# The COVID-19 Shutdown Decision

Arthur Small

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SYS 6014 Decision Analysis

# How to think analytically about COVID-19 shut-down and re-open decisions?

- Public choice
- Health and safety risks
- Cost-benefit analysis
- Ethics
- Sunk costs
- Distribution of costs and benefits

# COVID-19 shut-down: What are the trade-offs?

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At broadest level, can imperfectly but usefully think of the shut-down decision turning on a single key trade-off.

The shut-down delivers:

- *Benefits*: Reduced health risks: Fewer deaths and health crises
- *Costs*: Economic disruption, loss of production

Benefits and costs are both:

- very large in magnitude
- characterized by large uncertainties
- distributed unevenly through the population
- not under the control of a single unitary decision-maker - these are *public choices*

# How is this decision analogous to those we've modeled?

Some features we've already seen:

- Decision-maker: A high gov't official, e.g., U.S. state Governor, national Prime Minister
- Action set: On each date $t$, announce a shut-down level from a menu of options
  - Decisions made sequentially, each on the basis of updated but still-imperfect information

- State space: On each date $t$: Imagine you had all the data:
  - The true state of the system: which people are in which state of vulerability – susceptible, infected, recovered, immune
  - Health characteristics/status of each population member: age, immuno-compromised status, etc.
  - Social structure: who's sheltering with whom
  - State of the health care delivery system: capacity, current demand for services, supplies of key materials, etc.
  - Etc.

- Parameter space: key unknowns:
  - Rate of exposure, as a function of social distancing policy and other measures
  - Rate of contagion, conditioned on exposure
  - Health consequences, conditioned on contagion
- Predictive model(s): Information about impacts of choices
- Etc.

# How is this decision distinctive?

- How to trade off health and mortality risks with economic costs? Comensurable?
- Costs and benefits are *unevenly distributed* through the population
- *Externalities*: Individual choices impose costs on others.
- This is a problem in *public choice*: Multiple (here, *many*) individuals affected who may differ in their objectives/utility functions, yet must all accept a uniform decision (more or less).
- *Ethics* of alternative options

# How economists (tend to) handle public choices that affect risks to health, safety, mortality

# Social cost-benefit analysis

Framework for dealing with *public choices*.

Attempts to guide public choices as if they were those of a single, rational, optimizing decision-maker.

Core principles:

- Decision criterion concept: "Choose for the public what they would choose for themselves, if they were in position to do so."

When all costs and benefits are economic, monetizable: measure costs and benefits in monetary units.

When it benefits or costs are not easily monetized (health, environment, etc.), use various techniques to assign dollar values to costs and benefits.

Guiding principle for these exercises: Estimate value based on how people make analogous trade-offs in their private choices.

# Measuring improvements in health and safety

How much do people pay for safety?

How much extra do they demand to be paid for dangerous jobs?

Etc.