POLICY INSIGHTS
Thinking ahead for Europe

No 2020-11 / May 2020

The great lockdown: was it worth it?

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Abstract

What the IMF calls the 'great lockdown' has thrown Europe and the global economy into a deep recession. When putting their countries into lockdown, governments essentially pushed the panic button, mostly in the face of rising fatalities. Was this the right choice? The answer to this question is usually framed in terms of the lives saved versus jobs lost. However, a closer look at the actual expenses for medical care that the pandemic has engendered so far and a bottom-up calculation for hospitalisation costs suggests that the economic costs of the great lockdown, while very large, might still be lower than the medical costs that an unchecked spread of the virus would have caused. There might thus be no need to assign an economic value to the lives saved to come to the conclusion that an unchecked spread of Covid-19 would have led to even higher costs than the great lockdown.

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This Policy Insight is based on joint work with Claudius Gros, Roser Valenti, Lukas Schneider and Kilian Valenti, Institute of Theoretical Physics, Goethe University, Frankfurt a.M. and Vivantes Klinikum Spandau, Berlin. See "Containment efficiency and control strategies for the Corona pandemic costs", Working Paper, Clausen Center, University of California at Berkeley, by C. Gros, R. Valenti, K. Valenti and D. Gros (2020) (https://clausen.berkeley.edu/wp-content/uploads/2020/04/Corona_all.pdf).

978-94-6138-776-9

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1. Introduction and summary

The world economy is in free fall. The IMF predicts a global recession with GDP expected to fall by over 7% in Europe. This is the result of the 'great lockdown'. Governments all over the world saw no other way to stop the spread of the new coronavirus (Covid-19) than to shut down most economic activity by closing schools, offices and most other enterprises which are not deemed essential.

A key question often asked is whether the cure could be worse than the disease. The answer requires a framework that allows one to set the economic costs of a lockdown against the medical costs of the disease, as well as the value of lives saved. In Gros et al. (2020), we present a detailed, bottom-up measure of the medical costs that would arise if the disease were to run unchecked through the entire population. We distinguish among the direct costs due to the loss of working time, healthcare in hospitals, intensive care beds, etc. Aggregating these costs based on a detailed analysis of Covid-19 medical characteristics leads to the result that they alone could amount to a one-time cost equivalent to about 14% of GDP, or over €1,500 billion (€1.5 trillion) for the EU.

At first sight, this figure appears large relative to overall healthcare expenditures, which are in the order of 10-12% of GDP throughout the EU and relative to what member states are budgeting in terms of higher health expenditure. For example, in Germany, the Ministry of Health has so far foreseen an increase in expenditure of about €10 billion, which amounts to about 2.5% of German GDP. But one has to set this sum of €10 billion against the total number of cases in the country of about 200,000. The expenditure per case would thus be €50,000, or about the same as 100% of (annual) GDP per capita for each infection. Data from Spain confirm the same order of magnitude. The budget of the central government foresees for 2020 additional health expenditures of around €4.4 billion, also about 2.5% of Spanish GDP (Hernández, 2020).

If this pattern applies to other countries as well, the total additional health-related expenditures throughout the EU expected even under the hypothesis that the spread of the virus will be arrested soon, would be around €250-300 billion. This is of the same order of magnitude of the Solidarity Fund now being discussed.

While 2.5% of GDP might appear manageable, this figure is based on the assumption that only a small part of the population will contract the virus – at least this is what has been achieved so far. The few mass-testing studies undertaken to date suggest that probably much less than 5% (outside some limited hotspots) of the population has been infected up to this point. If the virus were to reach the remainder of the population, one would have to multiply the costs borne up to now by a factor of 20 or even more – leading to an impossible 50% of GDP for Germany.[1] It is likely that the costs of ramping up hospital capacity for the still modest infection

[1] Our cost estimates, detailed below, arrive at a much lower figure. The reason might be that they abstract from issues of hospital capacity, which arise when infections spike, because in our model societal reaction automatically

rates at which the epidemic has been stopped in most countries were also driven higher by the need for speed. But these calculations show that government finances would have been quickly overwhelmed by the medical costs alone if Covid-19 had been allowed to spread much further.

Hospitalisation costs naturally do not represent the only cost of a pandemic. For the political reaction, the loss of life is much more important. However, we find that in strictly economic terms, the value of lives lost represents only half of the overall cost of the pandemic.

There is a large strand of economic literature on what value to assign to a life lost. It is more difficult to find an objective base to assign a number to the economic value of the loss of life potentially caused by this pandemic.[2] But in principle this is a problem hospitals have to face every day when deciding what procedures to apply and what machines to buy. Our calculations suggest that even using conservative assumptions, this consideration would add another 16% of GDP to the cost of doing nothing.

The overall economic cost of letting Covid-19 run through the entire population could thus add up to around 30% of GDP, or over €300 billion for the EU.

On this metric, the economic cost of the great lockdown (7-8% of GDP) would seem to be much lower than that of an unchecked spread of the virus. One could of course argue that measures other than a lockdown, less damaging for economic activity, might have achieved a similar reduction in infections. But the real world question is whether choosing lockdown meant that the (imperfect) cure was worse than the disease. Our results suggest a resounding no.

2. Details of the cost estimates

The total cost to society of the disease can be broken down into three elements:

(i) the working time lost due to an infection,

(ii) the direct medical costs needed to treat an infection, and

(iii) the value of life costs.

'flattens the curve'. Yet, we still find that a 'laissez-faire' policy, which would lead to a substantial proportion of the population being infected, would simply a higher cost than very strict measures – even without assigning a monetary value to lives lost.

[2] Most existing studies (Roberts et al., 2010; Althouse et al., 2010) of the economic costs of the corona pandemic use the concept of the value of statistical life (VSL), which corresponds to the monetary value of an avoided premature death (Ashenfelter and Greenstone, 2004; Murphy and Topel, 2006; Thaler and Rosen, 1976; Viscusi and Aldy, 2003).

This framework has been applied in several recent contributions in which the evolution of the epidemic is taken as exogenous (Greenstone and Nigram, 2020), or relying on certain premises for the infection rates, as those in Ferguson et al. (2020).

Further studies discuss the relative effectiveness of different control measures, such as school closures versus a lockdown (Ferguson et al., 2020; Wilder-Smith et al., 2020), but without explicit cost estimates. Another strand of the literature takes the pandemic as given, and as the basis for scenarios for the economic impact and for the financial market volatility (Atkeson, 2020; Baldwin, 2020; Gourinchas, 2020).

The costs related to lockdowns or 'social distancing' would have to be set against the costs that are avoided through these measures.

Our approach allows us to scale the medical costs in terms of GDP per capita, which makes the analysis applicable not only to specific countries, but also to the EU as a whole and to most OECD countries.

2.1 Health costs, loss of working time

A first direct impact of a wave of infections is that a fraction of the population cannot work (while infected). This fraction can be based on the Diamond Princess data (Russell et al., 2020), where the entire population was tested. We thus assume that only half of those infected develop symptoms that require them to stay home for a one period of two weeks, followed by an additional two-week period of 'home isolation' until they are no longer contagious. We then assume that about 20% of the total population (or 40% of those with symptoms) develop stronger symptoms requiring one additional period of absence from work (Raoult et al., 2020).

To be conservative, we assume that there are no severe cases or deaths among those of working age. This results in a reduction in the workforce per year (52 weeks) of around (0.5-0.2)*2 + 0.2*3/ (2/52)= 2.4/52 = 5. This implies that for every 1% of the population infected about 0.05% of the annual working time is lost. If the virus were to infect the entire population, about 5% of working time would be lost, which would on its own be equivalent to a loss of 5% of GDP.

2.2 Hospitalisation costs

A second element of the cost of the epidemic that has not been much studied is the hospitalisation and other medical costs of treating those infected. There are no rigorous studies yet of the average costs of treatment for those infected (and with symptoms), but it is estimated that about 20% of the infected individuals require some sort of hospitalisation, of which one-fourth (i.e. 5% of all infected) then requires intensive care.[3]

Intensive care with ventilation is the most costly form of life-saving treatment in hospitals. In the US, the cost of two weeks in an intensive care unit is equivalent to about one year (100%) of GDP (Dasta et al., 2005). In Germany, which might be typical of the rest of Europe, the cost of two weeks of intensive care appears to be somewhat lower, around €20,000, or roughly 60% of GDP (Martin et al., 2008). We use the German parameter for a conservative estimate of medical costs.

The cost of general hospitalisation for two weeks is assumed to be €12,000, and equivalent to about 30% of GDP. We estimate that the median time from onset to recovery for mild cases is

[3] For comparison, an average influenza season leads to the hospitalisation of about 0.12% of the US population (CDC, 2020); one-fourth of them require intensive care, with one-twentieth (0.13% of all infected) dying (Russell et al., 2020).

approximately two weeks and three to six weeks for patients with severe or critical cases of the disease (WHO-China Joint Mission, 2020).

We use a conservative estimate of two weeks of intensive care and two weeks of general hospitalisation for severe cases.

This results in a medical cost of 0.05*(0.6 +0.3) + 0.15 *0.3 =0.09*GDP.

This simple calculation suggests that if the virus were to affect the entire population, hospitalisation costs would amount to 9% of GDP, or over €1,000 billion at the level of the EU.[4, 5]

2.3 Value of lives lost

We now turn to the third element that has featured prominently in much of the political discussions, namely the loss of life. We are concerned here only with its economic aspect.[6] The cost of premature death through the disease represents the most difficult contribution to evaluate in financial terms, but it is also the aspect that has attracted most attention. Major contributions (Greenstone and Nigram, 2020) are based on an evaluation of the economic value of lives lost. We propose a slightly different, more conservative framework.

There are two ways to attribute a monetary value to a life saved or lost.

The first one, mentioned above, is based on the concept of a value of statistical life (VSL), which is commonly used in the impact assessment of public policy with the aim of lowering the probability of an avoided premature death (Renda, 2013). The concept of the VSL is typically applied when the probability of death is very low (e.g. car accidents), but could be lowered even more (using seat belts). Another widespread application of the VSL is in the area of environmental legislation, where the VSL used is often very high – up to millions of euros or dollars (see Greenstone and Nigam (2020) for a discussion). These high values might be appropriate in these areas (traffic safety and environmental standards) because those who might potentially lose their lives might often be young, or at least of average age. In these cases, one could consider the monetary value of the output not produced because of premature death.

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[4] For comparison: the estimated average, annual, total economic burden of influenza to the healthcare system and society was $11.2 billion ($6.3-25.3 billion). The direct medical costs of treating influenza patients were estimated to be $3.2 billion ($1.5-11.7 billion) and indirect costs $8.0 billion ($4.8-13 billion).

[5] The cost estimates discussed so far refer to the per-period cost of those currently infected. For the total cost over the entire epidemic we need to calculate the discounted sum of all costs over time. Given that a period corresponds to about two weeks, we neglect discounting, which would make little difference even if one uses a social discount rate of 5% (per annum!) instead of using market rates (which may be negative). The total medical costs over the course of the epidemic can then be written as the simple sum of the cost per unit of time, as in Gros et al. (2020).

[6] Wolfgang Schäuble, president of the German parliament, is one of the few dissenting voices regarding the primacy of saving lives. See "Schäuble will dem Schutz des Lebens nicht alles unterordnen", *Der Tagesspiegel*, 24 April 2020 (https://www.tagesspiegel.de/politik/bundestagspraesident-zur-corona-krise-schaeuble-will-dem-schutz-des-lebens-nicht-alles-unterordnen/25770466.html).

The figures used for the VSL taken from environmental or food safety regulations are in the order of 100 times annual GDP (e.g. the value of $10 million used by Farboodi et al. (2020) for VSL would be roughly 150 times annual US GDP per capita). It is apparent that this approach leads to very high costs, even with a very low case fatality rate. A VSL of 100 times GDP, if combined with a case fatality rate of, say 0.5% (lower than most estimates) would imply a total cost of 50% of GDP.

But Covid-19 is a high-death epidemic and mortality is concentrated among the elderly. For these two reasons we prefer an approach that is practised routinely by the medical profession.

Putting a monetary value on lives saved is unavoidable in medical practice, which is confronted with the problem of selecting the procedures to be used to prolong life – a situation that arises for many patients infected by the coronavirus under intensive care. A lower bound of $50,000 per year of life lost is typically used in the existing US literature dealing with the cost of medical procedures, with a central range between $100,000 and $300,000 (Neumann et al., 2014). The lower bound would be equivalent to about 1 year of GDP per capita, and the central range would correspond to a range of 1.5 to 4 years of GDP. Cutler and Richardson (1999) argue for a central value equivalent to three times GDP.

We use the lower bound of this range (about 1% of GDP per capita per year of life lost) for most of our simulations in order to provide a conservative estimate of the value of lives saved. This implies that the economic value of the premature deaths should be equal to the number of years the patient could have expected to live otherwise.

What remains to be determined is the number of years lost when a corona patient dies. This depends of course on the age of the patient. At age 80, the standard life expectancy tables for the EU-27 give an average life expectancy of about 8 years, which increases to 12 years at age 75 and 20 years at age 65. We use these tables in conjunction with the case fatality rates now available for some countries by age.

Table 1 provides some detail for the calculations by age group. For each age group (last column (6)) we provide the case fatality rate (last but one column)[7] and the percentage of this age group in the overall population (third column from the end). The product of the latter two is reported in column (3), which gives the contribution of the fatalities one can expect from this group (for each infection). This has to be multiplied by the remaining life expectancy for this age group (in column (2)) to give the contribution of each age group to total years lost per infection report in column (1).

This table shows that it is not only the very elderly who contribute to the total loss of years of life. The case fatality rates, at 16%, are twice as high for patients above 80 years of age than for

[7] These case fatality rates are often disputed and might be subject to over- or under-reporting. Case fatality rates might be over-estimated if people who die of other causes are diagnosed to have been infected. These cases might be classified as death with infection, rather than death because of infection. However, there is also considerable evidence from ‘excess mortality’ tables that many who have died of complications of a number of related symptoms have not been subject to testing and are thus not counted. Given that these two effects go in opposite directions we use the official data.

patients in their 70s (8%), but these younger patients also have a longer life expectancy. The contribution of this younger group to total lives lost is therefore slightly higher. Summing the contributions over all age groups yields a value of 0.27 lives lost for every infection.

It is often argued that the remaining life expectancy of those dying from the virus should have been shorter than that of their age cohort because they typically had what are called 'co-morbidity' factors. Even assuming that the average life expectancy of those succumbing to the Covid-19 virus was half that of their age cohort would still lead to an expected loss of life through all cohorts of 0.135. This would imply that the monetary value of the lives lost through an unchecked epidemic (i.e. without any social distancing measures) would still be 13% of GDP, which is similar to the figure in Gros et al. (2020). Hanlon et al. (2020) show that the difference between the statistical life expectancy and that of those who had co-morbidity factors is actually rather limited.[8]

Table 1. Years of life lost, by age group

(1)=(2)*(3) Years of life lost per infection	(2) Remaining years of life expectancy	(3)=(4)*(5) Contribution to deaths (%)	(4) Share in population (%)	(5) Case fatality rate (%)	(6) Age group
0.03	29	0.1	16	0.70	50-59
0.07	20	0.3	12	2.80	60-69
0.09	12	0.7	9	8	70-79
0.08	8	1.0	6.40	16	Above 80

Source: Own calculations based on various sources – UN demographic projections (for the age structure of the population (Germany)), Eurostat for remaining life expectancy (EU-27) and World in Figures for case fatality rates (the average for Spain and Italy).

3. Concluding remarks

An often overlooked cost of the Covid-19 pandemic is that of caring for those infected. Most evaluations of the economic cost of the crisis focus only on the number of probable or potential deaths the virus might cause. This is a mistake because the pure hospitalisation costs would also be very steep. Our calculations show that the economic costs of the great lockdown, while very high, might still be lower than the medical costs that an unchecked spread of the virus would have caused.

Stopping the pandemic is thus not just a question of avoided deaths, but also a question of saving resources from going into medical care, which would have to double in a short time to deal with the severe symptoms Covid-19 causes. Our calculations acknowledge the fact that in most cases Covid-19 infections are similar to common influenza, but the remaining proportion of severe cases is still large enough to lead to an immense cost for society.

[8] Their main conclusion is "[u]sing the standard WHO life tables, YLL per COVID-19 death was 14 for men and 12 for women. After adjustment for number and type of LTCs, the mean YLL was slightly lower, but remained high (13 and 11 years for men and women, respectively)" (Hanlon et al., 2020).

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