Strategies for controlling the medical and socio-economic costs of the Corona pandemic

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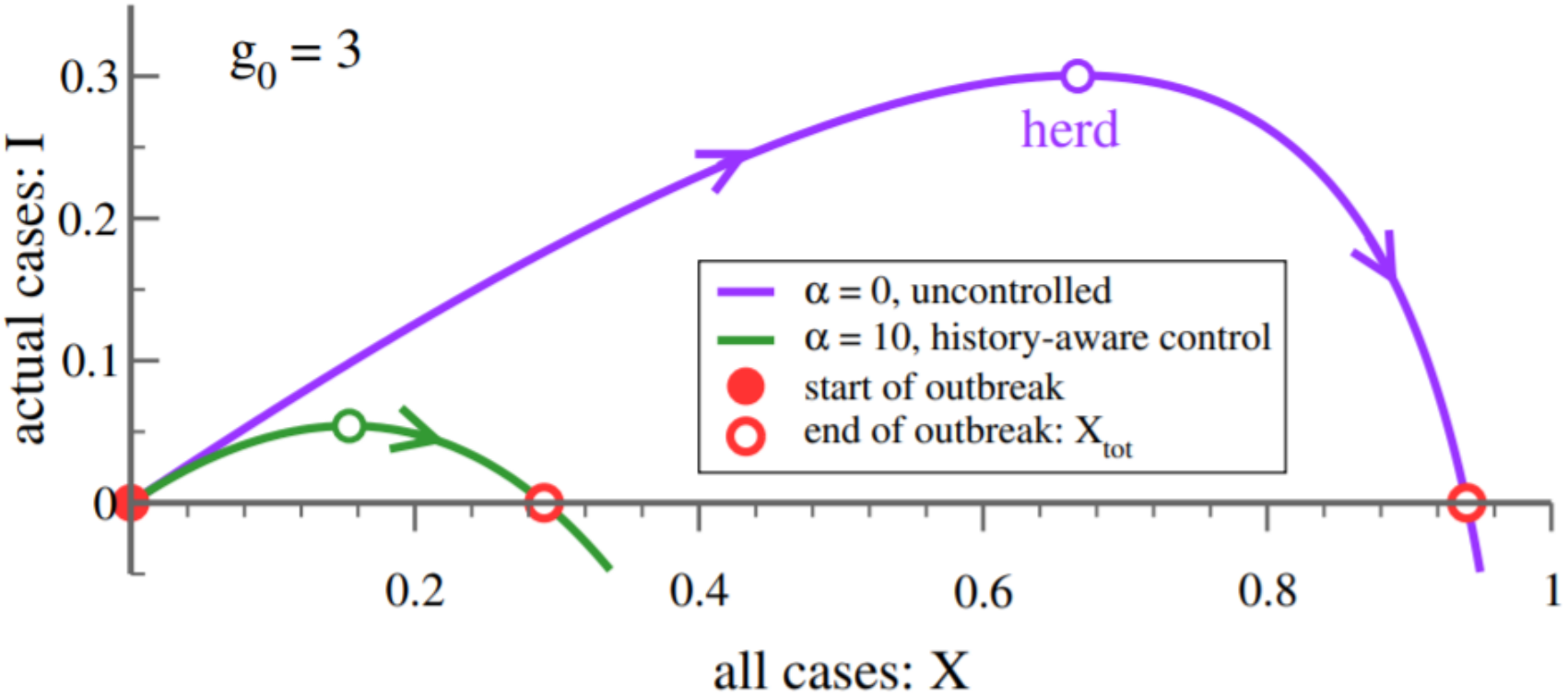
Based on (https://clausen.berkeley.edu/wp-content/uploads/2020/04/Corona.pdf)

Introduction:
Public health versus the economy?

- Purpose of paper:

1. Provide a simple estimate of costs of epidemic which is applicable across countries.
2. Provide model of epidemic when population and government react to spread of disease (key assumption: social distancing becomes acceptable when actual cases rise, providing evidence of its seriousness).
3. Put the first two elements together to check which approach leads to lowest social costs.

Avant-propos: Two technical points on i) herd immunity, and i) control



Part I: Simple estimate of (economic) costs of epidemic

- Most models concentrate on value of lives lost.
- We argue: medical (hospitalization, etc.) costs are important in themselves.
- Here: provide simple estimate of order of magnitude of both medical costs and value of lives lost – in a way that can be related to model and directly to overall evaluations of different strategies.
- Two simplifying elements:

1. No discounting (COVID-19 epidemic takes months, not years)
2. All figures as % of GDP per capita, facilitates cross country comparisons

Estimating ‘non life’ costs: bottom up versus top down

- Top down: take known costs so far, multiply by (inverse of) population still ‘susceptible’.
- Bottom down: look at key costs caused by infections (and multiply by percentage of population ‘at risk’): Key elements here: Working time lost, Hospital stay, Intensive care

Estimating ‘non life’ costs: top down

- Germany, the Ministry of Health has so far foreseen an increase in expenditure of about €10 billion, which amounts to about €50.000 per case, or 100% of German GDP per capita per case.
- Spain: similar, budget of the central government foresees for 2020 additional health expenditures of around €4.4 billion, or about €20.000 per case, about 2/3rd of Spanish GDP per capita per case (Hernández, 2020).
- Key question: proportion of population that might still be infected?
- For unchecked pandemic medical costs might be very large since potentially up to 90 % of population might be infected.
- All this without ‘bottleneck costs’ (ICUs, etc.).

Estimating ‘non life’ costs: bottom up

Key cost elements caused by infections (all in GDP per capita, unit of time 2 weeks (average for symptomatic cases):

First assumption: one half asymptomatic.

- Working time lost, two weeks symptoms plus isolation = one month lost = 5 % GDP p.c. .
- Hospital stay, two weeks for 20 % of cases with cost = 30 % of GDP.
- Intensive care, two weeks for 5 % of all cases with cost = 60 %
- Total hospital: 9 % (of GDP per capita, per case).
- Hospital + working time = 14% = 9 + 5 % (of GDP per capita, per case)

Estimating (economic) cost of lives lost

- Usual approach: take VSL (value of statistical life) and multiply by projected fatalities.
- Number of VSL usually taken from environmental or food safety studies, often in millions of euro/dollar (up to 100 times GDP).
- Immediate result: fatalities of only 0.1 % of population (like normal influenza!) still => cost of lives lost = 10 % of GDP
- A 1 % CFR => 100 % of GDP!
- => Models using VSL justify very high containment costs.

Estimating (economic) cost of lives lost, conservative approach

- VSL approach useful for rare events (especially those concerning the young), not for high frequency pandemic;
- we propose approach used in medical practice to value cost of life saving procedures, i.e. Years of life lost (YLL in reality similar to VSLY):
- Key value of year of life lost: +/- 1-3 times GDP per capita.
- Age specific fatality rates then become decisive.

YLL by age brackets

(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

Estimating (economic) cost of lives lost, final

- Age specific CFRs suggest total of years of lives lost = 0.27 per case, based on standard mortality tables.
- COVID-19 fatalities typically show one or several co-morbidity factors, suggesting lower life expectancy. But Hanlon et al. 2020 show that difference is rather limited (1-2 years lower).
- => lower bound for value of lives lost = 0.25 GDP per capita per case.

Summary of cost estimates

- Two key results:
- Top down and bottom up approaches concur that medical costs can be important in themselves, with +/- 10 % of GDP possible for an unchecked epidemic.
- This is equal to loss of GDP expected by IMF/Commission of 7-9 % of GDP for many countries.
- Value of loss of lives lost would more than double these costs, even on very conservative assumptions
- => ‘Great Lockdown’ justified?