COVID-19
UK Political Analysis

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Blowing Bubbles. Social distancing will come with contact contraction.

As of Monday, English residents will be able to visit a zoo in the morning, purchase jeans from what had previously been considered non-essential retail outlets in the afternoon (albeit in a different way to what had been previously thought 'normal') and watch a film at a drive-in cinema in the evening. How many of us will actually avail ourselves of this exciting opportunity is uncertain. On current plans, by July we will be able to frequent restaurants or pubs, seated either outside or at tables indoors that will probably by then be just 1.5 metres apart (the UK, Canada and Spain are the only developed nations insisting on 2 metres at the moment). Admittedly, we will not be able to send all of our children to school, we will be urged to avoid mass transit and international travel will not be restored until a set of air bridges are agreed with other countries (which is highly likely by July 1). A new normal not that different from the old one seems on the horizon.

Except that it is not. Three important academic publications released in the past 10 days are a sobering reminder of how challenging avoiding a second spike in the virus will be, how critical it is to limit overall mobility and the reality that social distancing alone will not be enough to keep the reproduction number below one. It will have to be linked to asevere and strategic contraction in the number of individual contacts that we enjoy.

Absent a vaccine, these factors will complicate and restict lifting the lockdown for a long period of time. Business overall and certain sectors of the economy need to address this.

EXECUTIVE SUMMARY

- Research indicates that the impact of the lockdown has been enormous. It has been responsible for about 80% of the fall in the reproduction number. It is estimated that in the period up to May 4th it saved some 470,000 lives in the UK.
- However, the legacy of the lockdown is that the best estimate for the number of UK citizens who have been infected is 6.8%. This is much lower than anyone thought it would be three months ago. The space for a second spike in infections (and therefore many more deaths) is clearly there. That risk has to be managed.
- A second and separate piece of research also clearly demonstrates the close link between mobility and the reproduction number. Social distancing can weaken the impact of increased mobility on R but it is highly unlikely to sever that bond.
- As a result, the research concludes that absent intense contact testing, tracking and tracing "an increase in mobility unsurprisingly shows a rapid reversion to exponential growth" in the reproduction number. This is a compelling argument.
- The final study shows that if mobility is restored and average social contacts are cut by 50%, but in a random and unstructured manner, then there will be a large increase in infections that would force the reproduction number well above 1.
- The researchers set out three different ways in which contacts can be curtailed alongside social distancing in a form that should be consistent with containing the virus. All are highly restrictive compared with pre-coronavirus socialisation.
- The practicalities of operating a test, track and trace system without a very effective app that is almost universally used will also push policymakers in the direction of insisting upon constrained contacts in order to avoid a second spike.

The UK has had many challenges in dealing with the coronavirus crisis, largely because of its demography and an economy with a small and extremely specialised manufacturing sector. In one aspect, however, it has and continues to be at the absolute cutting edge internationally. The research and modelling associated with especially but not uniquely

Imperial College, London and Oxford University have been astonishing in their influence. The same two institutions are at the front of the pack in the race to secure any vaccine.

This has been a bumper few days for those of us who actually rather enjoy reading the research output on coronavirus (even if some of the equations are truly mind-numbing). There are three which have recently emerged that are of real consequence to business.

Exhibit A. The impact of the lockdown on death rates and infection rates in Europe.

The first of these is *Estimating the effects of non-pharmaceutical interventions on COVID-19 in Europe* (snappy titles tend not to be a feature of academic publications), which was released on Monday in the journal *Nature*. This involved a large collection of researchers from several leading institutions. It modelled the effect of lockdown measures in eleven European countries that had (in different ways) imposed such rules, between the point that they came in and May 4th. It is an impressive and extremely important exercise.

Much of what it found is highly positive and welcome. The impact of the lockdown has been immense. It was responsible for some 80 per cent of the fall in the reproduction number. As a consequence, R was (as of May 4th) deemed to be below one in all of the countries surveyed, with some doubts remaining about Sweden. In the UK it was thought to be in the 0.7-0.8 range, which is a little better than the official UK Government figure. The result in terms of deaths averted is staggering. Across the eleven countries it is believed that 3.1 million lives were saved compared with continuing life as we had done. In the UK alone, the researchers outline that 470,000 fatalities had been avoided. This has to be considered a triumph of public policy and of a civic spirit which meant that the level of compliance with the lockdown was much higher than had been thought possible.

These findings do, though, come with a sting in the tail. The numbers of people who had been infected (as of May 4th) are much lower than any official projection was or would have been three months ago. For the 11 countries as a whole the average range is 3.2%-4.0%. It varies from lows in Norway (0.46%), Austria (0.76%) and Germany (0.85%) to

highs in the UK (5.1%), Spain (5.5%) and Belgium (8%). None of these are numbers of the scale that would have been anticipated. The UK, like the rest of Europe, is in the process of liberalising the lockdown with the better part of 93% of its population (there will have been a small rise in infection rates since May 4th) who have not had the virus, a group who plainly could contract it and manifestly could pass on it to others. This challenge is intensified by the absence still of mass instant antibody testing. This means that there are significant sections of the public who think that they have had the virus and can be relaxed about their health when they have not (due to misdiagnosis by themselves of their symptoms while unwell) and others who are under the impression that they have not had the virus when they actually have had it (but are asymptomatic).

These are not, to put it mildly, ideal conditions in which to attempt to restore society. By contrast (and being unacceptably brutal about it) if those 470,000 other deaths had been allowed to happen, we would by now be at about a 70% infection rate nationally, herd immunity would be about to enter the scene and the pandemic would be close to ended. Ministers and officials face an unenviable series of choices in the months ahead of us.

Exhibit B. The relationship between mobility and the reproduction number.

The second study released by Imperial College, London, also on Monday, is *COVID-19 Report 26: Reduction in mobility and COVID-19 transmission*. The object of this work was to "develop a framework to infer the relationship between mobility and the key measure of population-level disease transmission, the reproduction number (R)". It is a highly ambitious study in that it involved 53 countries. Their infection and death rates were modelled from before their lockdowns (of multiple types) and May 10th. The common measurement data deployed was that of Apple and Google mobility information. The metrics for Apple were the three that they measure: driving; walking and transit. In the case of Google it was three of the six variables they have the capacity to assess, namely transit stations, workplaces and retail and recreation activities (but not residential, grocery and pharmacy or parks as these did not work across such a large set of nations).

The results are once again striking. The correlation between reducing mobility and a cut in the reproduction number is evident. It was estimated that it explained 85%-87% of the change. Across the entire 53-country set, median mobility is thought to have reduced by 56% on the Apple criteria and 51% over the Google categories. The world slowed down. In some countries (Spain and Ireland) there were drops of 75% plus on Apple's statistics.

The UK fared well on this test too. The estimate made by the researchers is that this country needed a reduction of 66% on Apple mobility and 57% for Google mobility to be confident that the R number would fall below 1. As of May 10th, the numbers for the UK were 70% on Apple and 66% on Google. The R number for new infections was analysed as 0.91 on the basis of the Apple data and 0.82 for Google. This was a real outcome, as the researchers believed that the UK was one of only three countries (the others being France and Spain) where not only was the reproduction number under 1 but mobility had been suppressed to an extent that the disease could be considered "under control".

Yet, once again there is the bitter as well as the sweet. Those figures for the UK on May 10th (which was before any notable aspects of the lockdown were lifted) hardly allowed for a huge amount of headroom (4% on Apple mobility, 9% on Google mobility) once the public was permitted to move more freely. Without strong social distancing they would almost certainly reverse course and take the reproduction number back above 1 again. Indeed, social distancing alone probably would not cut the mustard. The conclusion was:

"In the UK, the latest estimated R numbers are significantly below the threshold of 1 but are sufficiently high that, even if social behaviour and control interventions remain unchanged, the epidemic in the UK would likely continue for months. If social behaviour and control interventions remain unchanged, we expect daily deaths predicted to drop below 100 around the end of June. Without other changes (eg no increase in contact testing), an increase in mobility unsurprisingly shows a rapid reversion to exponential growth (in the R number)." [Emphasis added here to that in the original authored text].

So much for "under control". What that really meant was under control in *lockdown circumstances*. Any sort of liberalisation of the lockdown will lead to an increase in mobility. There would be no point in making these changes in permitted activity if they

did not. The objective, and it is difficult, has to be (a) to allow increased mobility in a way that is least likely to affect the R number adversely and (b) to supplement formal social distancing with other measures which will have a benign influence on the R number.

Exhibit C: The crucial importance of constraining contacts with other human beings.

The final and in many respects most significant piece of research comes from a team mostly associated with Oxford University's Leverhulme Centre for Demographic Science. It is entitled *Social network-based distancing strategies to flatten the COVID-19 curve in a post-lockdown world* published in the journal *Nature Human Behaviour* last Thursday.

This material covers a range of options as to how limiting (or not) both the number and the nature of social contacts would have a positive or negative effect on the R number.

In the first instance, the team looked at what would occur if, after lockdown, life were conducted as before with no social distancing and no limits on social contacts. As might be expected, the "sombrero" expected back in mid-March reappears at the drop of a hat. Numbers skyrocket. The R moves rapidly above 1. Infection and death rates explode.

What might not be anticipated is what happens if one adopts what sounds like quite a strict regime of insisting upon social distancing and cutting the number of social contacts that an individual has by half, but doing so in a random rather than formally-organised fashion. To illustrate, what would transpire if a person sought to reduce their contacts by 50 per cent by attending work on a Monday, Wednesday and Friday but staying at home on a Tuesday and Thursday, or by any means in which the people who they did intend to have contact with were not chosen in advance and life organised around those contacts?

The answer, according to the modelling, is that there is still a very substantial spike in the infection numbers (about 40% of the "sombrero" situation) and the R is pushed above 1 for longer than in the "sombrero" scenario (albeit with a lower peak in the R number). This is a powerful warning that social distancing and general reductions in social contact are unlikely to be enough to avoid some form of second spike in the virus later this year.

The academics then tested three means of cutting social contacts by 50% strategically.

The first was to 'seek similarity'. Individuals would choose their contact partners based on similarity of a predetermined characteristic, such as geographical proximity (spatial similarity), or membership of the same organisation (such as a sub-department at work) or a shared demographic feature (such as age group). Restructuring contact in this way reduces so-called 'network bridges' to groups of geographically or otherwise distinct 'others' and to those with whom no organisation or characteristic is shared (the rest of humanity). This contains any outbreak of the disease in localised areas of a network.

A prerequisite for this strategy is that people seek similarity on a dimension that facilitates forming comparatively small groups (for instance, those that are based in a designated geographical neighbourhood or in comparatively modest organisations).

The second approach is described as to 'strengthen communities'. Individuals must consider with whom their contact partners usually interact. When reducing contact, one should prioritise removing ties not already embedded in triangles (a triangle is a network configuration of individuals in which all three are mutually connected already). Hence, people should interact less with others who are not also in contact with their other contact partners. For example, two friends should only meet if they have many other friends in common. Once again, this would contain any second outbreak of the virus.

Finally, there are "social bubbles". While there is an overlap in vocabulary with the "support bubbles" which will be allowed from this weekend, the audience and intention in this case is significantly different. The aim here is having a small number of intense contacts. Individuals must decide whom they want to see regularly and strictly ration their contacts simply to those people. This reduces the number of contact partners but encourages a larger number of interactions. It seals off the outside universe. Employers could attempt small departmental or work unit "bubbles" of employees. These tight micro-communities are hard for a virus to penetrate and – crucially – if the infection is contracted by one contact in the bubble it probably will not spread much further beyond the bubble itself. This would drive the reproduction number downwards.

What do the researchers determine would work best? There is some good news here.

The first is that we can identify a 'winner'. The social bubble approach is the ideal one. When compared with a 'social distancing plus 50 per cent random social contacts cut', it delays the peak of any upswing by 37%, decreases the height of that peak by 60% and results in 30% fewer infected individuals at the end of the simulation endeavour. This is more efficient than the 'strengthening communities' and the 'seeking similarity' strategies in that order (delay of the peak by 34% and 18%, decrease in peak height of 49% and 44% and reduction of total infected individuals of 19% and 2% respectively). Furthermore, the seemingly least valid of the trio ('seeking similarity') can be rendered a much better performer if the single dimension of similarity chosen is that of geography.

The second is that all three (if 'seeking similarity' is based on residence) should be enough, when combined with social distancing, to keep the R number below 1 except in extremely localised (and ultimately containable) conditions, so avoiding a serious spike.

The third is that there is modest scope for mixing two (but probably not all three) of these approaches over time as the virus starts to work its way out of the system. To start with, nonetheless, it would almost certainly be better to choose one route and stick to it.

Personally, I do not find any of these three strategies immensely appealing. Ministers and officials probably do not adore them either. Yet they may become unavoidable. If the UK could be absolutely confident of an extremely accurate app that would allow any person who felt that they may have acquired the virus to self-isolate and obtain a test rapidly, and for their contacts similarly to be able to withdraw from society, but then be released again in a day or two once they had been tested, then these sorts of drastic social arrangments might be unnecessary. Such an app does not seem to be there yet. Matt Hancock was plainly reluctant to promise its imminent arrival speaking yesterday.

What we have is a far more 'old school' notion whereby a person who feels ill makes contact with an official contact tracer, explains who their social circle is, and then that set of individuals can be contacted and asked to stay at home while a test is conducted. The first results reported yesterday were respectable but well short of complete success.

This system will work far better if individuals construct their social and economic lives so that they can state with confidence and precision that "I am close to these ten people" and not "I stood next to some bloke called Matt in the office kitchen yesterday, there is half a chance that I might have passed it on to him." The second route promises chaos.

Conclusion.

The first route, however, promises a more complicated and far less normal economy and society. To illustrate this, it might be best to end with the thoughts of the research team as to how the post-lockdown United Kingdom might reset itself to avoid a second spike.

"For hospitals or essential workers, risk can be minimised by introducing shifts with a similar composition of employees (that is, repeating contact and creating "bubbles") and distributing people with shifts based on, for example, residential proximity where possible (that is "seeking similarity" on a spatial basis). In workplaces and schools, staggering shifts and lessons with different start and end times by discreet organisational units and classrooms will keep contact in small groups and reduce contact between them. When providing private or home care to the elderly or vulnerable, that some person should visit rather than rotating or taking turns, and that person should be the one with the fewest bridging ties to other groups and who lives the closest to them. Repeated social meetings of individuals of similar ages who live alone will carry a comparatively low risk. However, in a household of five, when each person interacts with different sets of friends, many shortcuts are being formed that are potentially connected to a very high risk of spreading the disease." [Emphasis added here to the original text].

These sorts of high-calibre studies are the core of what SAGE and other advisory bodies digest and in turn frame their recommendations to ministers and officials. They are the best advance warning of what is likely to become Whitehall thinking, policy and action.

They suggest that radical reconstruction of social contacts and interaction will soon be demanded alongside social distancing. This will complicate restarting the economy and might need to continue for an extensive and unpredictable duration. Food for thought while at a zoo, buying new jeans or watching a film from inside a car. Roll on a vaccine.

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