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) | (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?