

Health and Economic Costs after COVID-19 Lockdown Phase-Out: Optimal Trade-offs among Exit Strategies

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Context

- As the COVID-19 virus has spread, several countries have implemented a complete lockdown to prevent a spike in cases that would overload medical facilities and potentially cause up deaths in the hundreds of thousands in some countries, and possibly millions in the USA in a worst case scenario.
 - 1) Experience around the world suggests that easing off the current measures even slightly would accelerate the spread to an unmanageable degree. Complete lockdown is currently the only option available in most countries.
 - 2) Accelerating business failures and unemployment suggests that even substantial support through fiscal stimulus measures may not be enough to prevent scarring and lasting economic damage on industrial dynamics and human capital.
- Consequently, once new case numbers are reduced, there is an urgent need to find an exit strategy from the lockdown that contains the human life and health costs while allowing the economy to get back in gear. Below some options and the trade-offs involved are outlined.

Stock Markets

- In March 11th, 2020, stock exchanges around the world plummeted catastrophically, in unison, by at least than 10%
 - US
 - Dow Jones Industrials Average (aggregate across sectors)
 - S&P 500 (largest corporations)
 - NASDAQ (tech companies)
 - UK: FT100 (Financial Times index)
- The collapse for financial portfolios was the worst in over 30 years (since 1987 more exactly)
- Indeed exceeding the drop after the spectacular crash of Lehman Brothers that open the flood gates for the 2008 international financial crisis – aka the Great Recession.
- On the same day, in Tokyo and Frankfurt, the falls in asset values reflected by the NIKKEI and DAX indices were even deeper in proportional terms reaching nearly 13% losses respectively.
- In other major global stock markets, Hong Kong (Hang Seng), Shanghai and Shenzhen had losses that were relatively more subdued, but substantial at less than 4% overall.

Flight to Safety

- Beyond the simultaneous drop of all the stock indices, there was also the decline of credit default swap (CDS) numbers that provide an indication of demand for treasuries and other bonds regarded as relatively very safe assets
- Normally when investors shed risky equity from their portfolios, there is flight to the safety of Treasury bills and other government bonds
- But here, the evidence points to a sizable shift towards cash, with the US dollar gaining value against all major currencies, except the Japanese Yen
- Some have interpreted the decline in the demand for equity and bonds in favor of liquid assets as signaling potential panic among global investors currently beset with dual extreme uncertainty
 - Layer 1: Scientific and epidemiological knowledge about COVID-19 is limited
 - Layer 2: Erratic risk management in both health and economic policy by global decision makers
- Macroeconomic policy: COVID-19 being both aggregate supply and aggregate demand shock complicates optimal mix of fiscal and monetary policy

Challenges

- Lack of preparedness in a number of countries to deal with a pandemic of this proportion indicates serious general flaws in risk management
- With China's exception, where COVID-19 was first detected, governments were too slow to flatten the curve the only option to slow transmission was social distancing
- China was able to implement this strategy early and selectively with geographic segmentation focusing on the city of Wuhan in the province of Hubei
- But the social and economic costs of social distancing in terms of human capital and business network deterioration and of GDP losses is enormous
- The South Korean, German and Swiss strategy of massive testing and targeted healthcare/isolation is a superior option to flatten the curve
- But implementation requires supplies (for testing, prevention and treatment), technology and planning ahead
- While preparing for that strategy, deploy massive fiscal stimulus to limit the burden on the most needy until a viable exit strategy from lockdown measures is found

Exit strategies from lockdown: One size does not fit all

Six possible exit strategies from quarantine measures

Scenario 1 Lockdown until vaccine

- Retain reasonably heavy suppression measures until a vaccine is developed.

Scenario 2 Ease off gradually

- Ease off suppression measures such as event bans or school closures to keep infection rate steady and manageable.

Scenario 3 Adaptive triggering

- Ease lockdown once infections decline, reimpose when they begin to rise, repeat.

Scenario 4 Permits

- Use cheap antibody testing to identify immunity and allow those people 'out'; retain measures for those without a "passport".

Scenario 5 Weekly testing

- In the early stages of an outbreak, proactive screening facilitates active case finding, as well as contact tracing and quarantining.

Scenario 6 Contact tracing & testing

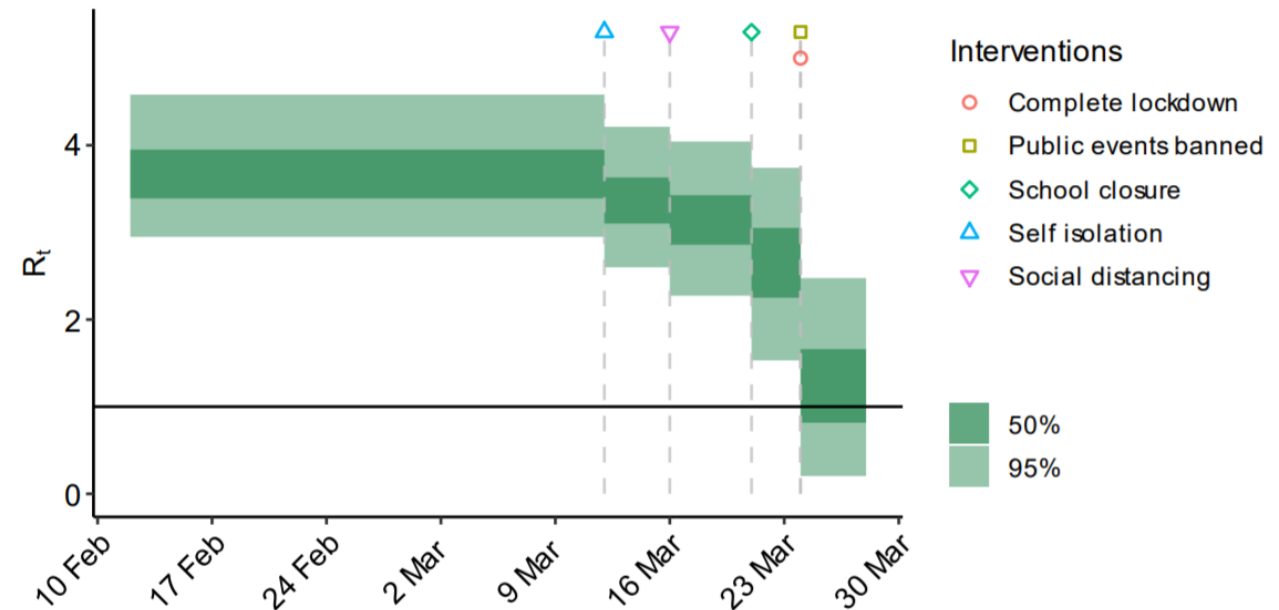
- Rollout of a contact-tracing app, combined with widespread PCR testing, to alert people who've been close to someone who subsequently tests positive.

Scenario 1: Lockdown until vaccine viable

- The baseline option is to maintain the status quo until a vaccine is developed. However, best estimates suggest that a vaccine could take over a year to develop and deploy.
- 12-month lockdown is likely to be practically impossible and economically extremely harmful in the short-, medium-, and long-run.
 - As case numbers drop, unemployment rises, and businesses go under, it may become **politically impossible** to maintain the current measures.
 - Even if it were possible, it could cause the **economy to shrink by a third** for a year.
 - The associated damage would **preclude any rapid economic recovery** – potentially large and permanent hit to living standards.

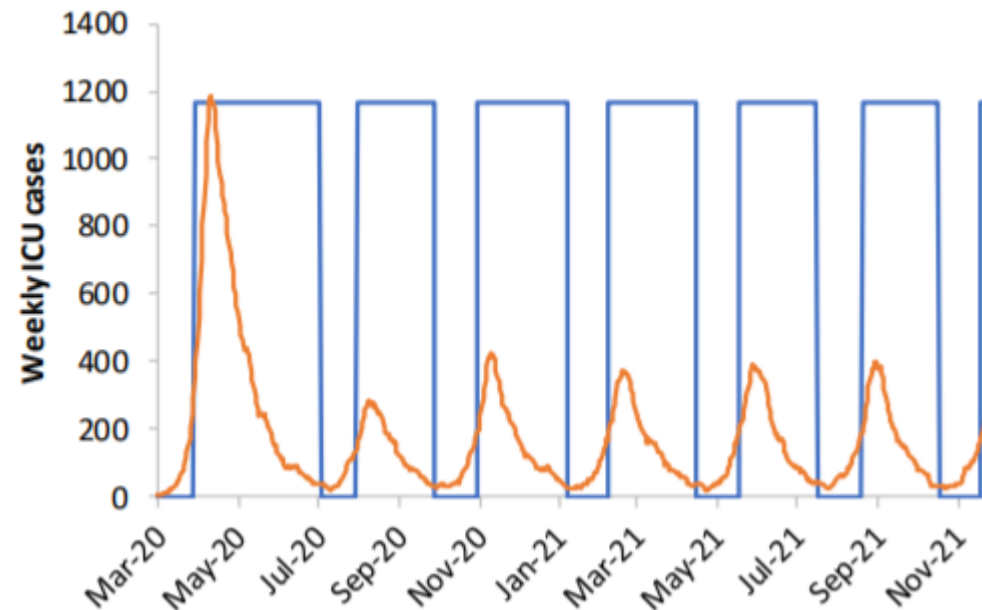
Scenario 2: Ease off on lockdown gradually

- In principle it might be possible to remove some of the measures currently in place while retaining others, in order to keep the reproduction number (R_t) below or very close to 1.
- Evidence to date suggests this is problematic. Imperial College research suggests that of all measures taken so far, only full lockdown may reduce R_t to around 1. Easing off alone therefore seems likely to yield another outbreak.



Scenario 3: Adaptive triggering

- Imperial College has proposed “adaptive triggering”: Social-distancing measures are implemented when ICU admissions pass a given threshold.
- However, shutdowns would be regular and last two-thirds of the year, making this little different to permanent lockdown from an economic perspective. Lockdowns could be less frequent if this approach was combined with others.



Scenario 4: Immunity permits

- Antibody tests – to identify those who have had the virus and are therefore immune – are potentially rapidly scalable, allowing some to return to work
 - Likely that only a minority will have had the disease in two months, limiting the economic benefits (although this is still uncertain).
 - With unemployment high, it will be politically unsustainable to allow some to work and keep others on benefits until a vaccine emerges.
 - Would be hard to maintain current measures – incentive for people to actively try to contract the virus.

Table 1: Posterior model estimates of percentage of total population infected as of 28th March 2020.

Country	% of total population infected (mean [95% credible interval])
Austria	1.1% [0.36%-3.1%]
Belgium	3.7% [1.3%-9.7%]
Denmark	1.1% [0.40%-3.1%]
France	3.0% [1.1%-7.4%]
Germany	0.72% [0.28%-1.8%]
Italy	9.8% [3.2%-26%]
Norway	0.41% [0.09%-1.2%]
Spain	15% [3.7%-41%]
Sweden	3.1% [0.85%-8.4%]
Switzerland	3.2% [1.3%-7.6%]
United Kingdom	2.7% [1.2%-5.4%]

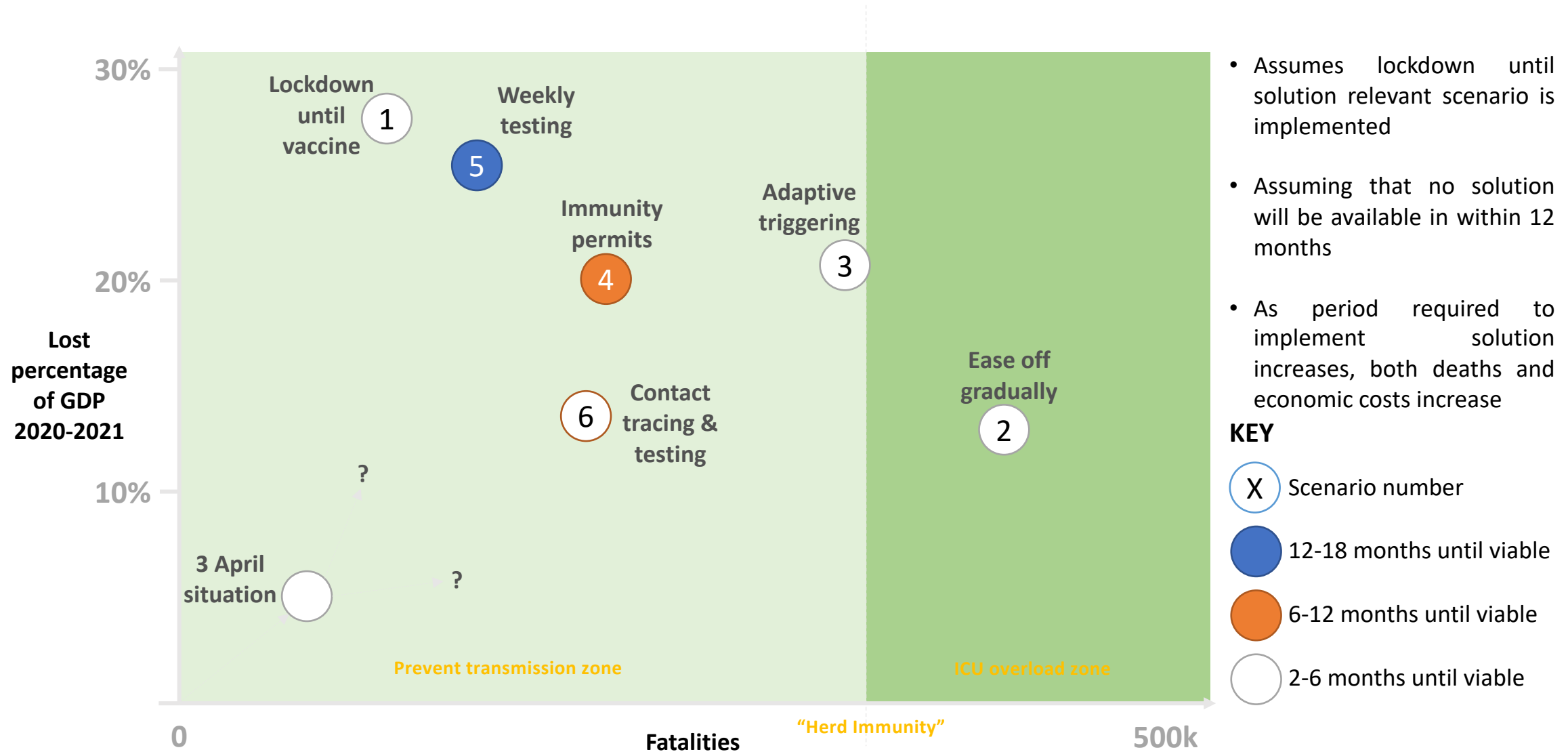
Scenario 5: Weekly national testing

- Two significant hurdles suggest this would not be possible for at least several months. Current challenges include both lack of physical resources and shortage of personnel:
 - Supplies: The availability of testing machines/kits suggest that it could take many months to achieve the million tests per day needed for a “testing only” approach
 - Human Capital: Administration of such a system would be complex, requiring a large trained workforce

Scenario 6: Contact tracing plus mass testing

- Contact tracing (CT) involves: identifying someone with disease; listing all those who have come into contact with the person; and monitoring or isolating those people.
- Whether CT can bring an epidemic under control ($R(0) < 1$) depends on:
 1. Transmissibility of the disease before symptoms appear
 2. The proportion of contacts traced
 3. Time between the onset of symptoms and isolation
- App-enabled contact tracing can act on 2 and 3 and is operational in some countries. Combining this with mass testing (PCR and antibody) would strengthen its effectiveness

Exit strategy trade-offs?



Two conditions for effective contact tracing

- Mass testing combined with contact tracing appears to offer the best hope for ending the lockdown and reviving the economy while minimizing deaths
- It is not currently viable but may become so within weeks. Viability rests on two conditions:
 1. Sufficient testing capacity to respond rapidly: If contact tracing is to be effective it needs to be supported by quick turn-around mass testing on demand
 2. CT technology with sufficiently wide take-up: Contact tracing is only effective if a) the coverage of contacts is high, and b) the message to isolate comes quickly to infected individuals

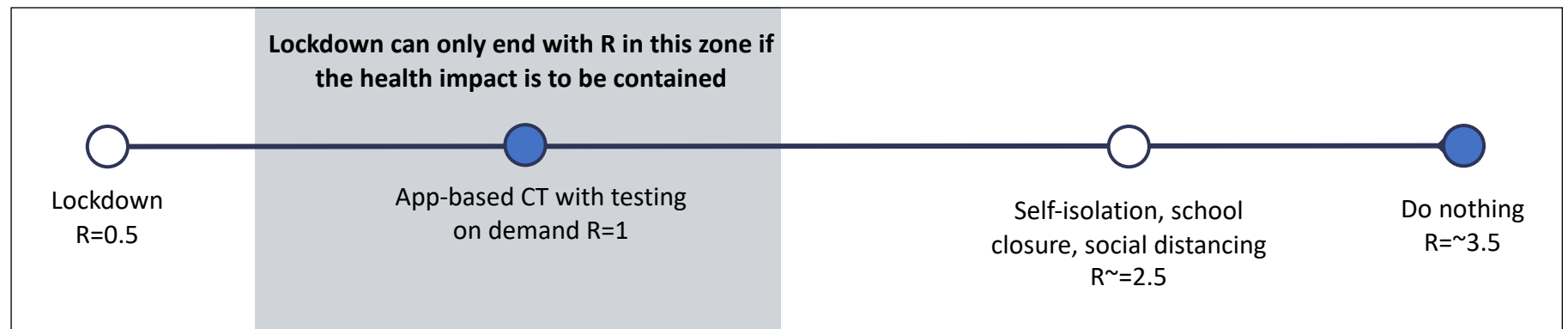
Boosting testing capacity

Five steps are required to boost testing capacity:

1. **Diversity:** Any lab capable of processing testing should be harnessed. Any company working on a viable test should be supported and, where possible, provided support to scale. This includes procuring from foreign producers.
2. **Open source:** Make funding, data and anonymised positive patient samples available to start-ups with promising tests. The private sector is not able to fully mobilise without anonymised patient samples.
3. **Oversight:** Appoint responsible agency just for ramping up testing capacity, reporting to the executive branch – including the option of kit/machine imports.
4. **Communication:** Establish a clear and effective route into the government and PHE's testing community for promising suppliers.
5. **Strategy:** Various targets and dates have been promised over the last week on testing. Now is the time for a clear, simple and achievable target that everyone can rally around.

A contact-tracing regime that gets $R(0) < 1$

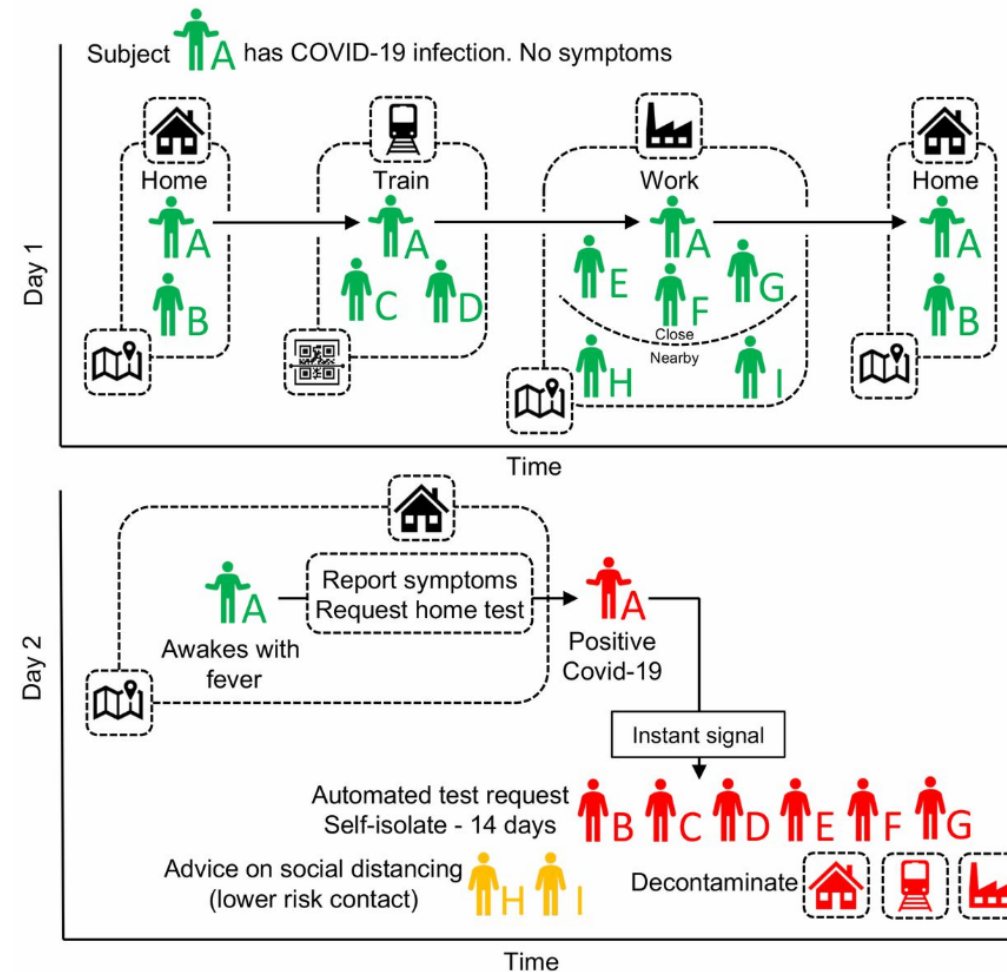
- The second condition for exiting lockdown is that the contact tracing technology is good enough to hold the reproduction number $R(0)$ below or close to 1. If it fails to do so, further lockdown will be required. The achievable level of $R(0)$ depends on:
 - **High coverage** of the population – modelling work suggests the large majority of the population would need to be involved.
 - **Rapid notification** to isolate – time-to-isolation is critical to reducing spread.
 - **Accurate diagnosis** – mass isolation triggered by self-reporting could undermine trust, so swift mass testing is essential.



R estimates entirely assumed, for illustrative purposes only

Contact-tracing regimes in practice

App-based technology can help if coverage is high and alerts are immediate.



From Luca Ferreti et al. (April, 2020),
Quantifying SARS-CoV-2 transmission suggests epidemic control with digital contact tracing

Singapore's TraceTogether

- TraceTogether is a voluntary app that informs users when they have been exposed to a person who subsequently turns out to be infected. It is currently used by around 1 million Singaporeans and designs out many of the civil liberties concerns that often arise:
 - **Works via Bluetooth** to establish the distance between the user's phone and other users' phones
 - Is **anonymous** – only the phone number is required
 - **Does not track** the user's location
 - Users have the right to **revoke consent** for the storage of their data at any time
- The Singapore government has recently announced lockdown measures and had to revert to severe suppression measures. TraceTogether currently has around 1 million users in a population of 5.7 million – coverage of less than 20%. It seems likely that the coverage needs to be significantly higher to stop the epidemic.

Geographic and demographic segmentation

- The potential of app-based contact tracing, combined with mass testing, to lower $R(0)$ is uncertain and would require continual adjustment and improvement relative to the experience in Japan and Singapore.
- Supplementary approaches that were very effective in China could be used to limit the health and economic damage during that process:
 - **Geographic segmentation:** There is substantial variation in the prevalence of the virus in different parts of the country. It may therefore be wise to take a regional approach to lockdown measures, easing them off in regions where case numbers are lower.
 - **Demographic segmentation:** It may be possible to ease lockdown measures on the working-age population first, especially if the propensity to COVID-19 is higher for older populations.

Economic Prospects and Investor Expectations

- Epidemiologists lamented,
 1. the sluggish implementation of social distancing, quarantines and ultimately lockdowns, and
 2. the lack of more widespread and much needed mass testing to slow down transmission
- Now there are concerted efforts around the world to more closely follow the WHO directives
- Also, the virus diffusion peak may happen within two months
- But, there may be further ways unless a solid post-lockdown strategy is in place to flatten the curve for good
- Learning from different strategies based on massive testing (e.g. Germany and South Korea) and also social distancing (e.g. geographic and demographic segmentation in China) have improved the prospects of slowing down contagion and fatalities
- Progress towards a credible exit strategy can move international investors to expect better prospects of a global macroeconomic recovery, especially if the much hoped for “flattening of the curve” happens relatively soon for economic activity to revive
- An optimal exit path involves not only controlling the damage to human life and health but also substantially dampening the overall economic cost of COVID-19