



Frankfurt School

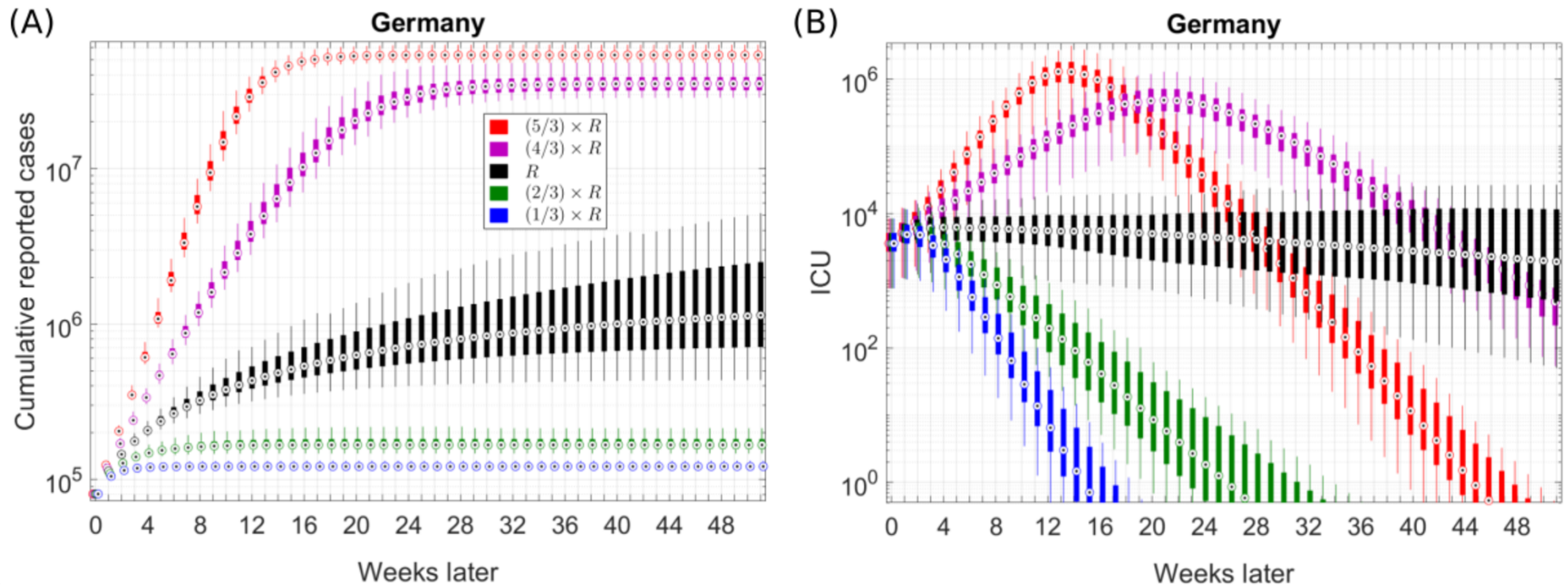
What Is the Price for Flattening the Infection Curve?

Afschin Gandjour

Background

- Distinguish 'flattening' and 'squashing' the curve
- 'Flattening' the curve:
 - Assumption: new vaccines or treatments will not be available before herd immunity is achieved
 - Goal: to prevent an overstretch of intensive care unit (ICU) capacity
- 'Squashing' the curve:
 - Goal: to suppress the pandemic until an effective vaccine or treatment becomes available (herd immunity is avoided)

Background



<https://www.medrxiv.org/content/10.1101/2020.04.04.20053637v1>

Aim

- Aim: To determine the clinical and economic value of a shutdown successful in 'flattening' or 'squashing' the curve
- Base-case comparator: no ICU capacity left to treat COVID-19 patients
- Other comparators: ICU capacity exceeded by 50%, 100%, 200%, and 300%

Methods

- A life-table model was developed in order to summarize the age-specific mortality impact of COVID-19
- Two methodological approaches:
 - Independence assumption: Individuals not dying from COVID 19 have the same probability of death as all individuals before the rise of the pandemic.
 - Harvesting assumption: Those who die from COVID-19 are sicker and "would have died anyway"
- Value of an additional life year is \approx €100,000 (based on negotiated prices for new, innovative oncological drugs)

Data

Input	Mean (range)	Reference
Probability of death by age and gender in Germany	see reference	Federal Office of Statistics, 2019
Population size by age	see reference	Federal Office of Statistics, 2020
CFR in Germany		Robert Koch Institut, 2020
Total population	0.021 (0.0037 – 0.021)	
0-4 years	0.001	
5-14 years	0.001	
15-34 years	0.001	
35-59 years	0.001	
60-79 years	0.035	
80+ years	0.148	
Proportion of cases in the ICU	0.039 (0.02 – 0.06)	Robert Koch Institut, 2020
CFR in the ICU	0.30 (0.21 – 0.52)	Robert Koch Institut, 2020
CFR for ICU non-admission	1.0	Barry, 2004
CFR one year post ICU discharge	0.59 (0.47 – 0.73)	Damuth, 2015
Herd protection threshold	0.70 (0.60 – 0.70)	Kwok, 2020

Results

- 'Flattening' the curve:
 - A successful shutdown is projected to yield an average gain between 0.03 and 0.10 life years (0.3 to 1.2 months) per capita in the German population.
 - The corresponding economic value ranges between €2841 and €9930 per capita.
 - Extrapolated to the total population: 7% to 24% of the gross domestic product in 2019
- 'Squashing' the curve:
 - The economic value of 'squashing the curve' even amounts to 91% of the GDP.
 - But it is highly sensitivity to changes in CFR: a CFR of 0.37% reduces the economic value to 28%.