Lockdown policy choices, outcomes and the value of preparation time: A stylised model

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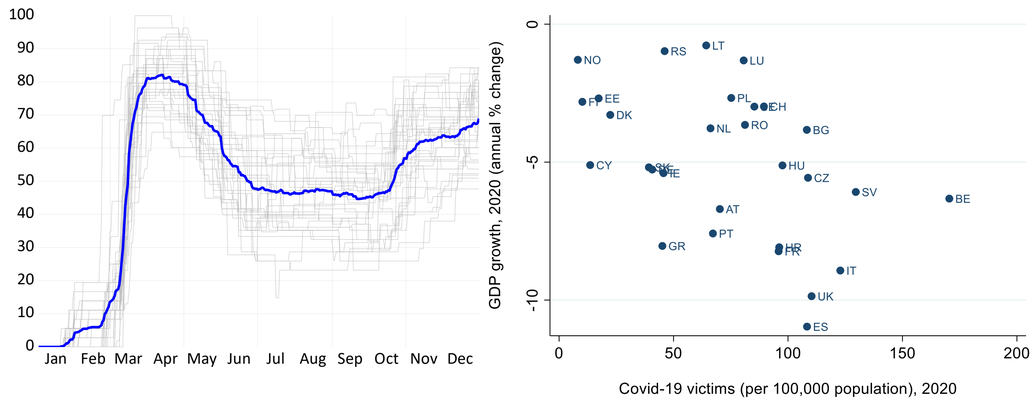
Motivation: lockdown economy & "flattened curve"

- COVID-19 has confronted societies with a **trade-off** between '**flattening the epidemic curve**' and **preserving production** and income in a context of **uncertainty**
- **Lockdowns** have become main "policy **instrument**" in anticipation of a vaccine or cure
- **Lockdown intensity** insufficient to explain **differences in infections (u) and losses in production and income (I)** across countries

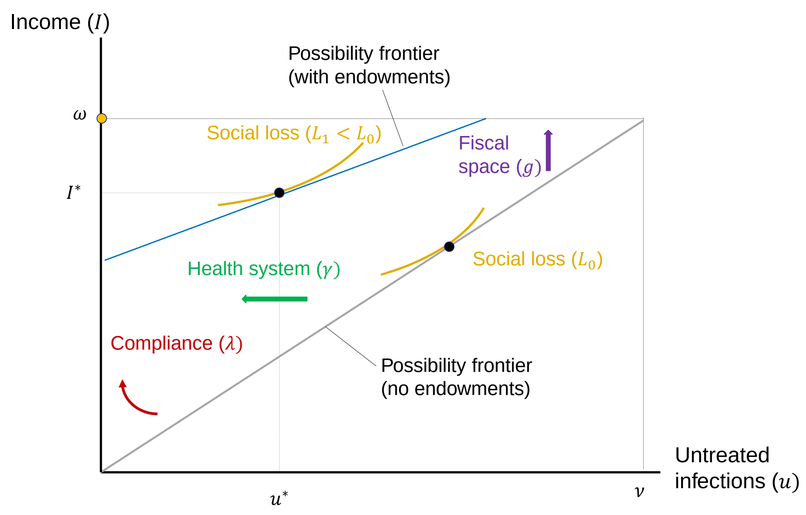
Lockdown stringency and COVID-19 impact on lives and growth in Europe, 2020



- Other **country characteristics matter**: fiscal space and health sector (endowments), sectoral structure, timing of outbreak, compliance, ability to implement targeted measures

Contribution: a framework for a lockdown 'policy rule'

- Why do **lockdown intensities and outcomes** vary across countries? Paper proposes explanations in a **static stylised model**
- Derives **infections-income possibility frontier** (trade-off) depending on labour force (ω), severity of pandemic (ν), share of contact-intensive sectors (α), fiscal space (g), health care system (γ), mitigation efficiency/compliance (λ), preparation time (τ)
- 'Policy rule': **optimal lockdown intensity** (l^*) found by minimising social loss function (L). Determines income (I^*) and number of untreated infections (u^*)



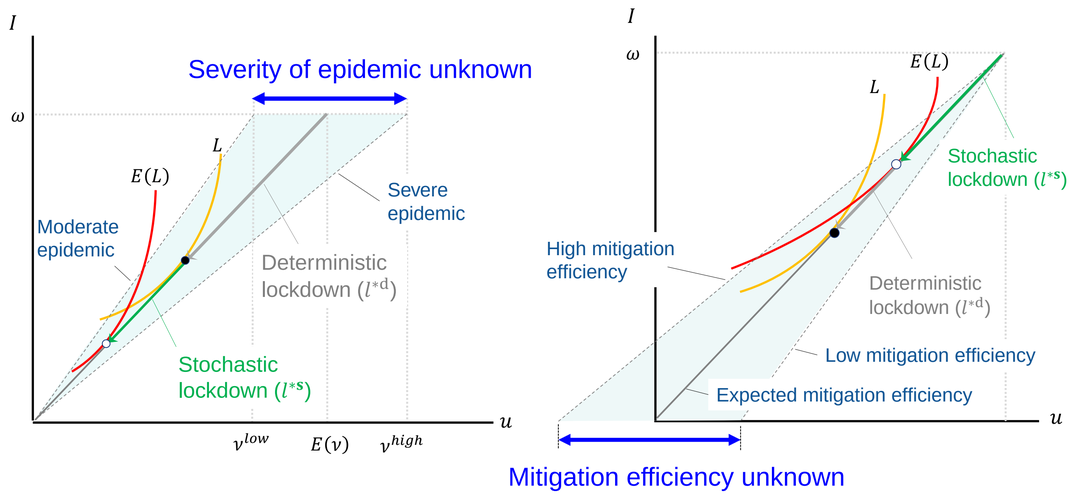
- Lockdown intensity increases in ν, α and g (lockdown affordability) and decreases in γ. Compliance (λ) effect ambiguous

References

- Brainard, William, 1967, Uncertainty and the effectiveness of policy, *American Economic Review*, Vol. 57, No. 2 (May): 411-425
- Hale et al, 2021, A global panel database of pandemic policies, *Nature Human Behav* 5, 529–538 (2021)

Uncertainty: Flattening *which* curve? Can it be flattened?

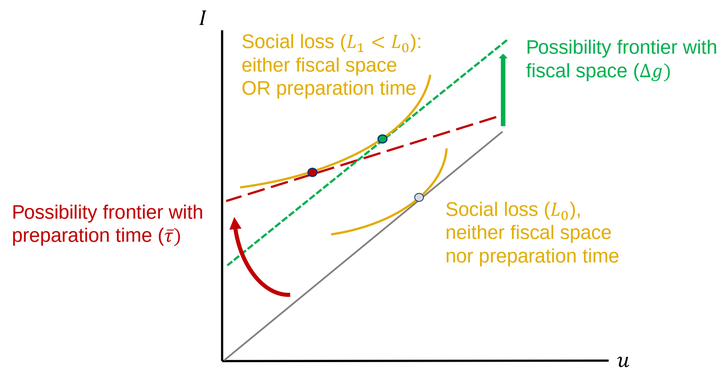
- **A novel virus**: severity of epidemic and mitigation efficiency unknown *a priori* => **position of infections-income possibility frontier not known with certainty**
- Calibrating optimal lockdown intensity (l^{*s}) by minimising ***expected*** **social loss function** ($E(L)$) => will differ from deterministic setup and depend on the dominating uncertainty (priors)
- **Uncertainty about severity of epidemic** translates into **tighter lockdown** ($l^{*s} > l^{*d}$) and lower production (cf. **insurance premium**)



- **Uncertainty about mitigation efficiency**/compliance translates into **less vigorous lockdown** ($l^{*s} < l^{*d}$): less reliance on costly instrument if its effect is uncertain (cf. **attenuation principle**, Brainard (1967))
- Optimal *ex ante* decision, will be sub-optimal *ex post*: matters for **ex post evaluations** of lockdown policies
- Differences in lockdown intensity between countries can result from uncertainty (priors) rather than preferences

Sequential outbreaks and the value of preparation time

- **Sequential outbreak** of COVID-19 conferred preparation time (τ) to some countries, increasing mitigation efficiency and reducing social loss: **'head start' on virus**
- Preparation time is windfall benefit. Fiscal space of Δg required to lower social loss by same amount (**equivalent variation**) – lockdown intensity and outcomes will differ



- In multi-country setting, those **hit early** provide **positive externality**

Conclusions

- **Tractable and intuitive framework** explaining differences in lockdown decisions and outcomes
- **Endowments reduce the social loss of epidemic**, but **effect on lockdown intensity and outcomes is specific to endowment** (fiscal space ≠ health system capacity)
- Framework can be used for **comparative statics** and extended to include **targeted measures** (e.g. working from home), which change the nature of the trade-off