the level of unhealthiness implied in practice. Deaths could be unbounded. Countries that are dominating their

epidemic have already demonstrated that they are not willing to accept unlimited mortality; they are therefore unready to adopt an economic threshold. Thus we see the reversal of previous priorities noted by a former governor of the Bank of England (Mark Carney, 2020).

The same problem of unbounded deaths afflicts more sophisticated methods of reconciling competing goals, traditionally conceptualised in economics as a utility function. We can establish a ratio scale of both unhealthiness (e.g. number of deaths) and economic activity (e.g. employment) (Stevens, 1951). This gives us the basic prerequisites for the use of a utility function. However, any utility function that itself lacks a threshold of unhealthiness again offers the possibility of an unacceptable number of deaths. That is, an elegant (differentiable) utility function without thresholds may be adopted, but it will always be secondary, operating within bounds established by the paradigmatic threshold.

Such a secondary utility function may be helpful but is not needed. Once the threshold is established, one obvious approach is simply to attempt to maximise economic activity subject to that constraint. Unless the epidemic becomes quiescent, due to seasonality perhaps, this approach will lead to the threshold becoming a target, at least until the point when all NPIs are abandoned. This substantiates the point made above that, as a determinant of mortality, the epidemic's own dynamic arising out of the virus's inherent nature may be matched by the paradigm adopted by a domination-committed government.

The same arguments apply if one adds additional goals. Thus we can conclude that in any country that has the capacity to dominate, and has chosen to, the paradigm that governs the resolution of competing goals will be one of a threshold of unhealthiness. The choice of this threshold is therefore the single most important decision such a government can make in managing its domestic affairs today.

This simple conceptual framework provides a clear basis not only for making decisions but also for understanding what decisions have been made. To take the UK as an example, we conclude that the most important decision the government has taken during the COVID-19 crisis was the adoption of a strategy of domination, revealed when the Prime Minister announced lockdown measures on 20 March (Boris Johnson, 2020a). The second most

important decision emerged in stages between 16 April and 28 April. On 16 April the Foreign Secretary announced five tests for lifting NPIs (Dominic Raab, 2020), the fifth being: “Any adjustments to the current measures will not risk a second peak of infections.” On 27 April, the Prime Minister talked of the NHS being “overwhelmed” (Boris Johnson, 2020b). On 28 April, the fifth test was revised by the Deputy Chief Scientific Adviser in a slide with the addition of the clause “...that overwhelms the NHS” (McLean, 2020). This sequence of statements introduced the idea of a threshold of unhealthiness; initially this was defined vaguely enough that it might have fallen into the category of either EF or HF; by the end it was fairly clearly defined as the higher EF and, within that category, at the upper end. Since the NHS has not been overwhelmed in the first wave of the epidemic, the threshold selected by the government implies it is willing in future to tolerate demand on the NHS that is at least as high as at the peak of the first wave.

Looking at the paradigm supplied by Ferguson et al, it is also expressed as a threshold of unhealthiness and there is again some vagueness. What is the “low” level of case numbers it has in mind? A public health scholar might say it will at least be some variety of HF; but a politician might use it to mean some variety of EF. However, even allowing for that vagueness, “low” cannot really be regarded as equal or higher than the peak of the first wave. Therefore, one can say that the UK government, having adopted its first, dominating phase, has rejected its second, “indefinitely low” phase, and is no longer following the strategy of suppression.

If we consider that the threshold of unhealthiness is fixed but the epidemic itself is unpredictable, then another conclusion is that there can be no absolute commitment to any economic activity or policy that requires the absence of NPIs. All such commitments are contingent, both on the natural ebb and flow of the epidemic and on the government’s skill in managing it. Government has become like sailing. It is likely that plans at all levels will have to be made and discarded over and over until herd immunity is reached.

The future course of the pandemic in any territory will depend heavily on its government – first on the capacity for domination, then on the political will to implement it, and then on the paradigm adopted, which for those that have chosen domination will take the form of a

threshold of unhealthiness. Therefore it would be helpful to have a table of countries, and sub-national units with the autonomy to establish their own approach, listing their status on these points.

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