The 8th European Congress on Computational Methods in Applied Sciences and Engineering
ECCOMAS Congress 2022
5-9 June 2022, Oslo, Norway

Mortality containment vs. economics opening: optimal policies in a SEIARD model.

Andrea Aspri[1], Elena Beretta[*2], Alberto Gandolfi[3] and Etienne Wasmer[4]

[1] Universita' di Pavia, andrea.aspri@unipv.it
[2] NYU Abu Dhabi, eb147@nyu.edu
[3] NYU Abu Dhabi, ag189@nyu.edu
[4] NYU Abu Dhabi, ew1555@nyu.edu

Keywords: *epidemic model, nonlinear ode, optimization, control*

We extend the classic approach (SIR) to a SEAIRD model with policy controls. A social planner's objective reflects the trade-off between mortality reduction and GDP, featuring its perception of the value of statistical life (PVSL).We introduce realistic and drastic limitations to the control available to it. Within this setup, we explore the results of various control policies. We notably describe the joint dynamics of infection and economy in different contexts with unique or multiple confinement episodes. Compared to other approaches, our contributions are: i) to restrict the class of functions accessible to the social planner, and in particular to impose that they remain constant over some fixed periods; ii) to impose implementation frictions, e.g. a lag in their implementation; iii) to prove the existence of optimal strategies within this set of possible controls; iv) to exhibit a sudden change in optimal policy as the statistical value of life is raised, from laissez-faire to a sizeable lockdown level, indicating a possible reason for conflicting policy proposals.

REFERENCES

[1] Aspri, Andrea; Beretta, Elena; Gandolfi, Alberto; Wasmer, Etienne, Mortality containment vs. economics opening: optimal policies in a SEIARD model. *J. Math. Econom.* 93 (2021), 102490, 19 pp. 91B64 (92D30)