

EDI COVID-19 ESSAY SERIES



The unequal impact of Covid-19 on different regions: The role of policy, genetic, and cultural factors

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The unequal impact of Covid-19 on different regions : The role of policy, genetic, and cultural factors

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Introduction

One puzzling question that arises in connection with the spread of the virus SARS-CoV2 is why there are so large variations in its incidence (the infection rate) and its lethal consequences (the death-toll) across countries and across regions within countries. At this stage at least, nobody is able to bring forward a general hypothesis that would satisfactorily answer such a thorny question even if attention is focused on a limited geographical area, such as Europe, Asia, North or South America, Africa or the Middle East. The difficulty comes from the fact that there are many confounding factors at play, and they involve variations in geographical situations, biological determinants, public health policies, economic circumstances, and social or cultural characteristics. In this short essay, attention will therefore be focused on Europe and our specific contribution will more particularly consist of highlighting the role of some neglected factors, socio-cultural factors in particular, without pretending that they play a dominant role, let alone an exclusive role.

A striking contrast offered by the map of covid-19 in Europe is between the relatively low rates of infections, hopsitalizations or deaths in places like Germany, Austria, Scandinavia (with the exception of Sweden), and Eastern Europe, on the one hand, and the relatively high rates observed in countries like Italy, Spain, France, the United Kingdom, Belgium and the Netherlands, on the other hand. Equally striking are the intra-country variations found inside some countries, as attested by the examples of Italy, France and Switzerland. As is well-known, Lombardy in northern Italy has been the hotspot of the country's epidemic with the city of Bergamo at its centre. In the central and southern parts, including the big cities of Roma and Napoli, the penetration of the SRAS-CoV-2 has been much better contained. In France, while the virus has hit the Paris region, Bourgogne and Eastern France with particular vigour, the western and southern parts of the country (and Britanny) have been largely spared. In Switzerland, the French-speaking part, Romandy, has epidemiological statistics close to France whereas its German-speaking, Alemanic part evinces strong similarity with Germany and Austria, and its Italian-speaking part, the Tessin, strong similarity with northern Italy.

Variations in public health policies : Asia

In addressing inter-country variations, a lot of attention has been paid to explanations that privilege public health facilities and policies, including the capacity of the governement to plan and anticipate and its ability to act decisively at the right moment. In this regard, South Korea, Taiwan, and to a lower extent Singapore, have been presented as models to emulate because, following early warning signals, they were able to intervene early in the transmission chain of the virus. Concretely, this means that they tested people belonging to a hotspot of infection and isolated them as soon as they were detected positive. By thus breaking or slowing down the propagation process at a critical stage, they could avoid to lock down their people with all the adverse economic and social consequences that this implies. The availability of an adequate testing and contact-tracing capacity was a major factor of success, and there is no doubt that in building it the governements of Southeast Asia had learned from their experience of the first epidemic of SRAS (2003), now called SRAS-1, which eventually did not propagate outside Asia. And it is not only a matter of good public governance but also of self-discipline on the part of the citizens themselves : the latter, too, had learned from the SRAS-1 experience and quickly adjusted their behaviour when the threat of SRAS-CoV-2 emerged.

Other Asian countries have also followed effective strategies to box the epidemic, such as Vietnam and the state of Kerala (India). Vietnam intervened energetically soon after the virus's outbreak. In no time, the government declared a state of emergency. Carriers were swiftly detected and isolated with the particular aim of protecting old people. To trace the contacts of infected travelers, the contribution of the personnel from the army and the civil service (in addition to health workers) was called for while stringent lockdowns were imposed on some districts with the assistance of heavy police guard (Economist, 9-15 May 2020 : 41).

Interestingly, Kerala had learned through an earlier experience of struggling against another bat-borne pathogen, the Nipah virus. Remarkably, this virus was tamed within a month, thanks to « an all-hands approach that included district-wide curfews, relentless contact-tracing and the quarantine of thousands of potential carriers » (Economist, 9-15 May 2020 : 40). The government of Kerala has used the same approach to fight covid-19, and it obtained the same impressive results with very few deaths. It is remarkable that just three days after reading about the new virus in China, and before Kerala had its first case of Covid-19, the Minister of Health, Shailaja, held the first meeting of her rapid response team. The next day, 24 January, the team set up a control room and instructed the medical officers in Kerala's 14 districts to do the same at their level. By the time the first case arrived, on 27 January, via a plane from Wuhan, the state had already adopted the World Health Organization's protocol of test, trace, isolate and support (Guardian, 14 May 2020).

The aggressive measures adopted by the government meant that at the height of the virus, as many as 170,000 people (out of a population of 35m people) were quarantined and placed under strict surveillance by visiting health workers. Those who lacked an inside bathroom were housed in improvised isolation units at the state government's expense. Even more impressively, 150,000 migrant workers from neighbouring states who were trapped by the lockdown in Kerala were accommodated, housed, and fed with no less than three meals a day for six weeks. Those workers are now being sent home on charter trains (Guardian, 14 May 2020). In the other way around, the situation was less favourable since twenty times more of the country's people have died of the illness in another country than have at home (bear in mind that many people from Kerala work abroad, particularly in the Gulf countries).

Variations in public health policies : Europe

Returning to Europe, an essential fact is that it did not go through the SRAS-1 painful experience and could not, therefore, draw useful lessons from it for the future. Moreover, it did not take seriously the outburst of the SRAS-CoV-2 in Hubei province (China) since the belief was that, like SRAS-1, it would remain confined to Asia. Hence the general state of poor preparation of European public health systems when the virus penetrated in Europe. Worse, even the Italian plight did not cause a serious alert in many European countries because Italy

had a reputation of ill-organization and poor public health that cannot be generalized to other (West-) European countries. A number of countries, however, reacted faster than others and had available a better testing capacity from the very start of the epidemic. Foremost among them were Germany and Austria which have been considered ex post as the European best emulators of South Korea, Taiwan, and Singapore in terms of public health systems and policies.

Much less publicized are the sound approaches of Eastern European (and Baltic) countries in which the propagation of the virus has been relatively well controlled, with few hospitalizations and deaths. In addition to having younger populations and lower population densities than the worst-affected countries (Italy, Spain, France, the United Kingdom, Belgium, and the Netherlands), Eastern Europe benefitted from effective governments which took tough measures rather early in order to counter the first wave of the epidemic. This is probably due to the fact that they took the events in Italy more seriously than the comparatively self-confident countries of Western Europe. Thus, for example, the Czech Republic and Slovaquia quickly imposed the wearing of the face-mask even in the outer space. Also, the lockdown was pronounced earlier than elsewhere : whereas public meetings and events were still authorized in the United Kingdom and the Netherlands in the second and third weeks of March, a partial or complete lockdown was already in force in most Eastern European countries.

In Romania, the government responded to covid-19 with a harsh lockdown, declaring a state of emergency even before the country's first official death. This implied, among other things, that written declarations of purpose were required to leave home. Croatia required a government-issued pass to travel between towns whereas in Poland, among the first European countries to shut its borders, children under 13 were barred from leaving home without an adult, shoppers were compelled to wear disposable gloves and face-masks were required in public. Serbia, Hungary and Bulgaria were also quite fast in enacting harsh lockdown policies, contrasting with the United Kingdom, the Netherlands, and above all Sweden which never imposed a lockdown and preferred to opt for a policy of « freedom under responsibility » (Logo Business AM, 2020, May 6 ; Economist, 2020, May 2 : 16-7).

The particularly mild policy of Sweden allows for an interesting experiment since neigbouring Denmark, which shares may similarities with Sweden, followed the way of a rather harsh lockdown. The comparison is in favour of Denmark where infections and deaths caused by the virus are significantly lower than in Sweden : to this date, there are about 2,600 cases/1Million people in Sweden compared to 1,800/1M in Denmark, while the death rate is 320/1M in the former and only 90/1M in the latter. If Sweden is compared to Norway, the comparison is still more disadvantageous for Sweden since the rate of infection in Norway is hardly 1,500/1M, and the death ratio is as low as 40/1M (statistics extracted from worldometers as of May 7, 2020).

Genetic variations

Recently, microbiologists from the university of Ghent in Belgium have argued that part of the differences in the intensity of the epidemic are attributable to genetic variations. More precisely, some population groups carry a gene (ACE1) that facilitates the fixation of the SARS-CoV-2 while other groups exhibit a higher frequency of the polymorphism D of the same gene, which apparently makes them more resistant against this virus (Delanghe et al., 2020). Interestingly, the more one moves toward the eastern parts of Europe, the higher the incidence of this favourable variant of the ACE1 gene, and not only Eastern European countries but also Austria-Germany, Scandinavia, and southern Italy (where the Norman conquest left its biological imprint) are included in the zone where the polymorphism is found. Spain, Northern Italy, France, Belgium, the Netherlands, and the United Kingdom are not.

Although it is hard to say presently how far this genetic variation goes toward explaining the aforementioned inter- and intra-country differences in the propagation of the epidemic, it cannot be ignored and one wishes that the supporting research will soon be extended to other countries beyond Western and Eastern Europe, including Russia and other continents.

Cultural variations : contact habits

In addition to genetic variations and variations in public health policies and capacities, cultural differences can also potentially account for the observed contrasts in the incidence of covid-19. It has thus been noticed that contact habits and attitudes may differ significantly between some countries. Thus, the Japanese habit of keeping reasonable distances between interacting people strikingly contrasts with the Western European habit, especially in southern Europe, of kissing and hugging friends, relatives, and acquaintances. Moreover, in some countries like South Korea, China, and Japan again, people are accustomed to wearing facemasks as a way to protect themselves against air pollution, an attitude which is an oddity in Europe. In Vietnam, too, social comfort with wearing face-masks, acceptance of being isolated away from home, and respect for expert advice seem to have played a significant role (Economist, 2020, 9-15 May : 41). It is evident that these East Asian cultural habits are a big advantage under a virus attack when precisely these attitudes are conducive to effective protection against contamination.

There is yet another important sense in which cultural variations do matter, and they relate to the frequencies of contacts between people. For example, the Italian society is strongly centered on the family with the consequence that relatives frequently pay visits to each other. In particular, children and grandchildren often visit their grandparents and not doing so (when feasible) is considered as a grave breach of duty or social norm violation. In Scandinavia, by contrast, interpersonal contacts are not only more distant but also less frequent. It happens that so-called contact matrices have been estimated for a large number of countries, and they display such contact frequencies both within and between different age classes. A simple glance at these matrices shows, for instance, that the density of contacts is comparatively high for Italy and much lower for Germany. As for Belgium, it occupies an intermediate position.

In a recent paper, we have carried out an exercise that proceeds in two steps: first, using a standard age-structured epidemiological SEIR model calibrated on Belgian data, we simulate the effects of different lockdown exit strategies on the evolution of the epidemic, once its peak has passed ; and, second, we repeat the same simulations after having replaced the Belgiumspecific contact matrix by that of Germany and then by that of Italy keeping all other parameters unchanged. The three matrices are shown in Figure 1 below where it is clearly seen that the density of contacts both within given age groups and between different age groups is much higher in Italy than in Germany, with Belgium occupying an intermediate position. The Italian society, is characterized by many more visits between members of two or three generations than is observed in Germany (each cell reports the average number of contacts an individual belonging to age group *i* has with age group j)¹. How these cultural variations get translated into an epidemic and the ways of exiting it is the question raised by the authors (Platteau and Verardi, 2020).



Figure 1 : Contact matrices for Germany, Belgium, and Italy

Source: Prem at al. (2017)

To re-open the economy, the government of Belgium has three policy instruments : the extent of re-opening of the economy and the society (including schools), varying degrees of stringency of social-distancing measures, and varying scopes of the virus-testing programme. Different combinations of these policies define as many so-called lockdown exit strategies. To limit their number, Platteau and Verardi explore the following possibilities : partial or complete re-opening of the economy, no distancing versus moderate or stringent distancing, and no testing versus moderate or strong testing. They compare the effects of 11 different combinations of these policies (corresponding to 11 different exit scenarios) on the evolution of the epidemic and lend special attention to the presence or absence of a rebound effect and the date at which the epidemic comes to an end (in the absence of a vaccine). Then comes the critical step in their argument whereby they compare a given scenario as it unfolds in the case of true Belgium (the SEIR model fitted to Belgian data, including its specific contact matrix), pseudo-Germany (the same model where the contact matrix after the lockdown exit is now that of Germany), and pseudo-Italy (the contact matrix used is that of Italy).

Below, we present three comparative scenarios that will suffice to convey the central message of the simulations. In the first case (see Figure 2a), the government decides to completely re-open the economy and the society, yet not without ambitious public health measures in the form of strong social-distancing measures (implying the wearing of face-masks for social encounters) and strong testing (implying that each day 5% of the asymptomatic people in the population are detected and isolated). In the second case (Figure 2b), it re-opens the economy only partially, and the two accompanying public health policies are set at a moderate level. Finally, in the third case (Figure 2c), the economy and the society are only partially re-opened but strong public health measures are imposed.

¹ Note that the matrices are not symmetric but need to satisfy reciprocity. This means that within the population, on average, the time spent by someone from category A with someone from category B has to equal the time spent by someone from category B with someone from category A.



Figure 2b : Comparing Belgium, pseudo-Germany and pseudo-Italy



Re-open partially with moderate social distancing and moderate testing

What do we learn ? The first figure shows that, if only Belgians could inherit the contact habits of the Germans on the day of the exit of the lockdown, they would be able to completely re-open their economy and society provided that the government adopts strong public health measures on the levels of both social distancing and testing. Because they have other contact habits, however, complete re-opening is impossible without triggering a rebound of the

epidemic even when strong public health measures are enforced. And this rebound would cause a second significant peak. Moreover, if they inherited the contact habits of the Italians, the rebound they would suffer from would be still more serious : the second peak would be much higher and would occur faster. At the same time, the epidemic would extinguish itself earlier thanks to quicker building up of herd immunity in the population.

The second figure shows that even with moderate public health policies, Belgium could succeed in partially re-opening its economy and society without having to fear a rebound. To achieve that outcome, however, Belgium would have needed to inherit the contact matrix of the Germans. Since it does not, a rebound is unavoidable even though the second peak is now smaller than the initial one, attesting to the importance of reducing the extent of re-opening. With the Italian contact habits, Belgium would face an alarming rebound with a peak almost four times as high as the initial one.

Figure 2c : Comparing Belgium, pseudo-Germany and pseudo-Italy



Scenario: Re-open partially with strong social distancing, т=.05

Finally, we learn from Figure 3 that if the government combines partial re-opening of the economy and society with strong distancing and ambitious testing, real Belgium can avoid a rebound. If Belgians inherited the contact habits of the Italians, however, they would need a lot of time to get the epidemic under control, attesting to the importance of strong public health measures. With German habits, Belgium would not only avoid a rebound but also bring the epidemic to an end much earlier.

To sum up, with their own culture the Belgians must implement rather ambitious testing (and contact-tracing) schemes and enforce rather strict social-distancing measures if they want to avoid a rebound of the epidemic while re-opening their economy partially. If they inherited German cultural habits on the day of exiting the lockdown, they could avoid a rebound by implementing only moderate measures of testing and social distancing. But if they inherited Italian cultural habits, they would have no choice other than implementing very severe public health policies and proceeding much more slowly in re-opening their economy and their society.

Cultural variation : civic sense

In the foregoing discussion, we have implicitly assumed that the policies enacted by the government are enforced. This needs not be so, though. Citizens may show laxity in their abidance of governemental prescriptions and, if effective detection and subsequent punishment of rule violations are not in place, these prescriptions may be circumvented to a variable extent. Violating them is especially easy in the private sphere of life where government's intrusions are very hard to make and may be highly unpopular. For instance, if the government decides that family meetings may not gather more than four people who must always be the same (a rule adopted by the Belgian authorities as of May 1), and that social distancing must be respected in these meetings, it is obvious that it does not have the means of enforcing these measures. Hence the need to rely on the civic sense of the people, something that Belgian authorities officially declare as their policy: « the heart of our approach is a civic contract with the people since we are unable and also unwilling to police the private way of life », said the Prime Minister, Sophie Wilmès, while spelling out the national lockdown exit strategy on the eve of its implementation.

Assume that the government does not impose the public health measures but only recommend them. Then, economic theory shows that the decentralized optimizing behaviour of the people will yield an equilibrium in which the amount of social distancing would be smaller than the amount that the government would itself choose (Garibaldi et al., 2020; Alfaro et al., 2020; Eichenbaum et al., 2020). This is essentially because, when making their decisions, individuals take into account the risk of infection that social activities imply for themselves, yet not the externalities that their behaviour is liable to create. More specifically, they think of the risk of being infected by other people but not of the risk of contaminating them. Moreover, they ignore the congestion externalities that expose the available medical facilities to the risk of acute stress (Ichino et al., 2020). Under our assumption, whatever the government decides, the people choose too high a level of social activities because they under-estimate their social cost.

To translate this situation in terms of our model, we consider that, even though the government enacts strong social-distancing measures, for example, what the people actually implement are moderate distancing measures. The effects are entirely predictable by just labeling the measures as they are actually enforced rather than as they are officially declared. Now, if people have a strong civic sense, they will attach a positive value (utility) to the very act of following the government's prescriptions (or advices). If this is the case, the optimal level of social distancing under a decentralized equilibrium will get closer to the social optimum chosen by the government. We need not think of civic sense as a given that inherently characterizes some nations or groups whereas it is irreparably lacking in other nations or groups. As a matter of fact, people are able to learn from their experiences. It is therefore likely that Asian people who previously went through potentially dangerous epidemics have become not only able to better assess the costs of no-protection but also to better understand the benefit of following prescriptions enacted by their government. These two effects help explain the aforementioned fact that the same people have more easily complied with stringent public health measures than people from advanced Western countries who were not accustomed to the crisis conditions caused by Covid-19.

Conclusion

Our discussion suggests that a country like Germany is probably cumulating all or many of the advantages that work toward a successful lockdown exit: (1°) it possesses a strong public health infrastructure and has chosen sound public health policies that prepared the ground for

an effective battling against the covid-19; (2°) its people possess genetic characteristics that may make them less vulnerable to the virus; (3°) the contact habits that guide individual behaviour help slow down an epidemic, and (4°) they may evince a comparatively high level of civic sense. It is almost by chance that some of these characteristics operate in favour of Germany in the extraordinary circumstances created by Covid-19. In particular, the comparatively weak role of the family in Germany is not necessarily an advantage and some may see the family-based model of Italy preferable when ordinary conditions prevail. But the situation is radically modified in conditions of a raging epidemic when such a model is suddenly transformed from an asset into a liability.

Contact frequencies may also provide an (partial) explanation for the aforementioned variations inside Switzerland where in terms of rates of infection and death rates, the French-speaking part is close to France, the German-speaking part is close to Germany and Austria, and the Italian-speaking part is close to northern Italy. It is true, on the other hand, that important variations, such as those observed between northern and southern France, are not accounted for, attesting that there is no unique explanation for all the geographical differences observed. However, there is a key lesson to draw from our work and from the foregoing discussion: there is no one-size-fits-all solution that could be uniformly applied to all countries and even to all regions inside a given country. It is perhaps not coincidental that the European Union has been unable or unwilling to suggest, let alone prescribe, a common lockdown exit strategy for all its members, leaving them free to make their own decisions in the matter. The diversity of peoples and cultures inside Europe is too large to allow for a general solution to the complex problems raised by the present pandemic. The same conclusion also applies to large federal political entities, India, Russia, and the United States, for example.

References

Alfaro, L., E. Faia, N. Lamersdorf, and F. Saidi, 2020. "Social Interactions in Pandemics : Fear, Altruism, and Reciprocity", CEPR Discussion Paper, DP14716.

Delanghe, J.R., M.M. Speeckaert, and M.L. De Buyzere, 2020. "The Host's Angiotensin-Converting Enzyme Polymorphism May Explain Edipemiological Findings in COVID-19 Infections", *Clinica Chimica Acta*, June, 505: 192-193.

Economist, 2020. "Infectious Doubt", 2-8 May, pp. 16-17.

Economist, 2020. "Bargain Abatement", 9-15 May, pp. 40-41.

Eichenbaum, M., S. Rebelo, and M. Trabandt, 2020. "The Macroeconomics of Epidemics", CEPR Discussion Paper, DP14520.

Garibaldi, P., E.R. Moen, and C.A. Pissarides, 2020. "Modelling Contacts and Transitions in the SIR Epidemics Model", *Covid Economics*, Issue 5, 16 April 2020, pp. 1-19.

Guardian (The), 2020. "The Coronavirus Slayer ! How Kerala's Rock Star Health Minister Help Save It From Covid-19", 14 May.

Ichino, A., C.A. Favero, and A. Rustichini, 2020. "Restarting the Economy While Saving Lives Under Covid-19", CEPR Discussion Paper, DP14664.

Logo Business, 2020. "Pourquoi les pays de l'Europe de l'Est sont-ils beaucoup moins impactés par le coronavirus ? ", 6 Mai.

Platteau, J.P., and V. Verardi, 2020. "How To Exit Covid-19 Lockdowns: Social Structure Matters", Centre for Research in Economic Development (CRED), University of Namur, Mimeo.

Prem K, A.R. Cook, and M. Jit, 2017. "Projecting Social Contact Matrices in 152 Countries Using Contact Surveys and Demographic Data", *PLOS Comput Bio*, 13 (9): 1-21.

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