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Short Report

Modelling the economic impact of COVID19 under different policy choices: Mitigation versus suppression when time is a scarce resource

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ABSTRACT

Keogh-Brown et al.(2020) illustrate the application of economic modelling to inform and guide policy making during the COVID-19 pandemic in the UK. The methodology is based on linking a general equilibrium economic model to a simple epidemiological model of the infection. In this commentary a number of issues are discussed relating to the construction and application of the model, and the implications of the findings for government policies.

The COVID-19 pandemic has policy makers struggling for answers to questions about what strategies to pursue in the face of limited evidence. Keogh-Brown et al. (2020) set out to use a whole-economy simulation model linking the UK economy to a population-wide epidemiological demographic model for the UK to assess the potential macroeconomic impact of COVID-19 under *ceteris paribus* assumptions. This is then compared with other simulations based on separate policies of home quarantine, school closures and social distancing for 12 weeks (mitigation strategy) and indefinitely (suppression strategy). The numbers emerging from the simulations lead them to conclude that COVID-19 has the potential to "impose unprecedented economic costs on the UK economy" with the duration of the COVID-19 strategies determining the economic cost. They argue that the economic support package promised by the UK government "may be insufficient to compensate for longer term suppression of the pandemic" and note that this "could generate an even greater health impact through major recession".

The work illustrates the application of economic modelling to inform and guide policy making where time is scarce and decisions cannot wait for more information to be generated. Of course economic models of this sort are incomplete 'pictures' of reality and any 'findings' must be viewed based on that understanding. Nevertheless the paper is a welcome addition to the literature. However it does raise a number of interesting points for discussion, both in terms of the construction and application of the model and the implications of the findings for government policies.

Model structure: The authors stress the importance of using a general (as opposed to partial) equilibrium model for the potential macroeconomic impact of the COVID-19 outbreak and associated policies. However this is linked to "a simple epidemiological demographic model of the UK population … via application of epidemiological parameters including clinical attack rates (CARs), case fatality rates (CFRs), hospitalisation rates, and intensive care unit (ICU) rates". No account is taken of the indirect impacts on health arising from the outbreak including, but not limited to, reductions in fatalities, infections, health care utilisation and work loss days arising from the reduced incidence of other health conditions, nor of the adverse health effects of lockdowns. Even beyond the health sector, it would appear that not all firms have been adversely affected (BBC News 2020). As a result, the model presents an indication of the gross impact of the outbreak.

Attention might also be given to the aged care sector given the central role this has played in health (rapid spread of infections among both clients and staff), the casual nature of large sections of employment in this sector and the impacts on the health care sector.

All models are based on assumptions about how individuals and institutions behave. In this model behaviours are driven by profit and welfare maximisation for firms and individuals respectively. These assumptions could be challenged even in normal circumstances. But during pandemics it seems ambitious to assume such 'rationality' in decision making when 'coping' and 'seeing out the day' might take precedent over longer term economic goals. The underlying motivation for the health care (or in most cases government) sector is not identified as if it would be 'business as usual' at least in the underlying motivations

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of managers, providers and patients.

Model application: The application of any model requires assumptions about the values of model parameters. In the case of some key model parameters, such as labour supply, the values adopted by the authors represent substantial simplifications of reality. For example, workers are modelled as either remaining active or are at home caring for children unable to attend school. But many workers (in most cases women) juggled both working from home with pastoral care and education support for their children. All productivity is not lost when schools close and, with the elimination of commute times and adoption of remote team working, may in some cases have increased.

Parameter values adopted for labour supply are outdated being based solely on demographics as the driving determinant of activity. The population is assumed to be either 'working' or 'non-working' age, depending on which side of their 65th birthday they are, even though UK data for 2019 show that 22% of the population age 50–64 were not working while 12% of the population aged 65 and over were in work (Department of Work and Pensions 2019). 'Age'-based modelling is well past its 'sell by' date and particularly inappropriate for COVID 19 modelling given the leading role of compromised health status in determining health outcomes.

Similarly assumptions about length of stay in hospital and ICU fail to differentiate between those dying in hospital (the minority) and those recovering (the majority) even though these represent, from a duration of care perspective, systematically different groups (Lewnard et al., 2020; Rees et al., 2020).

The problem facing decision makers in some ways resembles that of 'preventive' programmes –how far do we have to go in delivering preventive care to achieve our health outcome goals. Because we don't know who will get the virus, we have to decide what size programme to implement even though some recipients would not have got the virus anyway. Putting aside the concerns with the model and its application, the data emerging from the models can be used to calculate the 'incremental effects and incremental costs of the two policies (mitigation and suppression) *compared to the baseline 'do nothing'*, as well as the incremental effects and costs of suppression *compared to mitigation* (see Table 1). In economic evaluation terms, suppression is far more 'cost-effective' than mitigation; we have to pay *on average* 50% more for each % reduction in fatalities (approximately 5000 deaths avoided) through mitigation than through suppression (10.62billion GBPs, or 2.1 million GBPs per death avoided under mitigation versus 7.03billion GBPs – or 1.4 million GBPs per death avoided under suppression). If a decision is taken to adopt mitigation, the *additional* cost per % additional reduction in fatalities associated with replacing mitigation with suppression is 'only' (approximately) 50% of that for associated with mitigation (5.45billion GBPs or 1.1million GBPs per death avoided). While the absolute size of these figures indicate NICE would be unlikely to approve either policy (should it ever be asked) without additional reasons beyond reductions in deaths, the interesting 'finding' is the relative 'cost-effectiveness' of suppression compared to mitigation. Of course as with all cost effectiveness analyses, this does not take account of the opportunity cost of the additional resources forgone under suppression, only the mean rate of return on those resources.

Finally, by suggesting that "the initial economic support mechanisms promised by the UK government may require further expansion if the pandemic is to be effectively suppressed without causing the collapse of many businesses and the loss of livelihoods of many workers" the authors implicitly assume that the support packages represent an efficient use of public funds. The existing economic support packages have focussed primarily on demand stimulation. Often these have been poorly designed and targeted leading in some cases to individuals being better off (financially) than pre COVID-19 (ABC News 2020). However COVID-19 mitigation strategies in many instances have controlled or reduced demand, through government-imposed lockdowns and closures. As a result, the health policies of lockdowns and closures negated demand stimulation policies, increased disposable incomes and resulted in stimulating savings despite interest rates falling to an all time low (Financial Times, 2020). Its hard to believe governments could find more counterproductive policy mixes. Given that the modelling highlights the linkages between health and the economy, it might be helpful to exploit those linkages in developing compatible health and economic policy mixes.

Table 1
Cost-effectiveness of Mitigation and Suppression strategies.

Policy	Mitigation	Suppression
Reduction in deaths compared to baseline (%)	29	95
Cost (Economic Impact) GBP billions	308	668
Mean cost per 1% reduction in deaths cf. baseline, GBP billions	10.62	7.03
Mean cost per 1% reduction in deaths cf. mitigation, GBP billions		5.45

Footnote: 1% reduction in deaths is approximately 5000 deaths avoided.

Ethical statement

None required.

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