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The Economics of Lockdown

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Abstract

In this paper, we suggest an approach to analysing policies relating to the COVID-19 pandemic. We discuss the formulation of policy and sketch how the approach can be applied to different specific challenges as policymakers try to make difficult choices for managing the pandemic and protecting the economy and society.

I. Introduction

When the full reality of the COVID-19 pandemic became apparent in March 2020, a range of increasingly stringent measures were put in place to halt the spread of the virus as the death toll mounted. Above all, the focus then was on ensuring that the limited capacity in intensive care units would not be overly stretched. The economic consequences of closing down significant parts of the economy often seemed like a secondary consideration but, in a short period of time, schemes were introduced to deal with the economic consequences of limiting economic activity.

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The term 'lockdown' entered the lexicon as a catchall for a range of measures – encouraging working from home, limiting public gatherings, keeping people off public transport, and curbing casual social interactions. Implementing lockdown included efforts to shield the vulnerable and to encourage those with symptoms to self-isolate. For almost the whole population, this was an unprecedented measure. But anyone who was aware of the history of pandemics would recognise echoes of such policy measures. During episodes of the Black Death, which ravaged the world for around four centuries, there were frequent lockdowns and quarantine measures put in place.[1] But this could not stop around 50 million people falling victim to the disease over this period. It suffices to say that human societies have had to manage serious infectious diseases throughout history and to try to mitigate the economic consequences.

The starting point for the most recent lockdown is different from what happened in the past. First, we live in a modern globalised economy with complex national and international supply chains where economic shocks are transmitted across space. Second, modern states in developed countries play a major role in managing their economies and in supporting their citizens. This was largely a twentieth century phenomenon with increases in state spending rising from around 10 to 40 per cent of GDP over the century in many advanced countries. Third, modern states are more accountable and more dependent, therefore, on the support of their citizens than in the past, with most of the rich part of the world presided over by governments that are deemed to be democratic in one way or another.

These differences create both challenges and opportunities. There are challenges because the restrictions on behaviour range broadly between local and global activities. Moreover, there is much more scope for comparing experiences that can be beneficial for learning but may also lead governments to follow what other governments are doing rather tailoring policies to local conditions. However, there are also opportunities where such learning is beneficial, and major crises have frequently been opportunities for renewal and building new forms of state capacity with lasting benefits.[2]

Mainstream public economics has generally paid scant attention to public health emergencies and their consequences. The textbook approach analyses the economics of public good provision and transfer programmes in general but rarely has this focused on taking emergency measures of the kind that we have seen in recent months. There is also comparatively little discussion of how far government policy can steer citizens' behaviour through exhortation

[1] The word 'quarantine' reputedly has its origins in the Venetian Italian word *quarantino*, the period of 40 days for which ships and people were isolated during an outbreak of plague.

[2] Besley and Persson (2011) discuss the economic and political factors behind decisions to build state capacity, discussing the centrality of war in this process.

and coordination, which has proved to be important through the lockdown. In particular, how governments can shape behavioural norms has received little attention compared with the use of standard economic incentives and regulations.

This short paper looks at some of the issues that come out of this pandemic and how we might think about the economics of lockdown from first principles. There is now a body of emerging economic research on the impact of the pandemic. The role of this paper is not to survey this. Instead, our primary focus is on exploring ways to achieve a reasonable combination of economic and public health considerations or outcomes. Viewing this as a trade-off between lives and livelihoods does have value in focusing some aspects of policy thinking. However, it is also simplistic for reasons that we outline. The policy and analytical questions now and in the future concern how to manage emergence from the lockdown, combining insights from economics with those from public health and medical sciences. This requires understanding the heterogeneous impacts of policy alternatives on different groups, sectors and regions. We discuss an analytical framework for considering alternative options as well as discussing the transition from rescue to recovery and the need to prepare for that recovery now.

The remainder of the paper is organised as follows. In the next section, we look at the context in some detail alongside some of the measures that have been implemented since lockdown. We then review policy objectives in Section III, before suggesting a way of approaching the policy challenge in Section IV. In Section V, we briefly discuss some applications, while in Section VI we examine some next steps. Finally, Section VII contains some concluding comments.

II. The context

The term 'lockdown' refers to a range of policy measures that were implemented over a fairly short period of time during March 2020. Table 1 gives an overview of these measures at critical dates. Most of these involved direct restrictions on economic and social activities; restricting economic activities that fostered social interactions, such as mass sporting and cultural events, as well as bars and restaurants. In addition, there was a dramatic reduction in the use of public transportation and educational establishments, including closure of schools. A variety of support measures were also introduced for workers and businesses, the centre piece of which was a furlough scheme for workers and government-guaranteed loans, particularly for small businesses. Liquidity problems were also eased through postponement of tax and rent payments.

The speed with which these measures were enacted was remarkable, as was the scale of support; around 9 million workers were eventually being supported

TABLE 1

Key measures during lockdown

Date	*Measure*
4 March	Expanded public information campaign is announced, focusing on handwashing for 20 seconds.
11 March	Budget 2020: £5bn COVID-19 response fund for pressures on the NHS and other public services (later announced: £1.6bn to local authorities, £1.3bn to enhance NHS discharge processes); WHO declares COVID-19 pandemic.
12 March	PM announces new self-isolation measures for those with symptoms.
16 March	Government announces new social distancing measures, including for anyone in a household with symptoms of COVID-19 to stay home for 14 days. Government advises that that mass gatherings should not take place, in line with new social distancing measures.
17 March	Chancellor announces £330bn to support economy during COVID-19 outbreak.
19 March	The Coronavirus Bill 2020 is introduced as emergency legislation to support the government to respond to COVID-19, including a wide range of powers and flexibilities.
20 March	Government announces further social distancing measures to close entertainment, hospitality and indoor leisure premises; schools, colleges and nurseries in England ordered to close 'until further notice'; bars, restaurants and shops to close, and new measures to support employers and employees.
23 March	Further social distancing measures come into effect requiring people to stay at home, stopping social gatherings and ordering the closure of certain businesses.
26 March	New support announced for the self-employed.
16 April	Lockdown kept in place for at least three more weeks; five conditions for easing measures announced.
23 April	Announcement of new infrastructure to roll out contact tracing on a large scale, including an NHS contact tracing app and hiring 18,000 staff to work as contact tracers.
10 May	Announcement of first steps for 'reopening society' from the lockdown measures, including encouraging people to go to work if they cannot work from home.

Source: The Health Foundation: https://www.health.org.uk/news-and-comment/charts-and-infographics/covid-19-policy-tracker.

by the furlough scheme in the UK. Most of this has been financed with increases in borrowing alongside quantitative easing measures by the Bank of England. The flipside of this was a sharp contraction in economic activity.

The decision to lock down large parts of the economy has major implications for well-being. It is important to recall that the economy does not exist as an end in itself, but because it allows people to work and make

a living and to acquire goods and services. It is also a basis for the funding of public services, which do not themselves directly generate revenues. When the government decided to move towards the lockdown, there was immediate recognition that there was a need for schemes to protect workers and provide ways of easing liquidity problems in businesses. There has also been support for hard-to-reach groups such as the self-employed, who generally pay less tax due to having that status. This raises important questions about a system of social insurance. The UK offers little in the way of reciprocal benefits, something that is likely to be reconsidered in light of the crisis.

The justification for the lockdown was the risk that infectious people pose to others, especially certain vulnerable groups, had we continued with the physical interactions associated with a normally functioning economy and society. Economies thrive on physical proximity and mobility of goods and people. Lockdown hit at the very heart of this. Estimates now suggest that there was an immediate hit to the economy, on a scale that will likely show up in years to come as the biggest recession since record-keeping began. But there is also evidence that this hit has been highly heterogeneous, with poorer households taking large hits to their earnings while rich households experience large (proportionate) reductions in their consumption along with higher savings.[3]

When assessing the impact of lockdown measures, it is important to realise that had the pandemic been allowed to continue without a lockdown, there would have been considerable economic and social costs in terms of sickness, death, and the self-protection that individuals would have adopted. There is some hint of this in Hacioglu et al. (2020a, b), who find that consumption was declining ahead of the formal lockdown measures being brought in as people changed their behaviour and, further, that lifting of lockdown did not have an instantaneous impact on behaviour. It is thus hard to know what the counterfactual would have looked like. Hence, caution is needed when comparing the status quo from a year ago to what is happening now, and it would be misleading to attribute the difference exclusively to the lockdown.

It is increasingly realised how unevenly the economic and social costs and benefits of lockdown are distributed. For example, there are big variations between young and old, different types of workers, some ethnic groups, urban and rural, geography, and rich and poor that aggregate numbers do not reflect. Thus, a much more granular analysis of how lockdown has affected the economy and society is required to understand its effects. Many workers can work from home in a lockdown and have little perceptible direct economic hit from the measures put in place, while others have lost their livelihoods completely. The young, who are much less affected by the disease directly, will likely pay a significant part of the economic price – possibly paying higher

[3] See, for example, Hacioglu, Kaenzig and Surico (2020a, b).

taxes over their lifetimes to fund the measures, having poorer job opportunities and lower pay, and losing out on education.[4] These are effects and insights that economists and other social scientists should work on and are well placed to bring out. Our focus here is primarily on economic consequences rather than social consequences more generally.

III. Objectives

1. Framing the choices

A lot of the debate about the impact of COVID-19 is in terms of two aggregates: income protection and lives saved.[5] We use this as a starting point for our discussions. This is often conceived of as a trade-off as sketched in Figure 1, which illustrates the possibility that different combinations of policy can generate different outcomes for income protection and lives saved. This kind of approach has been developed formally in the new literature, which combines epidemiology with macro-economics.[6] The reason that this represents a trade-off is because we have drawn it as downward-sloping over a range of outcomes, thereby suggesting that saving more lives can only be done with policies that incur greater economic costs. But, on closer inspection, Figure 1 does not actually illustrate a pure trade-off, as we have drawn a region where the curve is upward (i.e. there is a range over which more lives are saved and incomes are also higher).

While drawing a figure like this is easy and useful for framing, knowing the possibilities and how they are affected by specific policy decisions is not at all easy in practice. And there has been much research, since the onset of the COVID-19 pandemic, devoted to understanding how policies work and provide protection for citizens, either by reducing infection risks or protecting incomes. Also, it is important to have a perspective over time: actions today influence not only deaths and illness in the coming weeks but also in the coming years.

It is also worth noting that presenting the idea of a trade-off between health and the economy is a very different approach from how historical discussions of health and the economy have progressed, as stressed in Deaton (2014). Although the direction of causality is not straightforward, more successful economies have generally had healthier citizens, and investing in the health of citizens is acknowledged to have had significant economic benefits, thereby creating an upward-sloping curve between income and health. We expect this

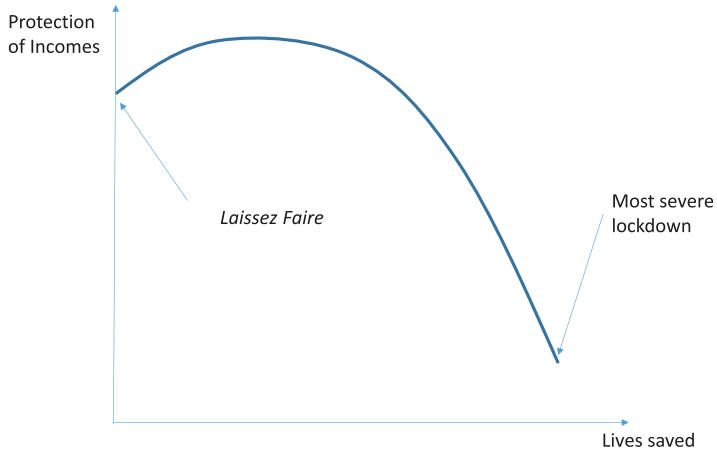
[4]The potential long-run effects of large-scale unemployment during the COVID-19 crisis in the United States are discussed in von Wachter (2020).

[5]For discussions relevant to associated trade-offs, see, for example, Ferreira (2020) and Gans (2020).

[6]See, for example, Acemoglu et al. (2020), Alvarez, Argente and Lippi (2020), Eichenbaum, Rebelo and Trabandt (2020), Gollier (2020) and Kaplan, Moll and Violante (2020).

FIGURE 1

A policy trade-off



to be true in the long run, especially if measures are put in place to reduce the likely recurrence of severe pandemics.

If the choices available to policymakers resemble Figure 1, then one way to think about policy choices is to decide where we would like to be on the spectrum of income protection and saving lives. However, there are good reasons for being cautious about conveying things in this way.

First, we are far from having anything like the knowledge that is needed to draw a practically useful version of Figure 1. The models that have been developed are useful in trying to quantify these trade-offs but they have to use parametrisations of both economic and epidemiological relationships, and there is huge uncertainty.[7] Some of this can be quantified but there is also unquantifiable uncertainty, which makes our thinking about confidence level, in a formal statistical sense, very difficult. The future path of the economy and the progression of the disease depend on future policies, which influence behaviour today, and nobody – not even the government itself – knows what that path will look like. So, translating a picture like Figure 1 to policy decisions is not straightforward.

Second, it is hard to know how far economic responses are due to policy and how far they are direct responses to the disease. Economic models begin with standard features where incentives are shaped by economic returns to different activities conceived of in monetary terms. However, such models are quite narrow, with psychological factors, such as fear, that can play a potential

[7]See Manski (2020) for an insightful discussion of uncertainty in the context of COVID-19 policy strategies.

role. More generally, there is a need to be cognisant of interdependence in decision-making as people follows norms. It is also important that there is trust in what people are told by government and in what fellow-citizens are doing. None of these factors is easily quantified and factored into the policymaking. Moreover, many of the policies that are being considered are not standard, and hence there is not an established body of empirical knowledge to draw upon. A case in point is responses to messaging by government as a means of changing behaviour, as in campaigns to encourage social distancing. Toxvaerd (2020) discusses a wider approach to behaviour in the context of social distancing decisions and stresses the importance of messaging.

2. Social judgements

Defining a welfare function to apply to the trade-off depicted in Figure 1 also raises issues. The standard welfare economics approach conceives of societal trade-offs in terms of a social welfare function defined on utilities. And, these ideas have been operationalised in a variety of ways for making social decisions. One well-known approach, which has been influential in health economics, particularly in examining alternative medical treatments, is the use of Quality Adjusted Life Years (QALYs). Miles, Stedman and Heald (2020) have used this approach to suggest that the economic costs of lockdowns have far exceeded the benefits when using standard values of QALYs of £30,000 as used by the National Institute for Health and Care Excellence (NICE).[8] NICE has utilised a QALY-based approach to many medical decisions, such as the use of certain drugs or procedures, and it has generally been seen to be useful in reaching decisions in a structured and transparent way. But the trade-off in such cases has a common metric for comparing treatments within an overall spending envelope. Such approaches have not been so influential in discerning what level of resources should be devoted to spending on health care as a whole. This requires valuing life and health relative to other goods – a much more challenging task.

Approaches to policymaking that are based on valuing life raise a number of issues. We know, for example, that societies have always and will always value lives differently in different circumstances. Air accidents receive a huge amount of attention and safety measures are very tight, while deaths from malnutrition or air pollution pass with far less attention and measures to prevent them are often weak. As a science born out of the Enlightenment, some economists view these apparently inconsistent social judgements as ‘distortions’. But in matters of life and death, there are limits to what such

[8] Although using an approach based on well-being, a broadly similar conclusion is reached in Clark et al. (2020). However, Knieser and Sullivan (2020) report a much more finely balanced calculation for the United States based on a weighted average value of around $46,000 per case.

quantifiable approaches can deliver in terms of insight into the ethical issues at stake and the practical decisions that must be taken. Whilst it is likely to be true that we would not spend an infinite amount to save a life, it is also true that we see and assess different kinds of risk very differently and agree that a life is far more than a single number of pounds or dollars. This is a position accepted by many influential philosopher–economists such as Amartya Sen.[9] We should note that in the case of COVID-19, older people have much higher mortality rates. Thus, an application of the approach would quickly run into the difficult issue of valuing the lives of older people relative to those of younger people. While some judgements are unavoidable, it would seem unpalatable to many to reduce these judgements to simple monetary values.

It is better therefore, in our view, to think about broader and deeper approaches to assess policy in relation to social goals that society wishes to achieve, and controlling infections for COVID-19 is now chief among these. This is very much like the way that we generally operate in spheres such as fighting climate change or reducing child poverty, where we think about how to achieve a series of targeted policy goals. These are to be assessed against corresponding metrics with appropriate measurement tools to monitor their achievement. An important feature of COVID-19 is the immediacy of the policy response needed and the assessment of how existing policies that protect the economy, some acting as automatic stabilisers, work alongside targeted policies. Nonetheless, the economic approach is powerful in identifying and analysing these metrics and provides another way in which economists can add value to this debate. It can also use microdata to help in predicting the impacts of policy, especially where incentives and behaviour are involved. The targets are set after public discussion of the possible outcomes that could occur, the actions available to influence them, and their likelihoods. Economists can also help to identify ways of reducing health risks as the lockdown is eased, thereby changing the trade-off between economic benefits and health costs.

Another caveat to taking Figure 1 at face value is that it characterises the trade-off in aggregate terms. But it matters whose incomes are protected and whose lives are saved. One lesson from the COVID-19 crisis that is emerging in a variety of empirical studies is the uneven impact on different groups.[10] The impact varies not only by income but also on other important dimensions such as gender, ethnicity, region and age. The social goals and the comparison of different means of achieving them have to include distributional issues around who bears what costs and who receives which benefits in different dimensions as central features.

[9] See, for example, Sen (2009).
[10] See, for example, Adams-Prassl et al. (2020a), Benzeval et al. (2020) and Blundell et al. (2020).

There are well-established methods in economics for studying distributional judgements.[11] A key idea is that one should be willing to trade-off aggregate gains in order to have gains that are more equally distributed; this is a feature of most standard welfare functions. Moreover, even using the sum of utilities as a criterion implies considerations of distribution if individuals have diminishing marginal utility, because a marginal pound to a poorer person would be deemed by many to be more valuable to a marginal pound to a richer person. One way to operationalise this in practice is to propose a set of distributional weights that reflect this, for example, by attaching a higher weight to a given benefit when it is for a poorer person. Moreover, such methods are often applied in public investment appraisals. As we emphasise further below, taking distribution into account is essential when looking at policy – the same mix of protection of lives and incomes could involve very different effects on different members of society.

3. Political economy

Economic frameworks are useful for framing the issues but politics is always in the background.[12] One way to think about the role of politics is as a way of aggregating diverse views and interests. We have already emphasised that different approaches and policies have distributional consequences, which need to be weighed up. These cannot be purely matters of expert judgements, and politics has always served as a way of trying to reconcile competing policy views or positions that affect citizens differently. The aggregation problem extends to the advice from experts, whether they be economists or medical experts. To the extent that such advice is conflicting or embodies distributional judgements, then politicians as elected representatives are ultimately responsible and face accountability through the ballot box in a way that scientists or other experts are not. There is no reason to expect that politics will reach consistent positions as competing views vie with each other to gain an upper hand. And, if citizens themselves do not have consistent or well-formed views on policy, it is not surprising that this becomes reflected in policymaking.

Although many are unhappy about the way specific decisions are made, it is misconceived to view politics solely as a nuisance in the process of policymaking. Many experts disagree and someone or some process has to make the adjudication among competing views. The process of government politics also creates the framework for legitimacy for policy actions and

[11] Classic contributions are Atkinson (1970) and Sen (1973).

[12] See Besley (2020) for a broad discussion of such issues as they have played out during the COVID-19 pandemic.

building trust. Politicians have to explain their actions to each other and to the public, thereby creating a framework of transparency and accountability.

When it comes to the economics of lockdown, policy advice has been key in trying to inform the political process. Expert advice is based on the best available evidence, but in a world of choices and trade-offs and distributional judgements, science alone will not be able to give an answer. Politics provides the framework that makes policy responses possible. But having coherent objectives and institutional frameworks to structure that engagement is essential. The COVID-19 pandemic has thrown up a range of debates about how the process of policymaking has worked and what frameworks have been used that will ultimately require some scrutiny.

IV. A policy framework

A strategic policy approach should have, at its core, the design of the best combination of policies to achieve the desired level of infection control at a minimum economic cost with due respect for distributional consequences. Calculations and calibrations of those costs then provide guidance for the different containment strategies that could be considered. It is important to consider the right portfolio of economic tools. A major lesson from policy analysis is that the identification of which combinations of instruments are needed to meet which goal is essential to social decision-making. Crucially, this means paying attention to the distributional consequences of each measure as well as to the economic incentives that they create.

For policy analysis, we first need clarity on goals and metrics associated with measuring success in achieving those goals. An approach sometimes referred to as cost-effective analysis examines how to manage and assess the costs of achieving goals in different ways. In the current context, the goal of maintaining control over infections should then be weighed against economic costs and their distributions associated with achieving that goal through different means.

Therefore, there are two broad sets of considerations. First, there is a direct benefit to relaxing lockdown measures in the form of gains to consumers and workers. This can be picked up with changes in costs of production, wages, consumption and employment, depending on the context. It is important to ask who the beneficiaries are, as they are unlikely to be uniform, and distribution matters.[13] Second, there is cost in terms of the consequences for infection rates associated with such measures. Mostly these cannot be measured directly, but measuring the effects of interactions between individuals on public

[13] During the COVID-19 crisis, there have been large advances in bringing in real-time data from financial transactions for doing this. See, for example, Adams-Prassl et al. (2020a), Carvalho et al. (2020) and Hacioglu et al. (2020a, b).

transportation or of increased density in social interactions is critical, at least as an intermediate step in studying this. This will give a feel for how far the easing of lockdown measures changes the infection rate.[14]

An important way of monitoring the progression of a disease such as COVID-19 is to look at the replication rate, often referred to as *R*.[15] Focusing on changes in *R* in response to policy, both nationally and locally, is one way to bring public health and economics together.[16] Relaxation of lockdown policies can increase *R* with economic, health and social consequences, which need to be evaluated against potential economic benefits from this relaxation. But the use of this approach requires appropriate allowance for uncertainty. For example, going from a value of 0.5 to 0.6 is less worrying than moving from 0.8 to 0.9, given uncertainty about *R* and the risks, and major economic, social and political costs associated with a second wave. There is a useful analogy between this approach and the use of temperature targets in climate change (such as keeping well below 2 °C), which can be helpful in a rational assessment of acceptable risk. Policy should be responsive in real time, depending on how far stated goals are being met. This is why measurement is so important to support the approach.

The assessment of the measurement of 'best' or 'least cost' could be important. Optimisation of the mathematical expectation of some objective function need not be the simple dominant criterion. The nature of uncertainties, the magnitude of consequences, and possible disagreement over values are such that we may choose actions that are robust in the sense that they perform reasonably well relative to other policies over a range of possible scenarios. Given uncertainties and gaps in knowledge, we should build in opportunities and processes for learning.

The lowest economic cost should not be confused with lowest cost to the public purse. Costs imposed by regulations can reduce employment or lead to inefficient utilisation of assets. Many of these costs are passed on to consumers in the form of higher prices. Other measures that require increased expenditures or lower tax revenues fall on government budgets in the first instance but do ultimately become costs or benefits to taxpayers, depending on their effects.

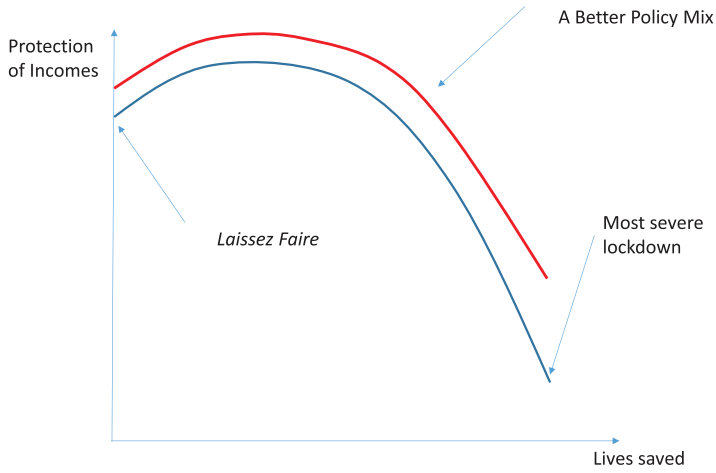
[14]Innovative work, such as that by Couture et al. (2020), is making use of mobile phone data to look at social distancing in the United States. There are also projects that are looking at infection rates in an increasingly granular way; see, for example, the use of local measures of *R* (https://rs-delve.github.io/Rmap/map).

[15]This is defined as the number of cases that are expected to occur on average in the population following the infection of a single individual. So if one person develops the infection and passes it on to two others, then *R* is equal to 2. If the average *R* in the population is greater than 1, then the infection will spread exponentially whereas if *R* is less than 1, then the infection will spread slowly, eventually dying out.

[16]See the discussion by Budish (2020), who considers how to formulate a social welfare maximising approach subject to the constraint that *R* is less than 1.

FIGURE 2

Better policy design



Effective engagement between citizens and government should also be viewed as a policy tool, given the importance of trying to influence the behaviour of citizens through moral persuasion and information. Building trust and confidence in measures taken by government is a way of improving the effectiveness of policy and can be thought of as part of achieving economic and public health gains. Thus, we should be sufficiently predictable in the criteria for, and design of, policies to carry the confidence of people who will be taking their own decisions. So, it is important to go beyond only considering the standard things studied in public economics, such as taxes, transfers and regulations. This requires a partnership between economics and other social sciences.

What we are suggesting can be related to the approach discussed in the previous section by thinking about good policy as a way of relaxing the trade-off between saving lives and the protection of incomes. We are looking ideally for policy innovations, which shift out the frontier, as illustrated in Figure 2.

Here, better combinations of income and health protection are possible, no matter how we choose to value them. However, we would stress that, although this is a useful test for whether policies have value, it is hard to capture many aspects solely in terms of this way of thinking, not least that careful consideration would have to be given to the distributional impact of policies. Also, it is not a necessary condition of good policy that it shifts the frontier out, as it could find a way of protecting a specific vulnerable group more effectively even if this leads to more overall lives being lost and less aggregate protection of incomes. That is not to argue that we are looking for such policies, but

where distribution is a key issue, who gains and loses may matter more than aggregate outcomes.

V. Applications

We now sketch a number of examples to illustrate how an approach along the lines of our suggestion can be useful in framing policy discussions in specific areas. Each of these applications is worthy of a study in its own right.

1. Workplace public health measures

Social distancing rules at work are likely to remain in place for some time to come. Such rules may make businesses unviable, or lead them to put up prices or to operate at a reduced scale that could lead to job losses. Even so, such measures could make eminent sense when it is clear how the specific regulation contributes to achieving the defined objective of controlling infection. But such measures have to be considered as a package alongside test, trace and isolate (TTI) and support programmes for firms and workers. When determining the stringency of regulations, the design should be focused on the responsiveness of the infection to policy intervention rather than narrowly on where the infection rate is highest.

Some measures can reduce infection at a relatively low cost, such as asking employees to wear face masks. Other measures being proposed are workplace rotation schemes.[17] In making comparisons across policy interventions, it is the incremental or marginal costs and marginal benefits that need to be examined. It is important to consider incentives. Firms can gain financially by implementing measures that allow their business to operate more fully. Where possible, policies should encourage the use of the creativity and local knowledge that firms have about the environment in which they operate. Government has limited knowledge of how specific businesses run.

2. Support for workers

Many workers who test positive or are forced to self-isolate will not be able to work. A scheme is therefore needed to support firms in encouraging them to test their workers and to help workers comply with isolation requirements. Some sectors, such as professional sports and (some) universities, are already developing their own testing strategies. This has the potential to bring local knowledge to bear on the design and implementation of measures. A key question is how far the state needs to mandate measures and, if so, of what form.

[17] See Ely, Galeotti and Steiner (2020).

Designing policy in this area requires insights from social psychology and behavioural economics as well as more standard insights about individual incentives. Appealing to civic duty is fine but this can be limited without strong supporting mechanisms in place to enable discharge of the duty, and some understanding that the measures make sense. In all cases, distributional consequences of policies need to be considered. The associated perceptions of fairness may influence both voluntary compliance and political acceptability. Differentiation may bring challenges in acceptance and administration but these are not hard and fast reasons to dismiss it completely; that could be costly.

3. Determining sectoral priorities

As we have already seen in the post-lockdown period, exit policies need to be targeted across a range of key dimensions, including time, geography, age/fitness and type of activity. There is now an emerging body of economic evidence and analysis that can inform policy in this area, including analyses of the potential for working from home.[18] Where possible, we advocate a bottom-up approach, recognising the differences across sectors and space. This is important because regulations will hit different sectors heterogeneously.

The wage subsidy scheme, which has been announced to replace the furlough scheme, recognises the importance of judgements being made in firms. Ways of reorganising business practices and their consequences will differ greatly. Businesses are also located in production networks and have multiplier effects through supply chains that need to be analysed and considered.[19] Many of these will be spatially specific. For example, the use of public transportation by customers and workers is also a key component of any sectoral analysis and policies should recognise local conditions. The costs of locking down the same sector in two different locations need not have the same public health implications.

4. Public transportation

This sector presents a range of specific challenges where economics and public health must work together. Traditionally, this sector has been subsidised by the state in part to reduce pollution and congestion. Thus, we do not necessarily expect it to run a profit and there are significant public subsidies already. But the need for social distancing makes many parts of the sector even more unprofitable. Raising fares to plug the financial gap will hit poor people particularly hard and is not an attractive solution. Subsidy programmes

[18] See, for example, Adams-Prassl et al. (2020b) and Joyce and Xu (2020).
[19] See Carvalho and Tahbaz-Salehi (2019) for an overview.

and bailouts to providers should be used strategically to ensure that there are strong incentives for providers to help implement public health measures for customers and staff, based on a thorough economic analysis of alternatives. A key policy challenge is how to cope with having a sector whose assets will be working well below capacity for a period of time. There is mounting evidence of the severe financial blow that public transportation in developing cities has already suffered.[20] As we move further into the recovery period, it will be important to think ahead on subsidies and bailouts to consider medium-term goals, such as environmental sustainability and levelling-up. In addition, the infrastructure and practices would need to adapt for remaking public transportation a safe option for mass commuting.[21]

5. Educational institutions

Schools have now reopened and universities are also moving into a new academic year. There is significant variation in their approaches and preparedness. To the extent that there is learning from experience and good practice, this is not problematic in itself as there is a need for specific strategy that reflects local circumstances. In universities, embedding TTI among students and staff to enhance the attractiveness of a return to a viable campus model yields gains in the educational experience and makes the UK more competitive in the global market for students. So, viable public health measures in student residences and lecture halls need to be weighed against the impact of economic costs (short and long term) to the sector in deciding whether and how any subsidies to universities are warranted. So far, student numbers have held up well and the priority has been to ensure that the learning experience is maintained.

Schools raise other issues because, as well as imparting knowledge, they are an important provider of child-care services to enable parents to work more productively. The crisis has emphasised the important gender aspect, as women have tended to take on caring responsibilities disproportionately.[22] An important policy challenge is to find the right infection threshold for school closures that balances public health and economic considerations in line with the framework that we are suggesting here. Moreover, it is important to consider heterogeneity here when formulating policy; the long-run costs of two years of disrupted schooling is likely to have far greater impacts on the very young (children of primary school age) compared with those in tertiary education, and this may also have a more severe impact on disadvantaged populations.

[20] See Bird, Kriticos and Tsivanidis (2020).
[21] See Ardila-Gomez (2020).
[22] See, for example, Andrew et al. (2020).

6. Priorities for vaccines

Economic analysis will also be important in making decisions about the priorities in rolling out a vaccine when one becomes available. Some consideration should be given to where vaccinating workers yields the highest economic gains so that other costly public health interventions can be relaxed. But distributional issues, including around vulnerability, are important too in deciding where to target within the population towards those at greatest risk. Economic incentives can also be used to encourage vaccination, for example through enlisting employers in implementing a vaccination programme for their workers.

7. Locally targeted approaches

Infection is mostly a local externality, so that strategies have to incorporate a spatial component that is responsive to the infection rates and characteristics of an area; they require the ability to increase or reduce the severity of measures in ways that we have seen in recent months. The degree to which local authorities can exploit local information to make this viable should be explored. Localised lockdowns administered from the centre may limit the extent to which they are perceived as legitimate and hence risk reducing compliance. Also, the government can learn from the private sector as it uses its local knowledge to find better ways of operating.

VI. From rescue to recovery

The time frame for policy measures is critical. Government has to be clear about recovery measures that it plans to put in place, which will soon restart many parts of the economy. This also affects health risk mitigation strategies, compliance and political acceptability, and bears on firms' plans, particularly when they assess whether to declare bankruptcy. Where measures can be kick-started even in partial lockdown, there is a case to get them underway, to avoid large costs from cliff edges or uncertainties.

In the medium term, increased labour costs associated with precautions, such as social distancing, will likely lead to more substitution of capital for labour. If the government does not want this, then a structured programme of ongoing wage subsidies (of the kind to which the furlough programme is now transitioning) will be needed. But these also need to be better coordinated with public health measures, such as linking subsidies to participation in a TTI programme. So far, this remains a work in progress.

The longer the lockdown measures continue, the more there may be permanent shifts from in-person to online transactions, with social implications as we have already seen in the decline of the high street. Decisions

will need to be made about whether to deploy tax and subsidy instruments to lean against this trend or to promote them if they improve longer-term economic outcomes. Active labour market and training policies can equip people for a changed economy, government and social priorities around structural adjustment, for a different working life, and with skills for the future, including those associated with sustainability and levelling-up.

We know from past recessions that the young suffer most (because of vulnerability to unemployment and scarring). Building policies to anticipate this, including investment in human capital, especially in sectors that employ many young people, will be helpful. The consequences of lost schooling will have an economic cost in the future that many have been trying to quantify. As we do our best to protect the old or infirm from COVID-19, we must also do our best to protect the young from the long-term costs on their education and future working lives – on which there is a rich economic literature.

Down the line, there will need to be measures that acknowledge that many businesses will have become unviable due to the lockdown. Emergency lending programmes will likely create unserviceable levels of debt, which will probably have to be converted into equity stakes – if not written off completely. This requires a discussion of criteria and mechanisms to distinguish those businesses that will be supported from those that will not. Also, what types of conditionalities or partnerships are needed as loans are unwound or converted to equity. This may have to happen before the pandemic is over, so that it could be tied to an incentive to undertaking appropriate public health measures. This process of subsidy and refinancing should focus on the jobs and activities of the future; looking backwards risks creating insecurity and missing out on opportunities to steer towards a more sustainable and equitable economy and society. We have examined these issues in other work on the recovery.

A reasonable assumption is that measures will be needed for at least the next two years, possibly longer. No doubt testing and treatment will continue to improve, but public health measures and their economic consequences would still be there at a later stage. The creation and distribution of a vaccine could change the nature of the choices that are faced. However, it is important to avoid putting too much weight on this; the prospects for an effective vaccine remain highly uncertain and that the extent to which infection leads to immunity will take some time to be established. Hence, effective interventions that can protect both health and the economy may even need to persist into the long term. To keep the economy moving over that period may therefore require an economic stimulus package on an ongoing basis for some time to come. This needs to focus on preserving investment in skills. It also needs to keep some important agendas that preceded the crisis: levelling-up parts of the UK that have fallen behind, meeting the net zero 2050 goal on carbon emissions and ensuring that the UK remains a globally competitive and innovative economy. Some of our most successful sectors, such as the cultural sector,

crucial to the attractiveness of the UK, will be particularly hit hard. Tough decisions will need to be made about support that is needed if the UK wishes to remain a global leader and a desirable destination.

It is therefore essential to develop a paradigm and framework for putting together considerations of economics and public health, and this will have lasting benefits, thereby emphasising that health and economic success complement each other rather than trade off against one another. New structures that allow firms to support their workers' health and encourage them towards life-long learning may even end up being beneficial in the medium and long term once the crisis is over.

VII. Concluding comments

The health shock associated with the COVID-19 crisis quickly became an economic shock and locking down the economy was an important part of this. Many of these measures, taken when the rates of death and infection were increasing, were quite crude in their impact. In the next phase of the policy response, measures have become more targeted both in terms of generating lower economic cost and in targeting places where there are regional outbreaks. It is increasingly realised that there will be no simple exit even if a vaccine is discovered. So, the task is to manage the consequences of COVID-19 in terms of both medical and economic interventions.

From an economic point of view, the question regarding what drives behaviour is key. Policy works when citizens understand and respond to it. Even in the case of explicit monetary incentives, it is highly uncertain how firms and consumers will respond. And when it comes to responses grounded in perceptions of risk, trust in authorities and behavioural norms, prediction is even harder. There is relatively little reliable evidence that can be translated from other contexts. Therefore, it is important to collect data to learn about behavioural change and to understand its sources.

Throughout, we have stressed the need to bring disciplines together and there have been important examples of collaborations that have emerged through the pandemic. This includes partnerships between different branches of the social sciences, but also between medical, data and social sciences. Even when there are technological innovations, there is a need to understand how these will affect society. A good example is the new testing and tracing app, which relies on how it is used by people in order to be effective.

In years to come, there will be important debates about how structures in place have facilitated a balance of expertise that is needed to bring economics together with insights from public health, medical science, data science and epidemiology. The health of a nation has both direct implications for well-being, but also indirect benefits by facilitating a stronger economy. Policies that are designed to promote health and well-being alongside increased

productivity will be facilitated by having sound policymaking frameworks in place. We also need to recognise that there is a real possibility of other pandemics in the future; we must be much better prepared for the next one.

References

Acemoglu, D., Chernozhukov, V., Werning, I. and Whinston, M. D. (2020), 'A multi-risk SIR model with optimally targeted lockdown', NBER Working Paper No. 27102, https://www.nber.org/papers/w27102.

Adams-Prassl, A., Boneva, T., Golin, M. and Rauh, C. (2020a), 'Inequality in the impact of the coronavirus shock: evidence from real time surveys', CEPR Discussion Paper No. 14665, https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3594297.

—, —, — and — (2020b), 'Work that can be done from home: evidence on variation within and across occupations and industries', IZA Discussion Paper No. 13374, https://www.iza.org/publications/dp/13374/work-that-can-be-done-from-home-evidence-on-variation-within-and-across-occupations-and-industries.

Alvarez, F. E., Argente, D. and Lippi, F. (2020), 'A simple planning problem for COVID-19 lockdown', NBER Working Paper No. 26981, https://www.nber.org/papers/w26981.

Andrew, A., Cattan, S., Costa Dias, M., Farquharson, C., Kraftman, L., Krutikiva, S., Phimister, A. and Sevilla, A. (2020), 'How are mothers and fathers balancing work and family under lockdown?', Institute for Fiscal Studies (IFS) Briefing Note No. BN290, https://www.ifs.org.uk/uploads/BN290-Mothers-and-fathers-balancing-work-and-life-under-lockdown.pdf.

Ardila-Gomez, A. (2020), 'In the fight against COVID-19, public transport should be the hero, not the villain', World Bank Blogs, https://blogs.worldbank.org/transport/fight-against-covid-19-public-transport-should-be-hero-not-villain.

Atkinson, A. (1970), 'On the measurement of inequality', *Journal of Economic Theory*, vol. 2, pp. 244–63.

Benzeval, M., Burton, J., Crossley, T. F., Fisher, P., Jackle, A., Low, H. and Read, B. (2020), 'The idiosyncratic impact of an aggregate shock: the distributional consequences of COVID-19', Understanding Society Working Paper Series No. 2020-09, https://www.understandingsociety.ac.uk/sites/default/files/downloads/working-papers/2020-09.pdf.

Besley, T. (2020), 'The COVID-19 crisis through the lens of political economy', LSE Working Paper.

— and Persson, T. (2011), *Pillars of Prosperity: The Political Economics of Development Clusters*, Princeton, NJ: Princeton University Press.

Bird, J., Kriticos, S. and Tsivanidis, N. (2020), 'Impact of COVID-19 on public transport', IGC Blog Post, https://www.theigc.org/blog/impact-of-covid-19-on-public-transport/.

Blundell, R., Costa Dias, M., Joyce, R. and Xu, X. (2020), 'COVID-19: the impacts of the pandemic on inequality', Institute for Fiscal Studies (IFS) Briefing Note No. BN0291, https://www.ifs.org.uk/publications/14879.

Budish, E. (2020), '$R < 1$ as an economic constraint: can we "expand the frontier" in the fight against COVID-19?,' Becker Friedman Institute (BFI) Working Paper No. 2020-31, https://bfi.uchicago.edu/wp-content/uploads/BFI_WP_202031.pdf.

Carvalho, V. M. and Tahbaz-Salehi, A. (2019), 'Production networks: a primer', *Annual Review of Economics*, vol. 11, pp. 635–63.

—, Garcia, J. R., Hansen, S., Ortiz, Á., Rodrigo, T., Mora, J. V. R. and Ruiz, P. (2020), 'Tracking the COVID-19 crisis with high-resolution transaction data', Cambridge Working Paper in Economics No. 2030, https://www.inet.econ.cam.ac.uk/working-paper-pdfs/wp2016.pdf.

Clark, A., De Neve, J.-E., Fancourt, D., Hey, N., Krekel, C., Layard, R. and O'Donnell, G. (2020), 'When to release the lockdown: a wellbeing framework for analysing costs and benefits', Centre for Economic Performance (CEP) Occasional Papers No. 049, http://cep.lse.ac.uk/pubs/download/occasional/op049.pdf.

Couture, V., Dingel, J. I., Green, A. E., Handbury, J. and Williams, K. R. (2020), 'Measuring movement and social contact with smartphone data: a real-time application to COVID-19', NBER Working Paper No. 27560, https://www.nber.org/papers/w27560.

Deaton, A. (2014), *The Great Escape: Health, Wealth, and the Origins of Inequality*, Princeton, NJ: Princeton University Press.

Eichenbaum, M. S., Rebelo, S. and Trabandt, M. (2020), 'The macroeconomics of epidemics', NBER Working Paper No. 26882, https://www.nber.org/papers/w26882.

Ely, J., Galeotti, A. and Steiner, J. (2020), 'Rotation as contagion mitigation', CEPR Discussion Paper No. 14953, https://cepr.org/active/publications/discussion_papers/dp.php?dpno=14953.

Ferreira, F. (2020), 'Is there a trade-off between lives and incomes in the response to COVID-19?', https://blogs.worldbank.org/developmenttalk/there-trade-between-lives-and-incomes-response-covid-19.

Gans, J. (2020), 'Health before wealth: the economic logic', https://medium.com/@joshgans/health-before-wealth-the-economic-logic-9c5414ae259c.

Gollier, C. (2020), 'Cost–benefit analysis of age-specific deconfinement strategies', *Covid Economics: Vetted and Real-Time Papers*, issue 24, pp. 1–31, https://cepr.org/sites/default/files/news/CovidEconomics24.pdf.

Hacioglu, S., Kaenzig, D. and Surico, P. (2020a), 'Consumption in the time of COVID-19: evidence from UK transaction data', CEPR Discussion Paper No. 14733, https://cepr.org/active/publications/discussion_papers/dp.php?dpno=14733.

—, — and — (2020b), 'The distributional impact of the COVID-19 pandemic', CEPR Discussion Paper No. 15101, https://cepr.org/sites/default/files/news/FreeDP_28July.pdf.

Joyce, R. and Xu, X. (2020), 'Sector shutdowns during the coronavirus crisis: which workers are most exposed?', Institute for Fiscal Studies (IFS) Briefing Note BN278, https://www.ifs.org.uk/publications/14791.

Kaplan, G., Moll, B. and Violante, G. L. (2020), 'The Great Lockdown: macroeconomic and distributional effects of COVID-19', Working Paper, https://benjaminmoll.com/lockdown/.

Kniesner, T. J. and Sullivan, R. (2020), 'The forgotten numbers: a closer look at COVID-19 non-fatal valuations', available at SSRN, https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3680348.

Manski, C. F. (2020), 'Forming COVID-19 policy under uncertainty', *Journal of Benefit Cost Analysis*, forthcoming (https://doi.org/10.1017/bca.2020.20).

Miles, D., Stedman, M. and Heald, A. (2020), 'Living with COVID-19: balancing costs against benefits in the face of the virus', *National Institute Economic Review*, vol. 253, pp. R60–R76.

Sen, A. (1973), *On Economic Inequality*, Oxford: Oxford University Press.

— (2009), *The Idea of Justice*, London: Allen Lane.

Toxvaerd, F. (2020), 'From epidemiology to economic policy', Blog post for the Bennett Institute for Public Policy, https://www.bennettinstitute.cam.ac.uk/blog/epidemiology-economic-policy/.

von Wachter, T. (2020), 'Lost generations: long-term effects of the COVID-19 crisis on job losers and labour market entrants, and options for policy', *Fiscal Studies*, vol. 41, pp. 549–90.