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Overview

The COVID-19 pandemic is not only confronting the world with a new and deadly virus – it has also brought 'science' back into the lead of policymaking. One can only welcome this dramatic recognition of the value and role of science to society amid the COVID-19 public health challenge. However, the science-based policy advice for measures to combat COVID-19 has also some worrying features. Three are being discussed here. They have led to a strong national bias in both science-based policy advice and in the national policies implemented to combat COVID-19. Alternative approaches are discussed focusing in particular on the European Union.

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Hammer or nudge? Science-based policy advice in the COVID-19 pandemic

The COVID-19 pandemic is not only confronting the world with a new and deadly virus – it has also brought 'science' back into the lead of policymaking. The global science community is busier than ever and open science is becoming the norm as researchers routinely share their data. Meanwhile, the vaccine research community, both in public and private research labs, is working together day and night in developing, experimenting and testing possible new vaccines. One can only welcome this dramatic recognition of the value and role of science to society amid the COVID-19 public health challenge. As if scientists wake up in a new world of facts and evidence-based policy.

However, the science-based policy advice for measures to combat COVID-19 has also some worrying features. First, a certain degree of arrogance of disciplinary knowledge with the rejection of any debate coming from researchers outside of the virology and epidemiological professions. Second, the imposition of confinement restrictions independently of other behavioural or social sciences insights on the broader impact of such unique societal experimentation. And third, the way current science-based policy advice combatting COVID-19 appears imprisoned in national data, leading to a strong national bias in policymaking.

It leads us to present some alternative, more speculative views on the regional impact of the COVID-19 outbreak. These views are presented as illustrations of the need to remain in science-based policy advice, even when confronted with a dramatic pandemic such as COVID-19, open to alternative views. They start from the wide disparity in COVID-19 contamination, hospitalisation and fatalities. To what extent can the study of the local environments which became breeding grounds not just of COVID-19 contamination but also of COVID-19 illness and mortality, provide additional insights. And in the same vein, to what extent are regions confronted

with the differential impact of COVID-19 not in a better position to design appropriate exit policies.

Crush the virus?

Viruses know no borders and in our globalised world, the undetected virus in pre- or asymptomatic carriers – individuals not exhibiting any symptoms of the disease (yet) – appears to have led to an unusually fast 'super-propagation' of COVID-19 across the world. Hence the calls for a radical 'hammer approach'[2] in the policy response to the COVID-19 outbreak. Such a policy response is based on the well-known, so-called SIR (Susceptible-Infectious-Removed) model[3]. Susceptible population runs into infected population and gets infected at a rate β which is the contact rate leading exponentially to new infections minus the rate γ of the infected population recovering or passing away. Policy will be focused on reducing the so-called basic reproduction number ($R0=\beta/\gamma$) indicating how many new cases one infected person generates. Quite naturally, lockdown will be considered the most effective way of reducing this reproduction number because doing so reduces both the number of susceptible and infected populations. However, and as pointed out by Daron Acemoglu[4], there is a lot of uncertainty about the parameters used in these epidemiological SIR models. Ultimately, the contact rate β is an economic and social variable which will reflect very different types of interactions between parts of the population with as a result different infection, hospitalisation and fatality rates. That variable will also be very different over time. Thus, historical comparisons with previous pandemics such as the 'Spanish Flu' in the early 20th century, apart from the major differences in the characteristics of the infection with the Spanish Flu – affecting more young people and having a shorter incubation period – ignore the very different social and economic environments within which individuals interacted 100 years ago.

The theoretical effectiveness of lockdown in these SIR models combined with the limited medical, and in particular intensive care facilities in most countries, even the most developed ones, has led one naturally to focus on immediate policies to reduce the degree of contact within a population leading ultimately to various forms of confinement. And based on the historical evidence from the Spanish Flu pandemic[5] in the USA, highlighting the fact that states with the tightest restrictions fared best economically subsequently, strict confinement appears the best policy to implement. Hence the standard policy view proposed and endorsed by the World Health Organization on the need for testing and the fast imposition of strict confinement policies.

'The hammer' is therefore the preferred policy approach for virologists and epidemiologists. Through extreme measures like social distancing, confinement, lockdown and travel restrictions, the 'hammer' crushes the spread of the virus and brings the R0 value quickly well below 1. From this per-

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" For the social scientist and social science-based policy adviser, a hammer represents anything but a useful tool. The focus will be rather on 'nudging'. "

spective, all measures contributing to such an immediate reduction are welcome, and the stricter the confinement measures the better.

Hammer or nudge?

For the social scientist and social science-based policy adviser, a hammer represents anything but a useful tool. The focus will be rather on 'nudging'. In the face of a new virus like SARS-CoV-2 it would consist of making sure that each incremental policy measure builds up to 'societal' behavioural change. From this perspective, authorities should carefully weigh the additional, marginal impact of each measure as it contributes to the overall reduction in transmission of the virus, starting from simple behavioural changes such as routine handwashing to social distancing – and then assess the impact of each. All this within a framework of transparency and consistency. Thus, implementing physical (rather than social) distancing will automatically prevent the occurrence of a large number of social events (like public football matches) or smaller social gatherings in pubs or restaurants without authorities having to specify exactly this or that set of new rules.

A 'hammer policy' approach combining all measures from social distancing to lockdown at once, is from this perspective double up leading to continuous questioning by citizens of the internal logic of individual measures. It also undermines the organisational innovation potential of entrepreneurs in personal service delivery coming up with potentially safe alternatives[6] to physical distancing. It will provide poor information on appropriate exit strategies as all major policy measures have been introduced at the same time, implying that it will be impossible to identify which deconfinement policies are likely to be the most effective.

A national bias?

The current virology and epidemiological based approaches all focus on the contamination and spreading of the virus within a national setting. For years now, epidemiological studies have taken individual countries as 'containers' for data collection and data analysis. The national setting also provides the framework for estimating the capacity of medical facilities, especially the total number of available intensive care units needed to handle COVID-19 patients.

The measurement of the pandemic and capacity of medical infrastructure are therefore organised within the boundaries of indi-

vidual states. In the case of Europe, this explains why national health prerogatives became so dominant, in line with the national funding of social and health security. It was the national scarcity of intensive care facilities that became the red line for introducing various national confinement policies and scientific expertise[7] organised by taking the state as a measurement unit.

As an indirect result, the internal borders of the EU, which had 'disappeared' 25 years ago under the Schengen Accord, were quickly closed, and often unilaterally, for fear of cross-border contamination. A policy called elsewhere a form of 'beggar-thy-neighbour' corona policy.[8] Doing so, COVID-19 undermined the notion of European values in favour of primarily national expert advice and values: a first collateral damage of COVID-19 in Europe.

Does location matter?

One may wonder, of course, whether there are not also other possible approaches to the outbreak of COVID-19. Might for example the study of the local environments that became breeding grounds not just of COVID-19 contamination but also of COVID-19 illness and mortality, provide additional insights? And if so, might such insights be relevant to policymaking?

From a geographic point of view, it seems logical to focus on the specific regions where COVID-19 found a particularly welcoming 'breeding ground'. Virology or epidemiological microanalysis will be on the physical contact stream of infected individuals; at a macro level, the focus will be on the particular regional environmental characteristics for 'welcoming' a COVID-19 outbreak. Thus, and limiting the analysis to Europe, in the northern Italy case it is likely that it is not the first hospitalised case in Codogno that is relevant, but rather the 'super-spreading' event: the Champions League game between Atalanta against Seville in Milan the day before with more than 40,000 Atalanta supporters from Bergamo. Similarly, the French outbreak had less to do with the first case identified in Bordeaux but with a religious event in Mulhouse at the Christian Open Door from 17th to 21st February 2020. Carnival also played a significant role in the spreading of COVID-19 in the Dutch region of Noord-Brabant. In Belgium, the highest contamination figures appeared regionally clustered in particular localities in Limburg having celebrated particular events[9].

Through such large social events, an unnoticed virus which had already infected a number of individuals could spread locally very quickly. Most surprising from this perspective is the observation that nursing homes became ideal breeding grounds for COVID-19 illness and mortality. The elderly residents in these homes had not travelled to northern Italy or been to large social events, but still represented an ideal 'breeding ground' for COVID-19. Old age, and in particular men having suffered or suffering from lung and heart diseases such as COPD,

Footnotes

1) I am particularly grateful to critical comments from Jean-Marie Beckers, Jean-Claude Burgelman, Joep Geraedts, Jos Kleinjans, Pierre Mohnen, Eleonara Nillesen, Jo Ritzen, Sven Van Kerckhoven, Luk Van Langenhove and Bart Verspagen. Views and errors remain, however, my own.

2) See in particular the various publications of Thomas Pueyo Brochard who refers to the measures to be taken as to "the hammer and the dance" (see Medium https://medium.com/@tomaspueyo). Martin Paul pointed this out in his latest blog on COVID-19 (https://www.maastrichtuniversity.nl/blog/2020/04/dealing-covid-19-hammer-and-dance).

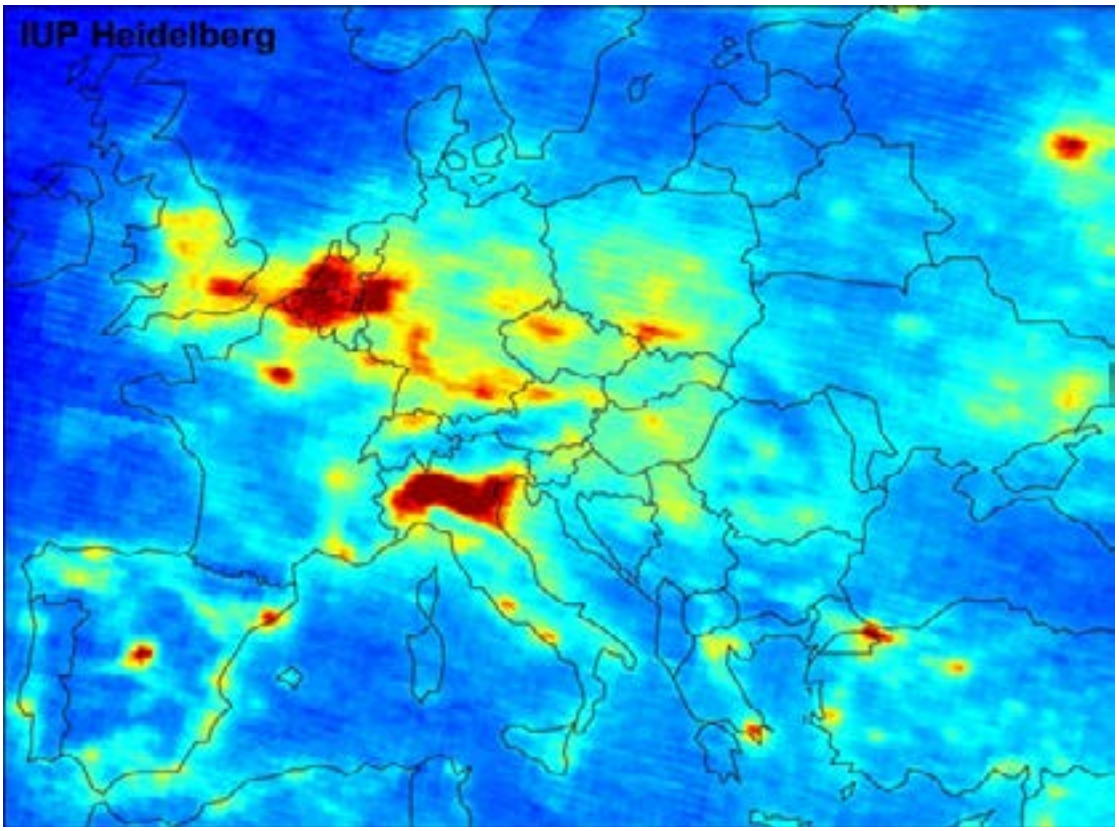
3) First used by W.O. Kermack and A.G. McKendrick, A contribution to the mathematical theory of epidemics, Communicated by Sir Gilbert Walker, F.R.S.—Received May 13, 1927, Proceedings of the Royal Society A, Volume 115, Issue 772 and applied to a variety of diseases, especially airborne childhood diseases with lifelong immunity upon recovery, such as measles, mumps, rubella, and pertussis.

4) Daron Acemoglu, 2020, Unknowns, Challenges and Opportunities in the Time of COVID-19, April 9th https://www.youtube.com/watch?v=PmKsuAsJjm4

5) Sergio Correia & Stephan Luck & Emil Verner, 2020. "Fight the Pandemic, Save the Economy: Lessons from the 1918 Flu" Liberty Street Economics 20200327, Federal Reserve Bank of New York.

diabetes and high blood pressure appeared to be the most 'susceptible population' for becoming ill because

national. The latter ignored how the concentration of more susceptible groups in society differed not only



of COVID-19. In other words, while COVID-19 spread in particular locations in Europe because of random social events in February and March 2020, a clear relationship emerged between the incidence of COVID-19 patients and the overall health of local populations, and especially the health of elderly populations in particular regions.

The 'openness' to international contacts: a major characteristic of European society, laid the basis for the rapid spread of COVID-19 across Europe. The health risk of COVID-19: the number of hospital patients with COVID-19 and the mortality rate became regionally clustered. Yet the 'hammer' policy response remained

substantially between countries but also between regions.

Does air quality matter?

The second more speculative question is the extent to which a second local factor: air quality, may have been of influence in explaining the clustering of COVID-19 illness and casualties in some regions and not in others. The amount of fine dust in the air is a typical local, often regional phenomenon. It would not explain the location of the outbreak of COVID-19 contamination in Lombardy, Mulhouse, Heinsberg or Tilburg, but it might help explain the high degree of COVID-19 illness and mortality in some of these regions such

as northern Italy[10]. Encircled by the Alps, the latter has an extreme concentration of both traffic and industrial production between the cities of Turin, Milan and Genoa and a Po Valley intensively cultivated. Northern Italy is currently the worst area for air pollution in Europe with high levels of ozone, nitrogen oxides, and fine particles, as illustrated in the figure above. The figure illustrates the high levels of air pollution in northern Italy, large cities such as Madrid, Barcelona, Paris, London, Brussels and the regions of Flanders, the southern part of the Netherlands and the German Ruhr area. All regions which have been heavily impacted by COVID-19 illness and mortality.

From a public health point of view, it is not surprising that the strong clustering of COVID-19 mortality rates would be closely related to places with poor air quality[11]. Air pollution may well be correlated with respiratory disease. The smallest particles of fine dust of 2.5 micrograms tend to lodge deep in the lungs, making citizens of those regions more vulnerable to COVID-19 infection. A recent World Bank study by Andrée [12] investigated the statistical relationship between COVID-19 incidence and air pollution in 355 municipalities in the Netherlands. Andrée's results are interesting in showing that so-called 'atmospheric particulate matter with a diameter less than $_{2.5}$ ($PM_{2.5}$)' is a highly significant predictor of the number of confirmed COVID-19 cases and related hospital admissions: "The estimates suggest that expected COVID-19 cases increase by nearly 100 percent when pollution concentrations increase by 20 percent. The association between air pollution and case incidence is robust in the presence of data on health-related preconditions, proxies for symptom severity, and demographic control variables." However, as Andrée himself stresses: "The findings call for further investigation into the association between air pollution on SARS-CoV-2 infection risk. If particulate matter plays a significant role in the incidence of COVID-19 disease, it has strong implications for the mitigation strategies required to prevent spreading, particularly in areas that have high levels of pollution."

It is not the purpose of the present policy brief to substantiate further the claim that regions with high air pollution have provided a more 'welcoming' breeding ground for COVID-19 contamination[13] but rather to illustrate how research in such other research areas might provide new insights on the health impact of COVID-19. Thus, one may wonder whether the various national COVID-19 confinement policies based on purely national virology and epidemiological scientific advice, have missed the geographical dimensions in which COVID-19 impacted local populations differently in terms of the need for hospitalisation and risks of mortality. Doing so, they inadvertently led to the 'lockdown' of entire national economies, whereas more focused regional confinements may have represented a more appropriate policy response to COVID-19.

Footnotes

6) A point well-recognised in the legislation on environmental standards: does one require for example that all cars of a company each have only a maximum amount of emissions or does one set standards at the firm level for the height of the overall emissions. The latter has proven much more efficient and cheaper, as one firm might work towards bringing the emissions of its trucks down, whereas another might focus on its overall car park. In the end, one can all share best practices, making a much larger overall impact.

7) Within each country different national, scientific media heroes.

8) Corvers, F. en L.Soete, Zet de grens met België op een kier, NRC, 17 april, 2020.

9) Such as in Alken (the so-called Monty Reunion on 6th March) or Sint-Truiden: carnival and the football match against Standard Liège on 7th March 2020.

10) A recent convincing scientific paper pointing to such a relationship can be found in Conticini, E et al., Can atmospheric pollution be considered a co-factor in extremely high level of SARS-CoV-2 lethality in northern Italy?, Environmental Pollution, https://doi.org/10.1016/j.envpol.2020.114465

11) As also reported in the NYT, A Harvard study found correlation between air pollution and COVID-19 deaths in the USA. See NYT, https://www.nytimes.com/2020/04/07/climate/air-pollution-coronavirus-covid.html

Conclusions

Healthwise, a regional COVID-19 policy focus will naturally focus on the most vulnerable, susceptible parts of the local population in combatting the pandemic; the opposite as it were of the smart specialisation development strategies typically pursued in European regions, namely weak regional vulnerabilities specialisation. Implementing regional confinement or quarantine raises of course complex implementation and maintenance issues. How to prevent people from being mobile between a confined region and other regions within a country?[14] For sure, it is easier to close a national border than to confine a particular region, as Italy witnessed when it attempted to do so in the early stages of the COVID-19 outbreak. But lessons could be learned. Ultimately, it raises similar practical problems of immediate, sudden closure and restricting the mobility of individuals to what are considered essential activities. The main point is that putting a region into quarantine is likely to have a more limited impact on the overall economy than national confinement policies. It will also enable one to introduce deconfinement policies more gradually, taking into account regional differences in contamination levels. Here too more targeted responses in the exit strategy in line with the geographical characteristics will be more effective.

And from a European perspective, such regional approach would open up the policy window of addressing COVID-19 in a more effective European way, exploiting now also more fully the notion of 'subsidiarity' in addressing COVID-19. Doing so, it would bring back the notion of solidarity between regions, as opposed to the current lack of solidarity between individual European Member States. Solidarity between regions in the EU as actually encapsulated in the European Treaties and reflected in the particular attention given to the so-called cohesion funds in European integration would possibly be the best response to rebuild European values at this time of COVID -19 crisis, contributing not just to economic convergence across Europe but also to health and social convergence.

Footnotes

12) Andrée, B.P.J. (2020), Incidence of COVID-19 and Connections with Air Pollution Exposure Evidence from the Netherlands, Policy Research Working Paper 9221, April.

13) A recent paper by Martelletti, L and Martelletti, P., Air Pollution and the Novel Covid-19 Disease: a Putative Disease Risk Factor, SN Compr. Clin. Med, https://doi.org/10.1007/s42399-020-00274-4 claims that the "SARS virus and other respiratory diseases such as COPD (chronic obstructive pulmonary disease) find fertile 'territory' in air pollutant particles and, in a linear relationship, they survive longer and become more aggressive in an immune system already aggravated by these harmful substances." In another recent study of Yaron Ogen, Assessing nitrogen dioxide (NO2) levels as a contributing factor to coronavirus (COVID-19), Science of the Total Environment 726 (2020) 138605 https://doi.org/10.1016/j.scitotenv.2020.138605, a regional spatial analysis has been conducted for 66 administrative regions in Italy, Spain, France and Germany. Results show that the concentration of COVID-19 fatality cases was in five regions with the highest NO2 concentrations combined with downwards airflow preventing an efficient dispersion of air pollution. As the paper highlights: "These results indicate that the long-term exposure to this pollutant may be one of the most important contributors to fatality caused by the COVID-19 virus in these regions and maybe across the whole world."

14) Of course it can be argued that many European countries have had experience in cross-border regions with such regional confinement policies having closed their borders.

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The United Nations University – Maastricht Economic and Social Research Institute on Innovation and Technology (UNU-MERIT) is a research and training institute of United Nations University based in Maastricht in the south of the Netherlands. The institute, which collaborates closely with Maastricht University, carries out research and training on a range of social, political and economic factors that drive economic development in a global perspective. Overall the institute functions as a unique research centre and graduate school for around 100 PhD fellows and 140 Master's students. It is also a UN think tank addressing a broad range of policy questions on science, innovation and democratic governance.

INSIDE:

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Some 25 years after the Schengen Accord, COVID-19 has undermined the notion of European values in favour of primarily national expert advice and values: a first collateral damage of COVID-19 in Europe.

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