IMPACTOS ECONÓMICOS Y POLÍTICAS PÚBLICAS EN TORNO A LA PANDEMIA COVID-19

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ECONOMIC RESEARCH ON COVID

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- COVID-19 epidemic
  - health crises
  - economic fallout crises

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  - macro: effects on aggregate demand
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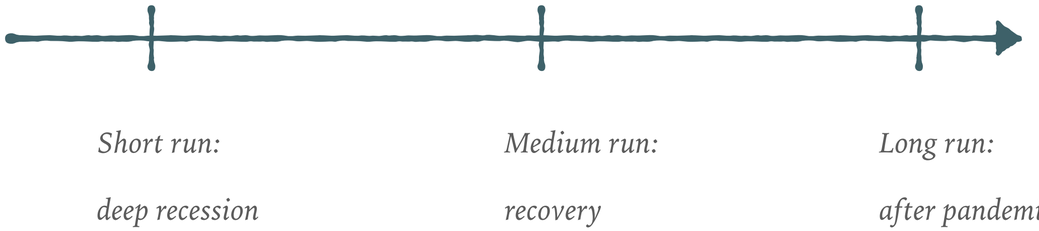
  - Economics: macro policy to mitigate recession
  - Epi-Econ: epidemiology + economics
- Today: talk about 2 papers of mine on each of these topic

MACROECONOMIC IMPLICATIONS OF COVID-19: CAN NEGATIVE SUPPLY SHOCKS CAUSE DEMAND SHORTAGES?

GUERRIERI-LORENZONI-STRAUB-WERNING

COVID MACRO: GUERRIERI–LORENZONI–STRAUB–WERNING

- Supply or Demand?
  - output *should* fall for health reasons ("Supply" shock)
  - but does it fall too much? Demand Deficient?



- Our take: Demand is endogenous…
- Supply shock —-> demand deficiency (aka "Keynesian Supply Shock")
  - complementarities across goods
  - income channel (incomplete markets)
  - input/output linkeages
  - business failures (long run effects)
  - job matches (long run effects)

PREFERENCES AND TECHNOLOGY

- Preferences

$$\sum_{t=0}^{\infty} \beta^t U(c_{At}, c_{Bt})$$

$$U\left(c_{At}, c_{Bt}\right) = \frac{\sigma}{\sigma - 1}\left(\phi^{\frac{1}{\epsilon}} c_{At}^{\frac{\epsilon-1}{\epsilon}} + (1-\phi)^{\frac{1}{\epsilon}} c_{Bt}^{\frac{\epsilon-1}{\epsilon}}\right)^{\frac{\epsilon}{\epsilon-1}\frac{\sigma-1}{\sigma}}$$

- Technology

$$Y_{jt} = N_{jt}$$

- Each worker with labor endowment $n_{it} = \bar{n}$
- Specialized labor, with fraction
  - ϕ in sector A
  - $1 - \phi$ in sector B

MARKETS

- Agents have access to zero-net-supply one-period bonds
- Budget constraint

$$p_{At}c_{iAt} + p_{Bt}c_{iBt} + a_{it} \leq w_t n_{it} + (1 + i_{t-1})a_{1t-1}$$

- Fraction μ face borrowing constraint

$$a_{it} \geq 0$$

- Limit cases…
  - $\epsilon \to \infty$ one sector model
  - $\mu \to 0$ complete markets in aggregate (Gorman)

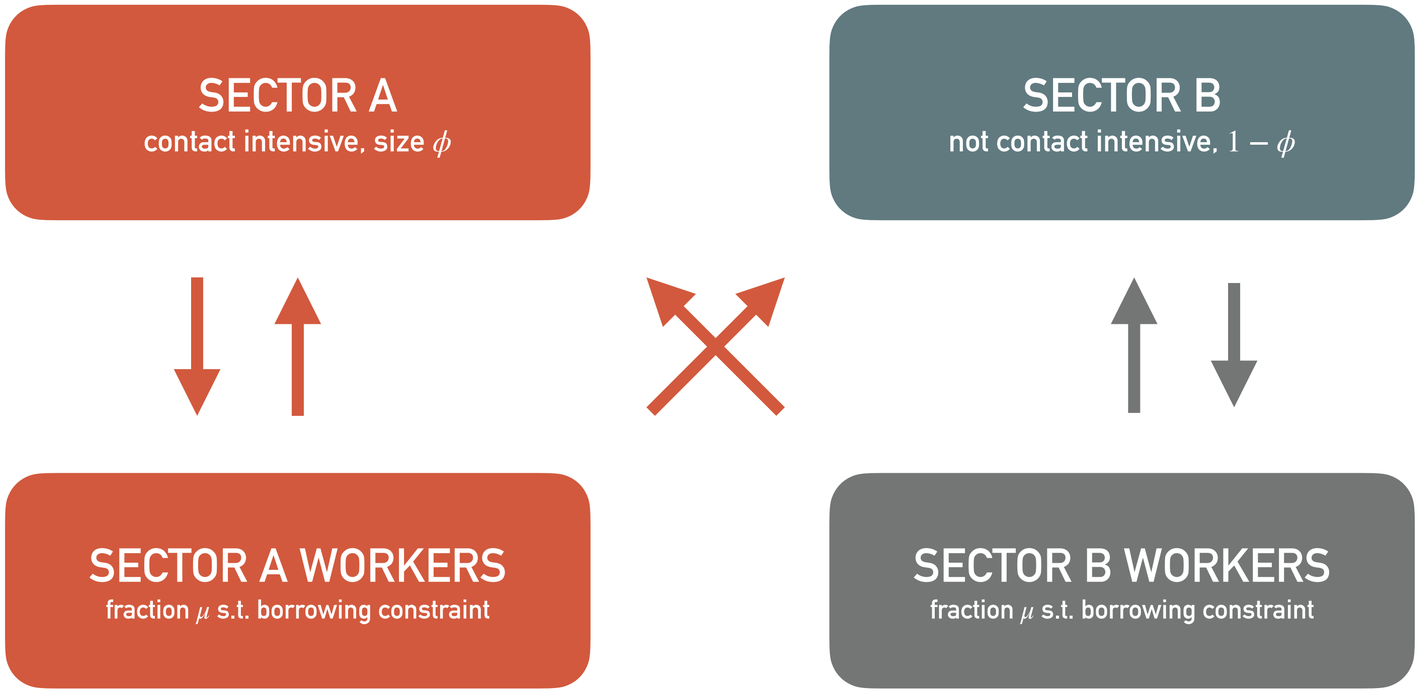
PANDEMIC SHOCK

- MIT shock…
  - Time 0: shutdown of sector A
    (fraction ϕ of workers get $n_{i0} = 0$)
  - Time 1,2,3,….: back to normal (flexible price allocation)
- Assume…
  1. Downward rigid nominal wages
  2. Central Bank keeps interest rate unchanged

- **Question: at time 0, is there excess demand or insufficient demand?**

PROPAGATION

- 2-sector economy, **intra**temporal substitution: ϵ, **inter**temporal substitution: σ
- Key question: how does shock propagate from A to B ? Demand? Supply?



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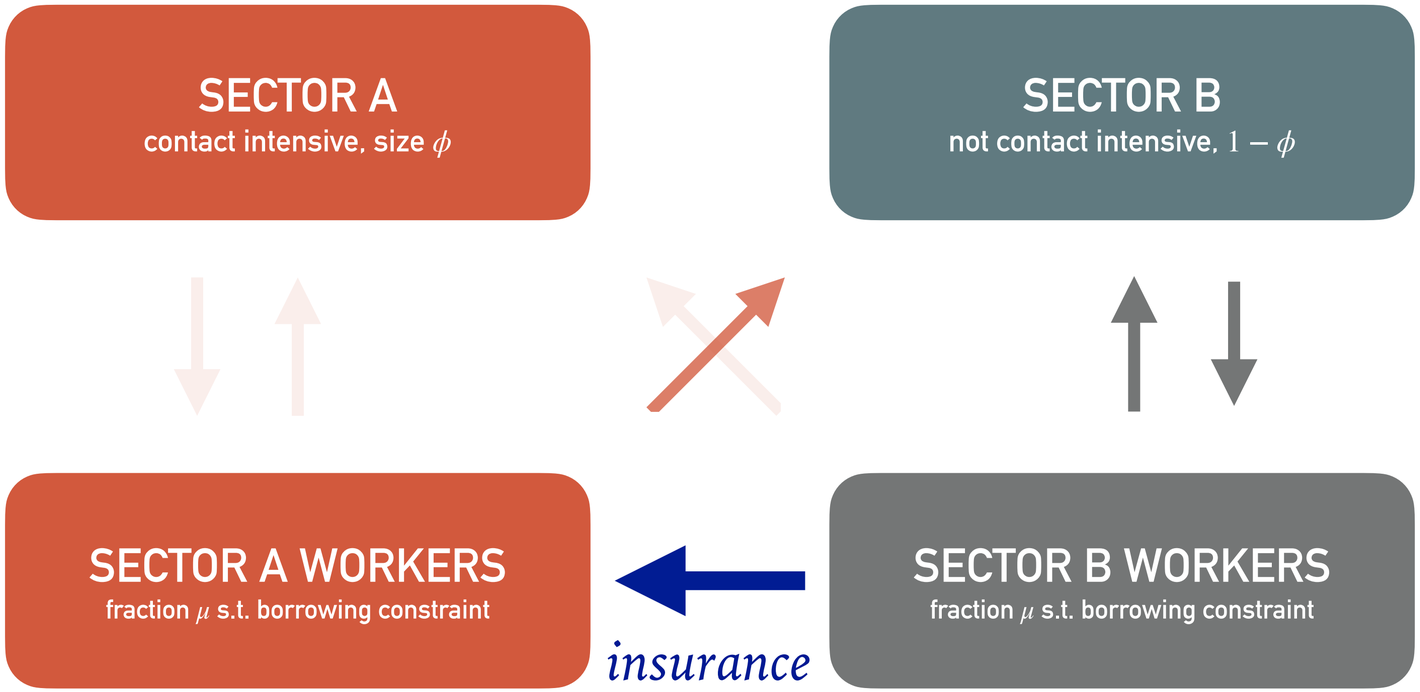

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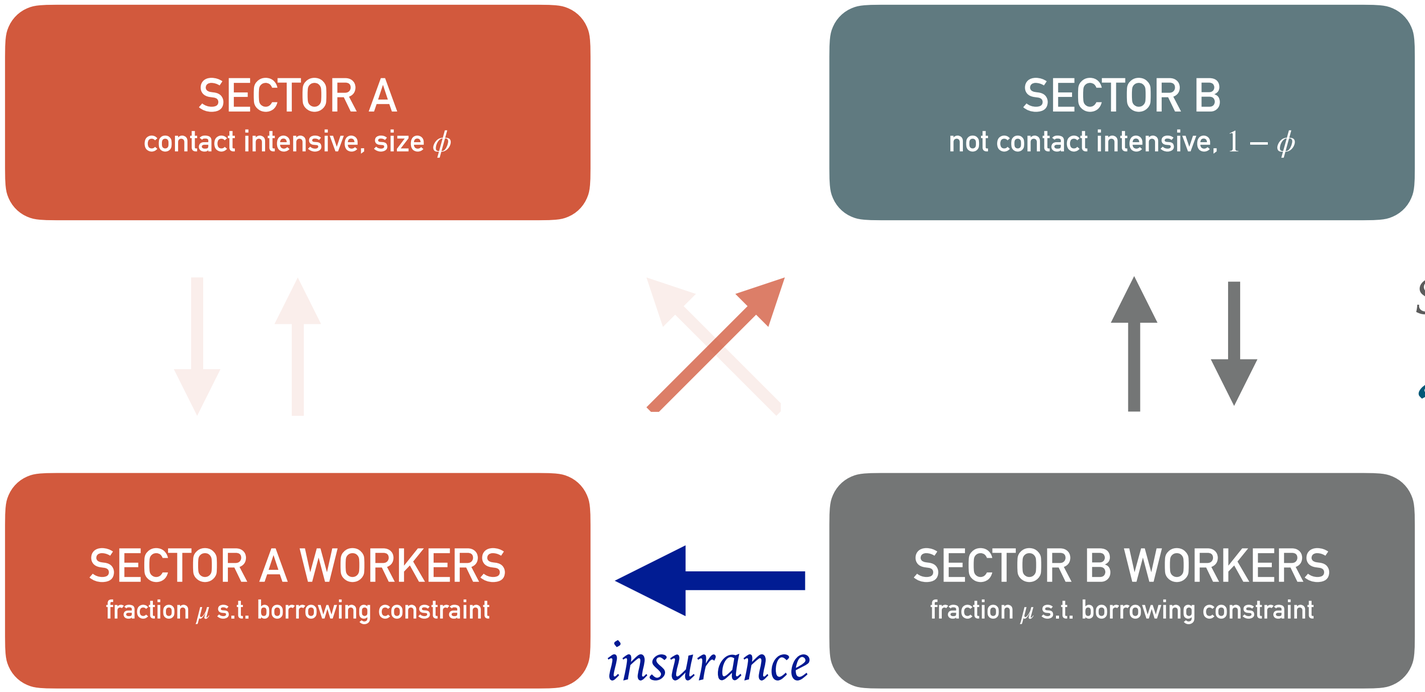

Standard supply shock in 1-sector model $\epsilon \to \infty$

"Keynesian" supply shock *if* $\sigma > \epsilon$

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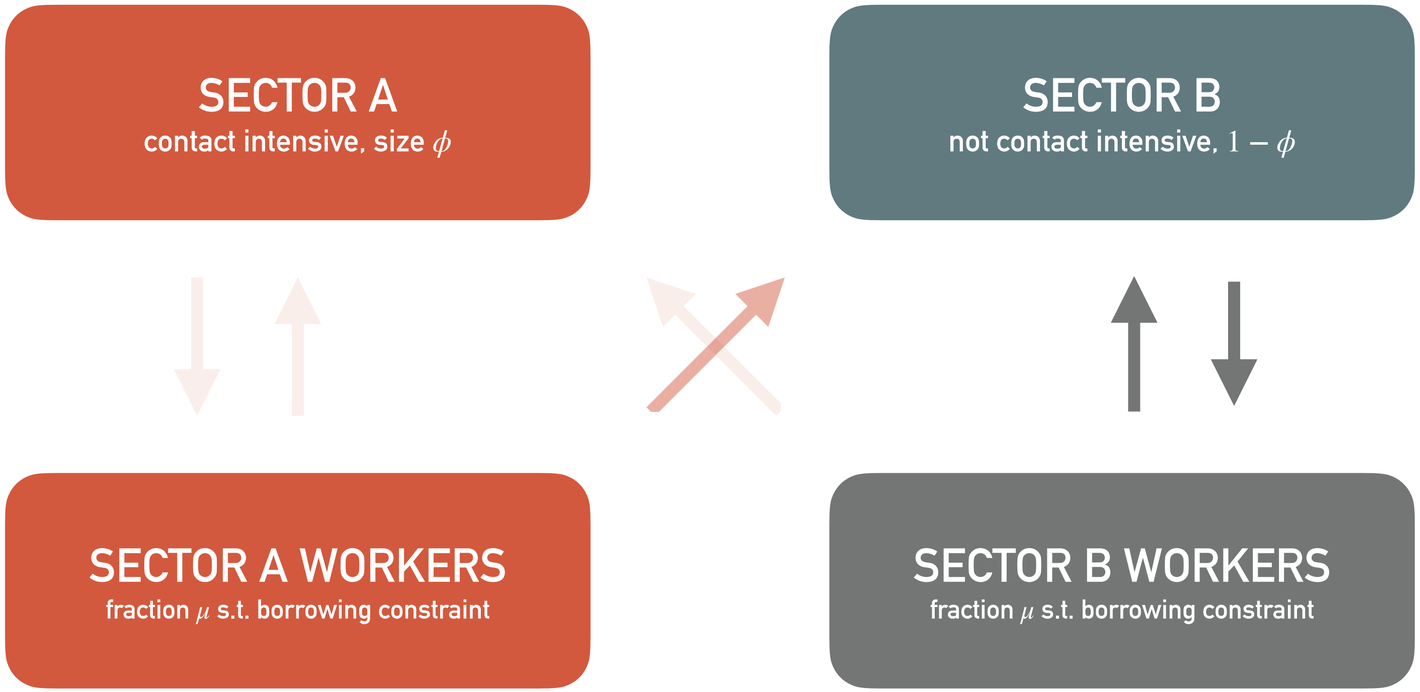

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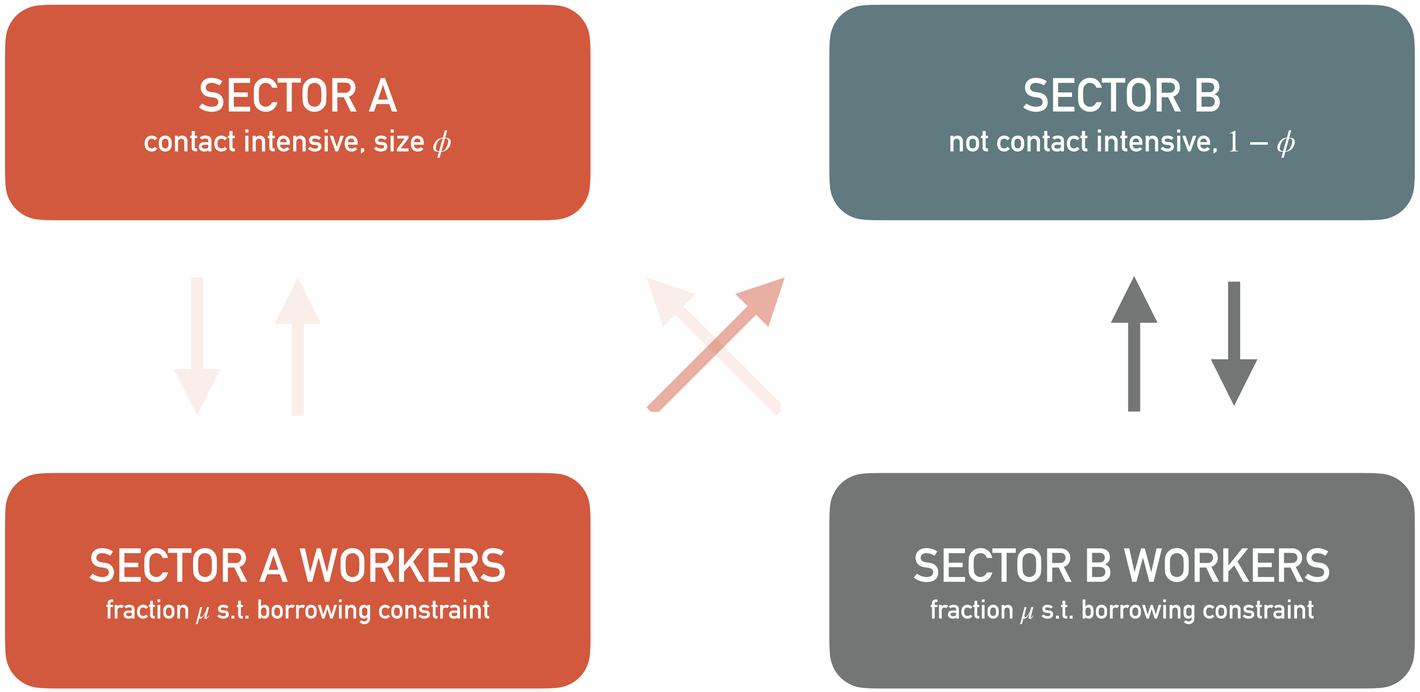

Keynesian supply shock

$$if\ \sigma > (1-\mu)\epsilon + \mu$$

(small ϕ limit)

PROPAGATION WITH INCOMPLETE MARKETS AND SUPPLY CHAINS

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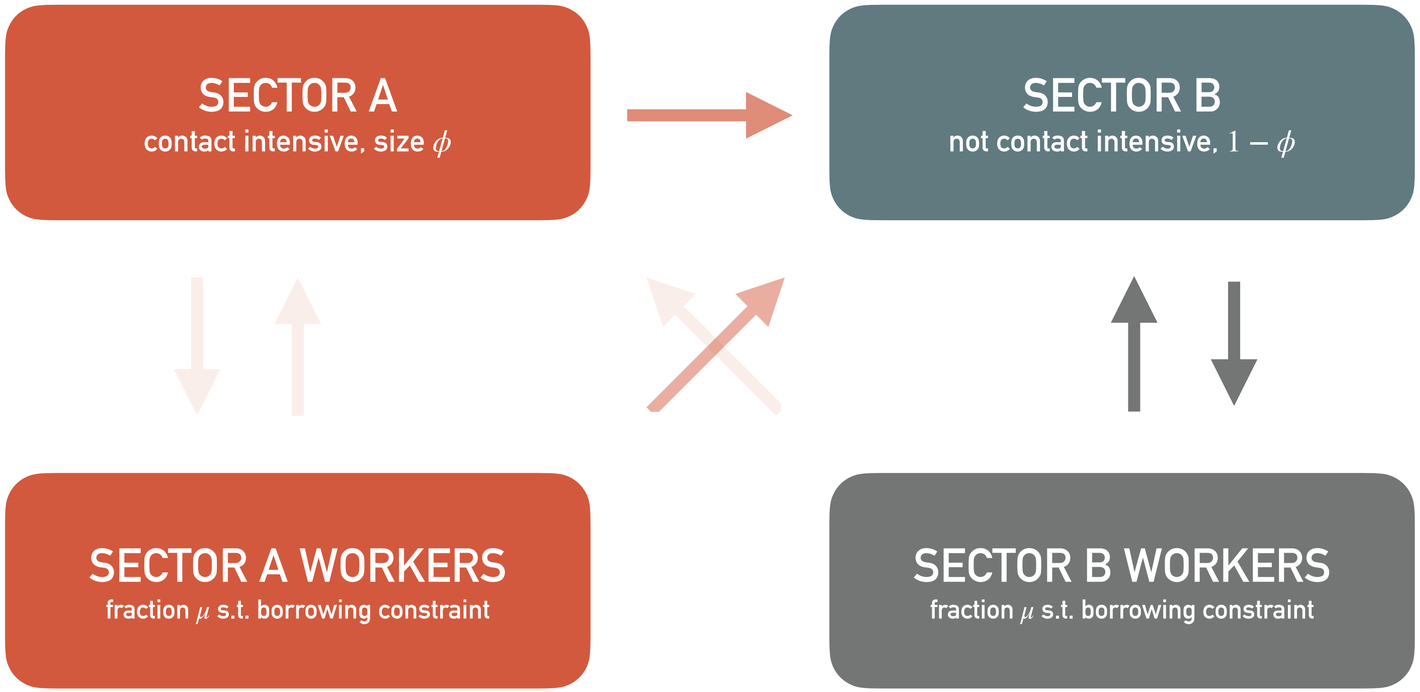

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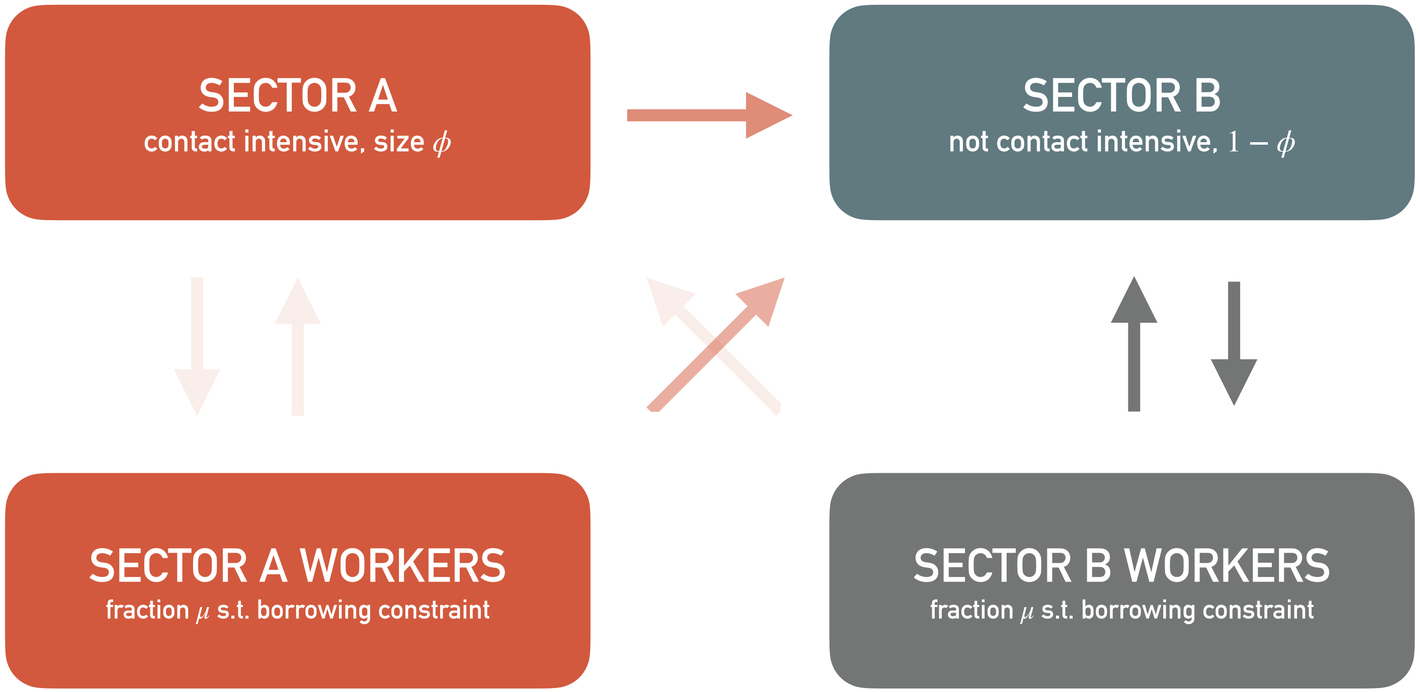
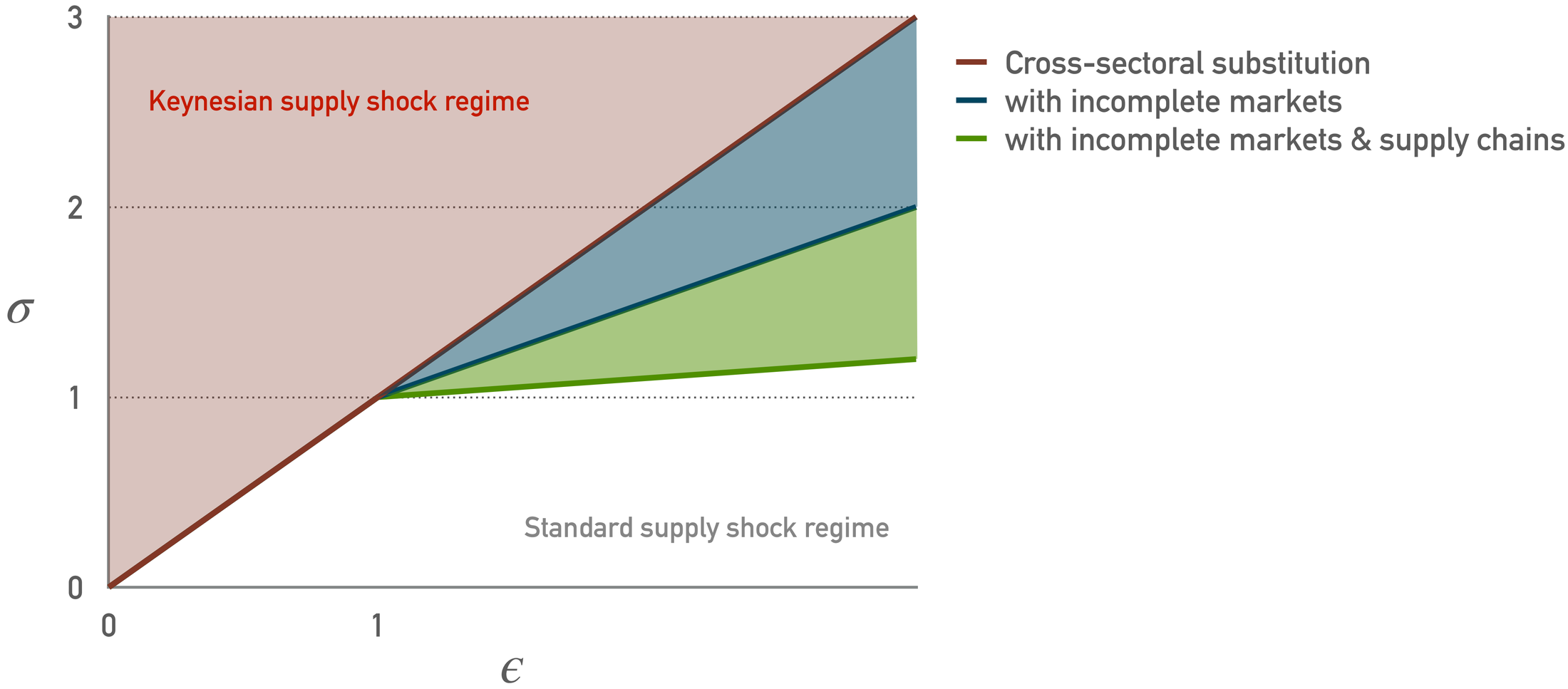


Keynesian supply shock

$$if\ \sigma > (1-\tilde{\mu})\epsilon + \tilde{\mu} \quad \textit{(small } \phi \textit{ limit)}$$

$$\tilde{\mu} > \mu \textit{ and rising in } x$$

KEYNESIAN SUPPLY SHOCKS IN ϵ, σ SPACE



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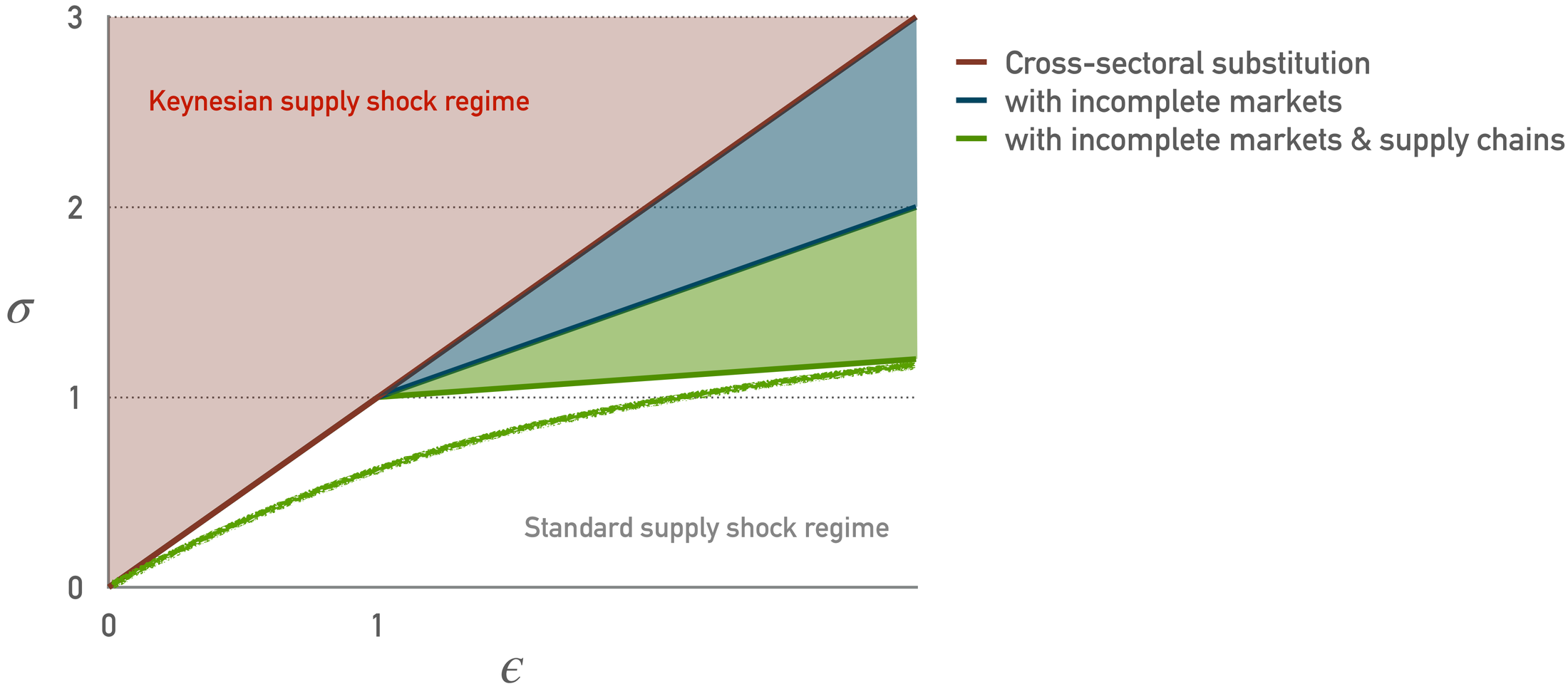

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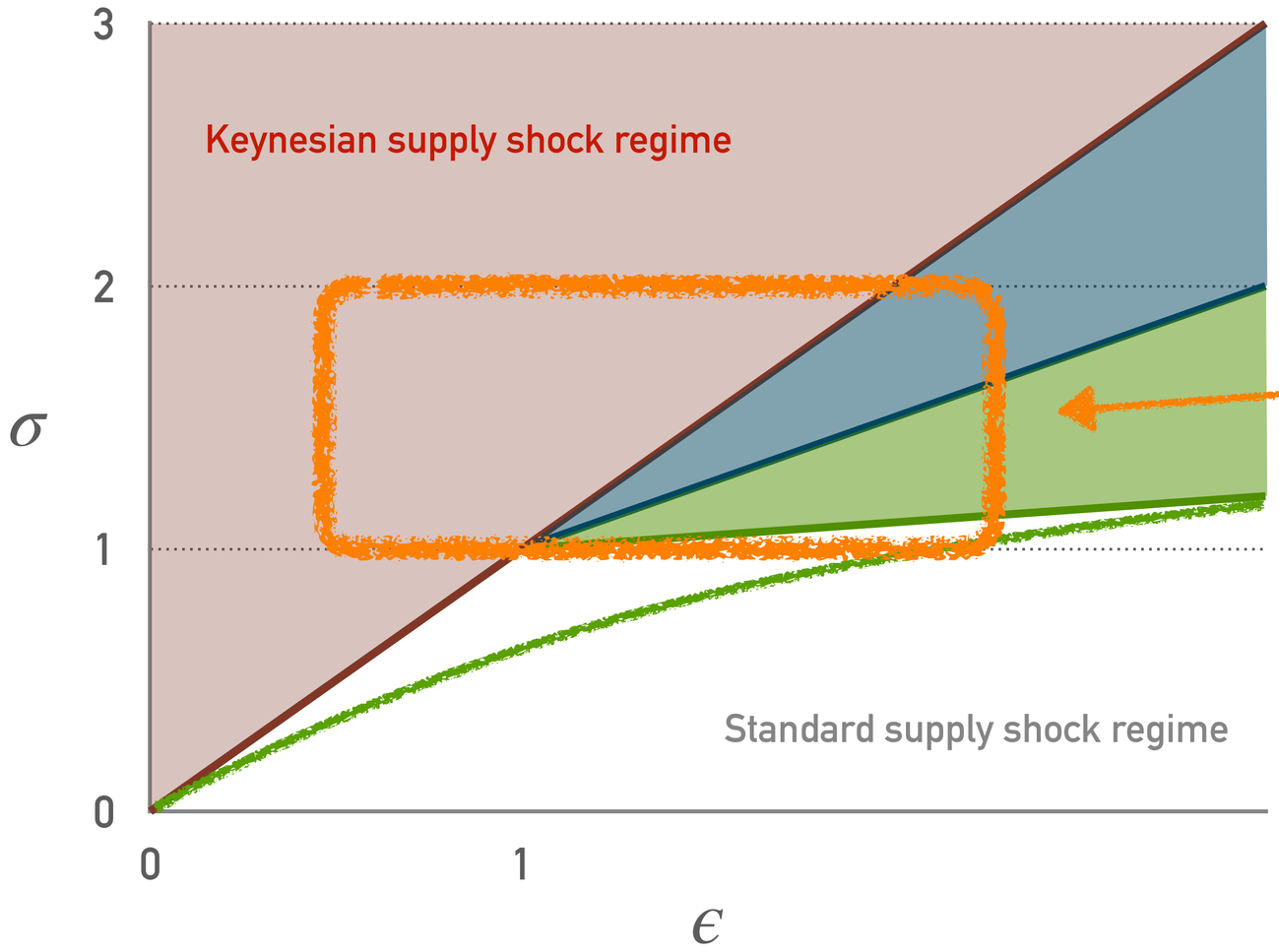

Cross-sectoral substitution
with incomplete markets
with incomplete markets & supply chains

Which area is plausible?

- $\sigma > 1$ … ?
- ϵ *around 1* … ?

INFLATION

- What happens to prices? … depends!
- When Keynesian supply shock operative:

SECTOR A
contact intensive, size ϕ

SECTOR B
not contact intensive, $1 - \phi$

Here nature of gains from trade shock matters!

- *prices ↑ if shock hits supply more*
- *prices ↓ if shock hits demand more*

Keynesian supply shock: prices ↓

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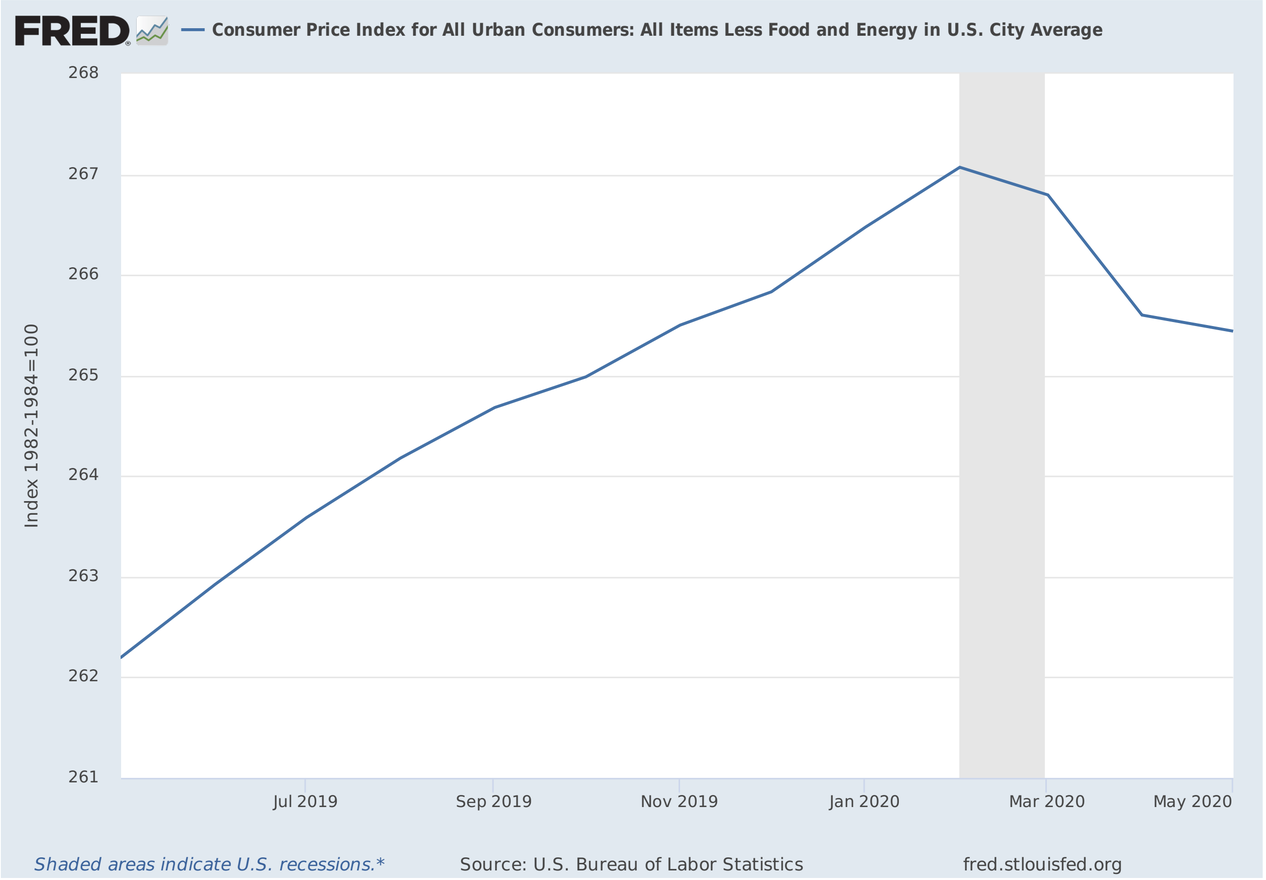
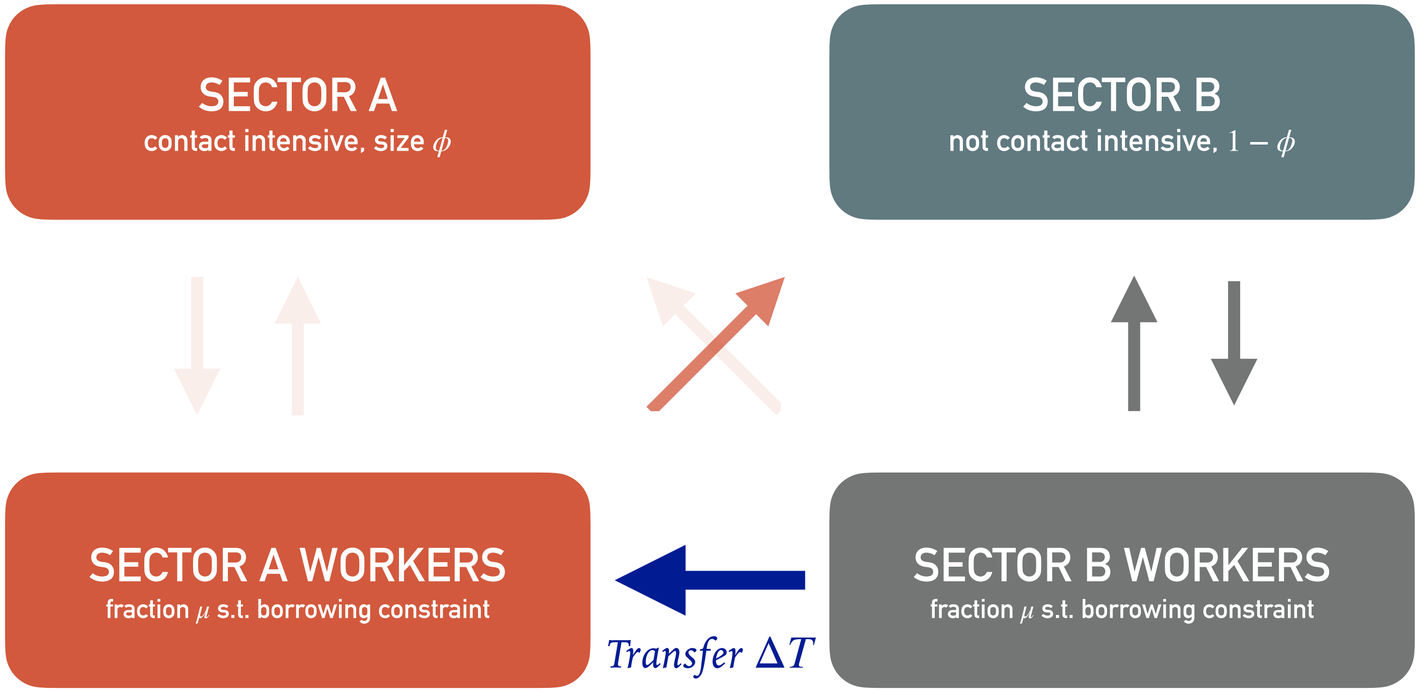
Overall: **measured** price inflation falls, **ideal** price inflation can go either way

INFLATION


FRED
Consumer Price Index for All Urban Consumers: All Items Less Food and Energy in U.S. City Average
Index 1982-1984=100
268
267
266
265
264
263
262
261
Jul 2019
Sep 2019
Nov 2019
Jan 2020
Mar 2020
May 2020
Shaded areas indicate U.S. recessions.*
Source: U.S. Bureau of Labor Statistics
fred.stlouisfed.org

FISCAL POLICY

- Focus on situation with Keynesian supply shock. How does fiscal policy help?



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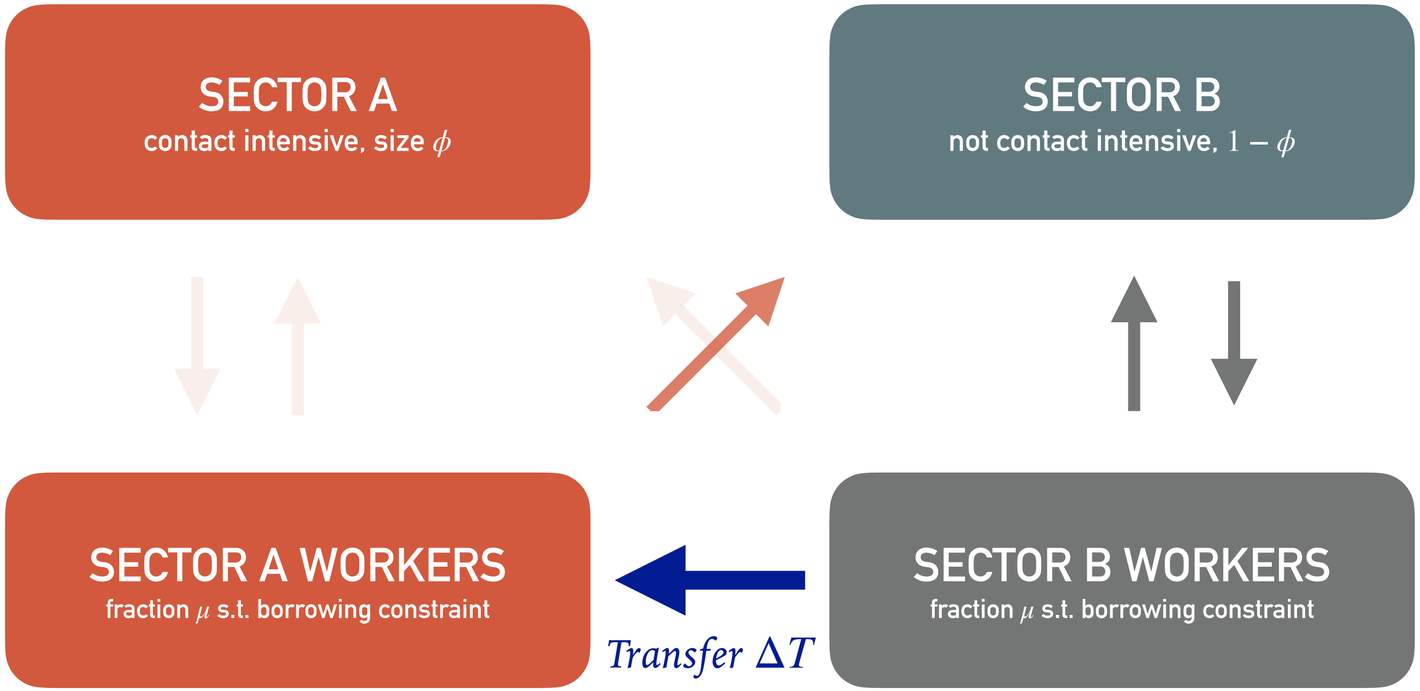

Multiplier less than ...

$$\ldots \neq \frac{mpc}{1-mpc}$$

Keynesian cross is "broken"

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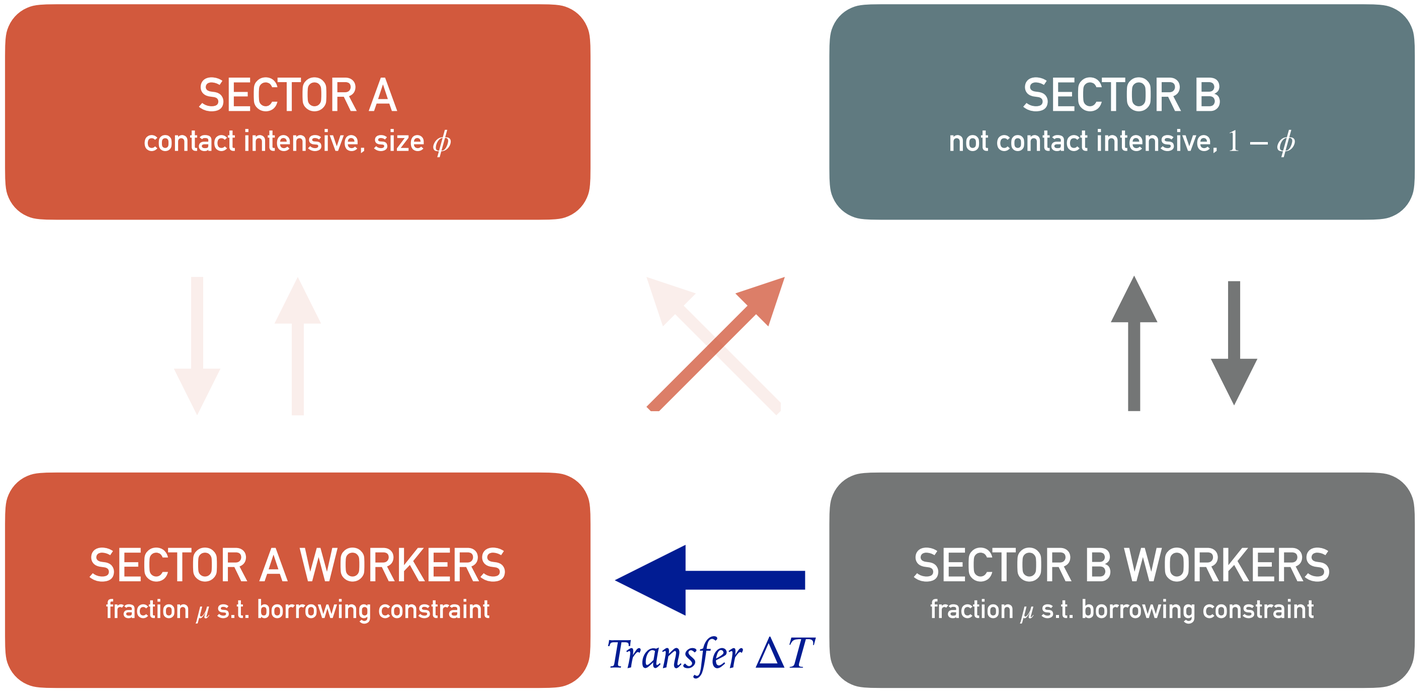

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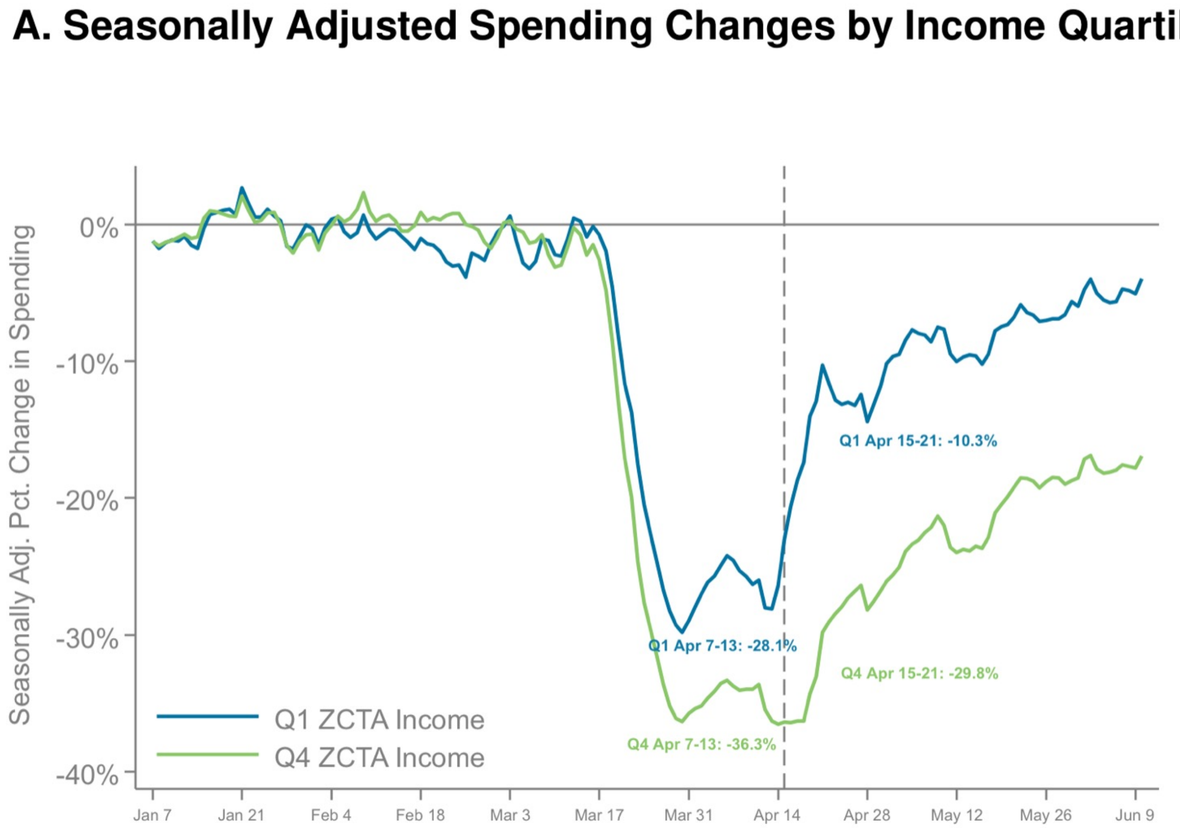
Keynesian cross is "broken"

But: **Insurance** value of transfer is **enormous** due to **asymmetry** of the shock!

FISCAL POLICY

- What level of replacement rate?
- Result from our anlaysis…
  - less than 100% may be enough for aggregates
    (idea: people want to cut total spending anyway)
  - 100% **optimal** for usual insurance reasons

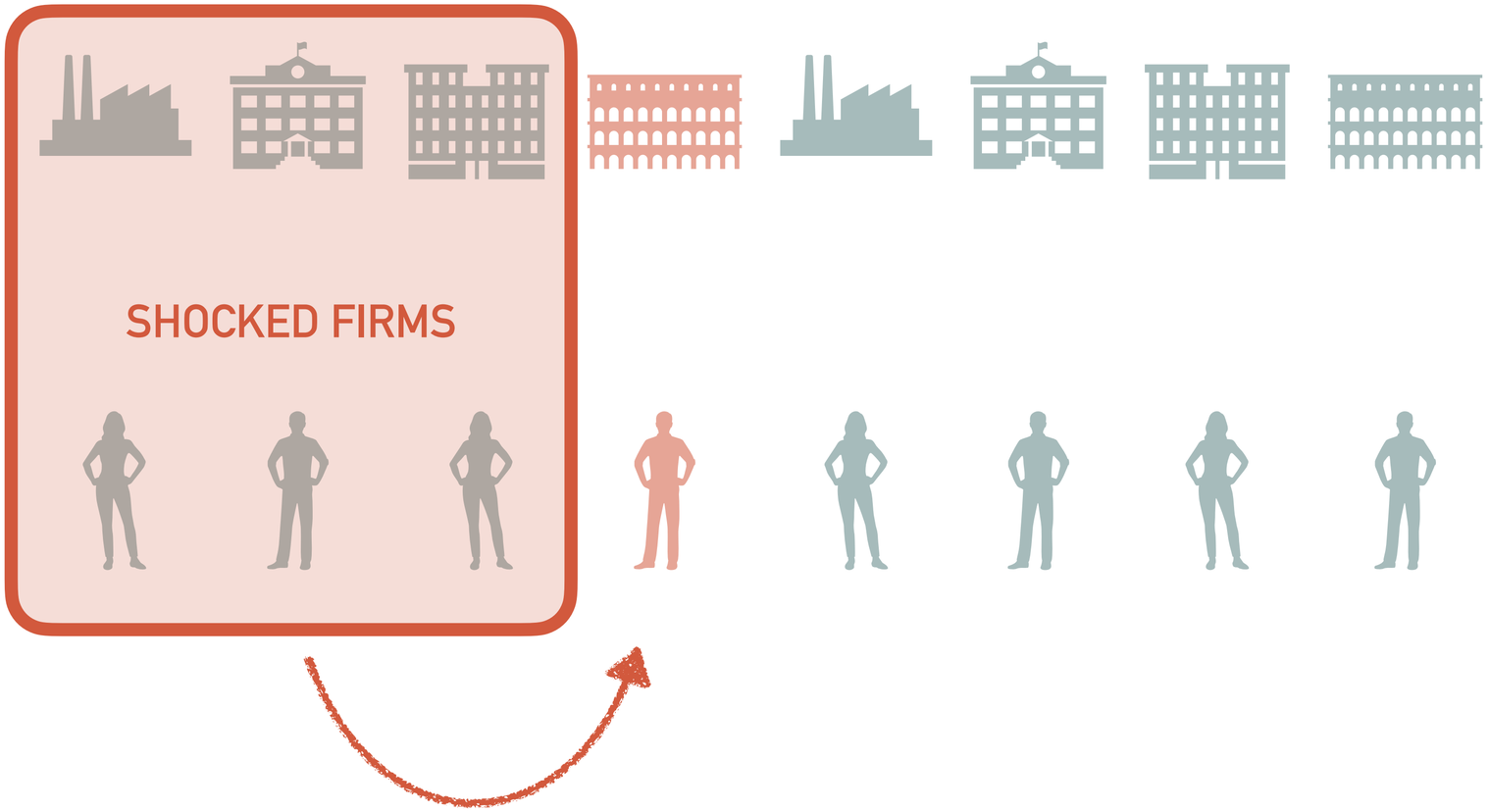
SOCIAL INSURANCE AT WORK



Chetty, Friedman, Hendren, Stepner, Opportunity Insights Team (2000)

BUSINESS EXITS

- Zoom into each sector …



Keynesian supply shock leads to business exits …

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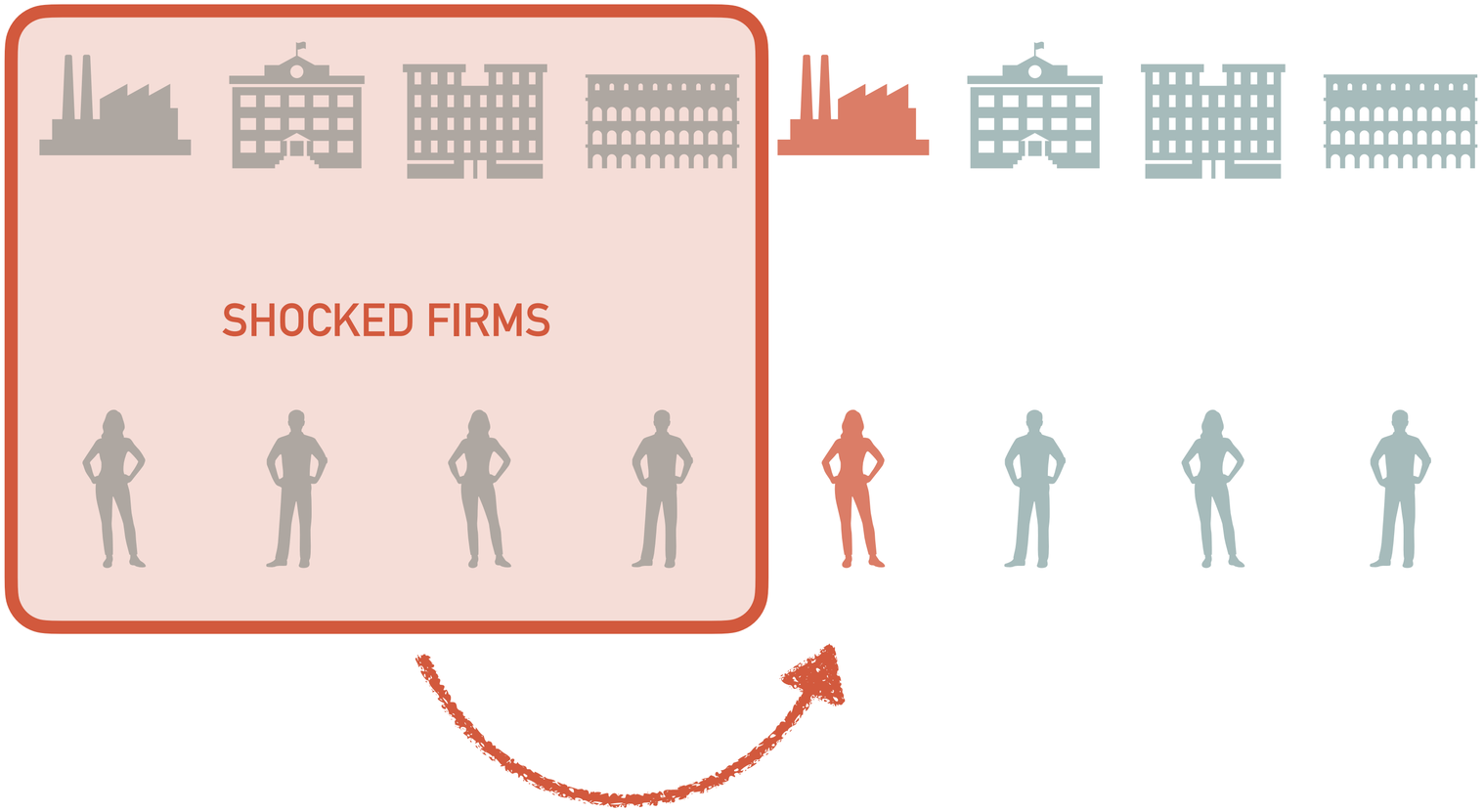

… snowballing into an even stronger Keynesian supply shock

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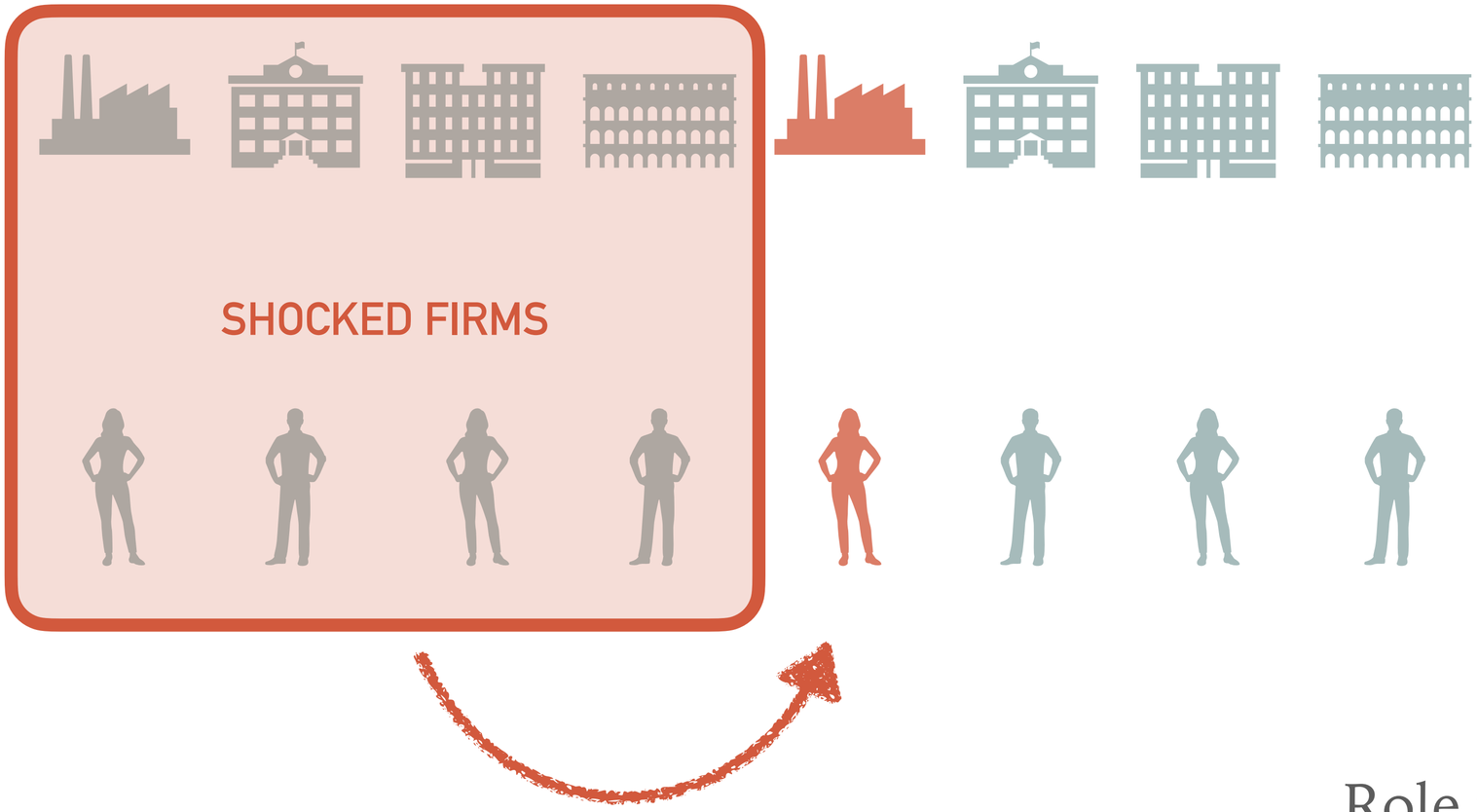

… snowballing into an even stronger Keynesian supply shock

Role for
business support

CONCLUSIONS

- Macro models…
  - Keynesian Supply Shock
    Output should fall…
    … but economy needs policy support!
  - Promote risk sharing via targeted UI and business support
  - Short run and avoid longer run scarring

- Macro and Public Economics

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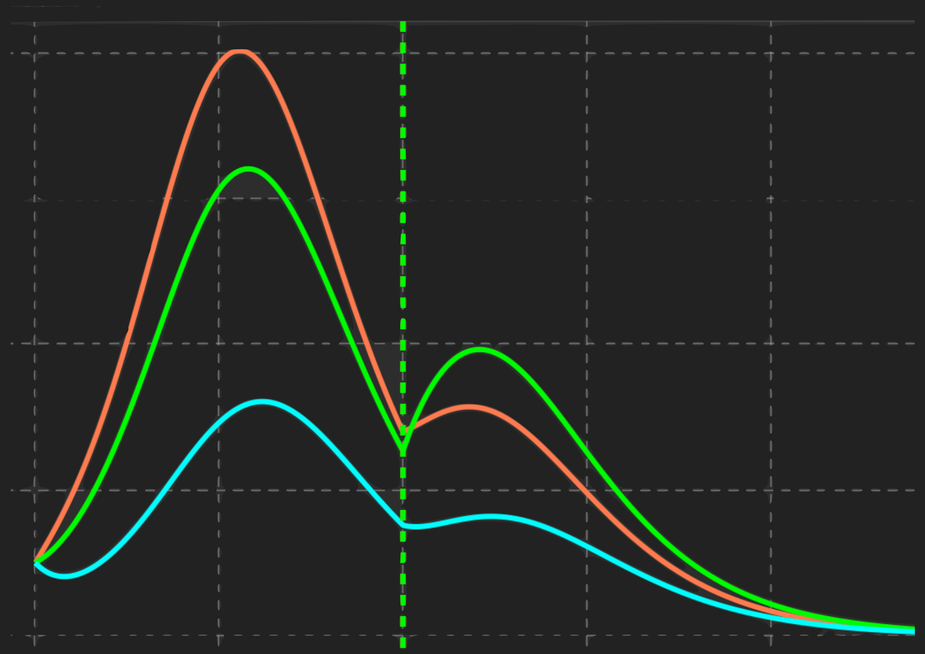
GUERRIERI-LORENZONI-STRAUB-WERNING



OPTIMAL TARGETED LOCKDOWNS IN A MULTI-GROUP SIR MODEL

ACEMOGLU + CHERNOZHUKOV + WERNING + WHINSTON

(MIT) (MIT) (MIT) (MIT& SLOAN)

THIS PAPER

- **Policy analysis for COVID-19…**
  - **Epi:** herd immunity, effect of mitigation, timing, etc.
  - **Econ:** costs of lockdowns, optimal policy, etc.
- **COVID-19:** very asymmetric effects

Age Group	Mortality rate
20-49	0.001
50-64	0.01
65+	0.06

(Ferguson, 2020)

This paper: simple multi-group model

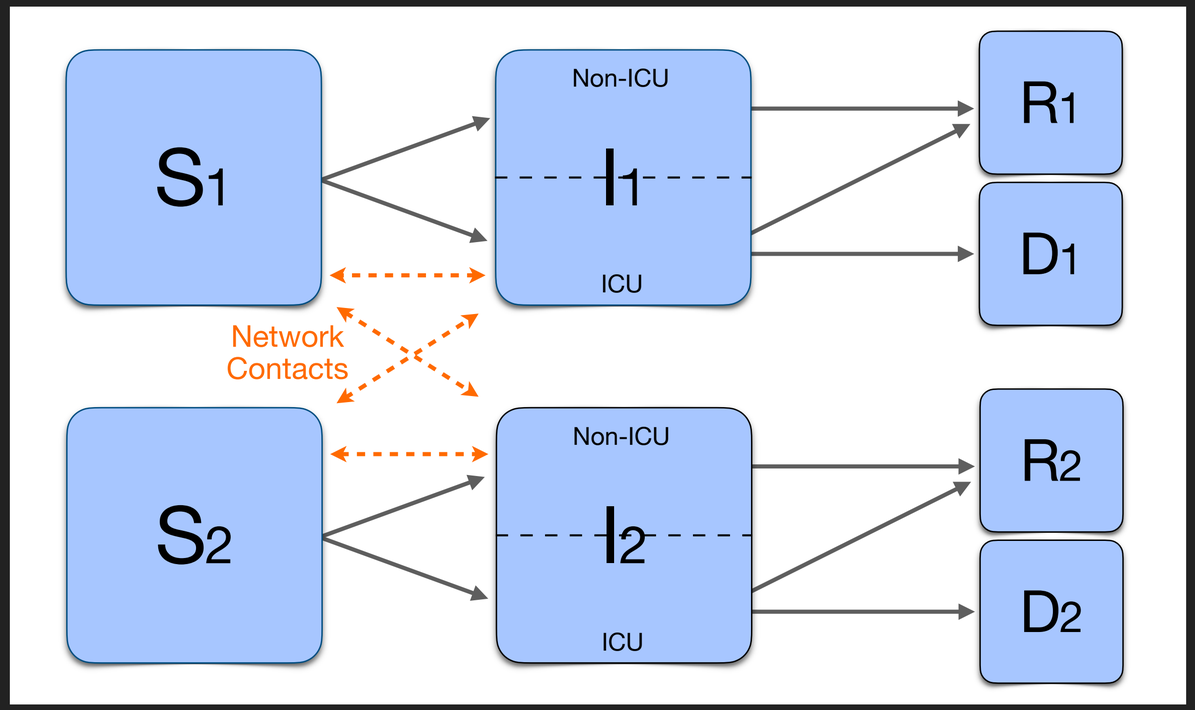
+

explore optimal policy implications

IMPORTANT CAVEATS

- We are not epidemiologists
- Model parameters uncertain
- Policy implementation: further details on the ground

SIR MODEL + ECONOMIC COSTS



- Lockdowns…
  - benefit: reduce interactions, lower infections
  - costs: lost output
- Optimal Control timing of lockdown

MODEL ASSUMPTIONS

- Fatality rate depends on infection rate (hospital capacity)
- Recovered are immune (may or may not circumvent lockdown)
- Testing and isolation: fraction infected are isolated
- Lockdowns: are not perfect
- Elderly interact with young
- “Cure” (vaccine/antivirals) arrive at some T

MODEL

$$\text{new infections} = \beta SI$$

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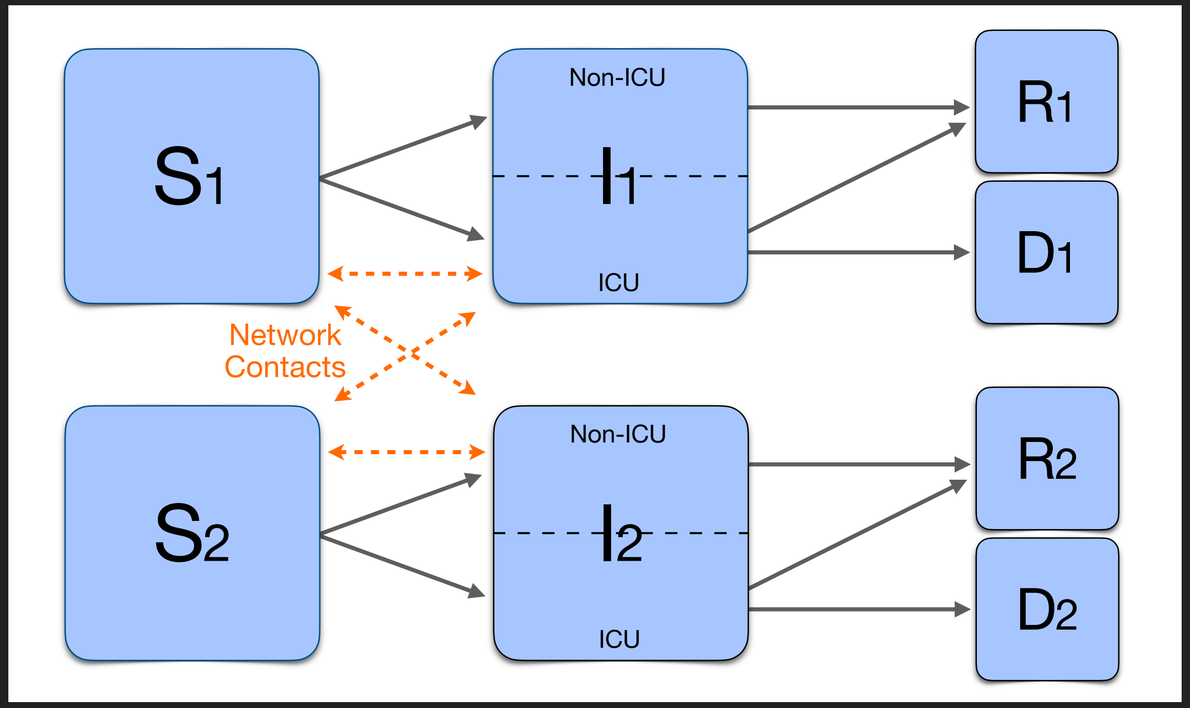

$$S_j(t) + I_j(t) + R_j(t) + D_j(t) = N_j$$

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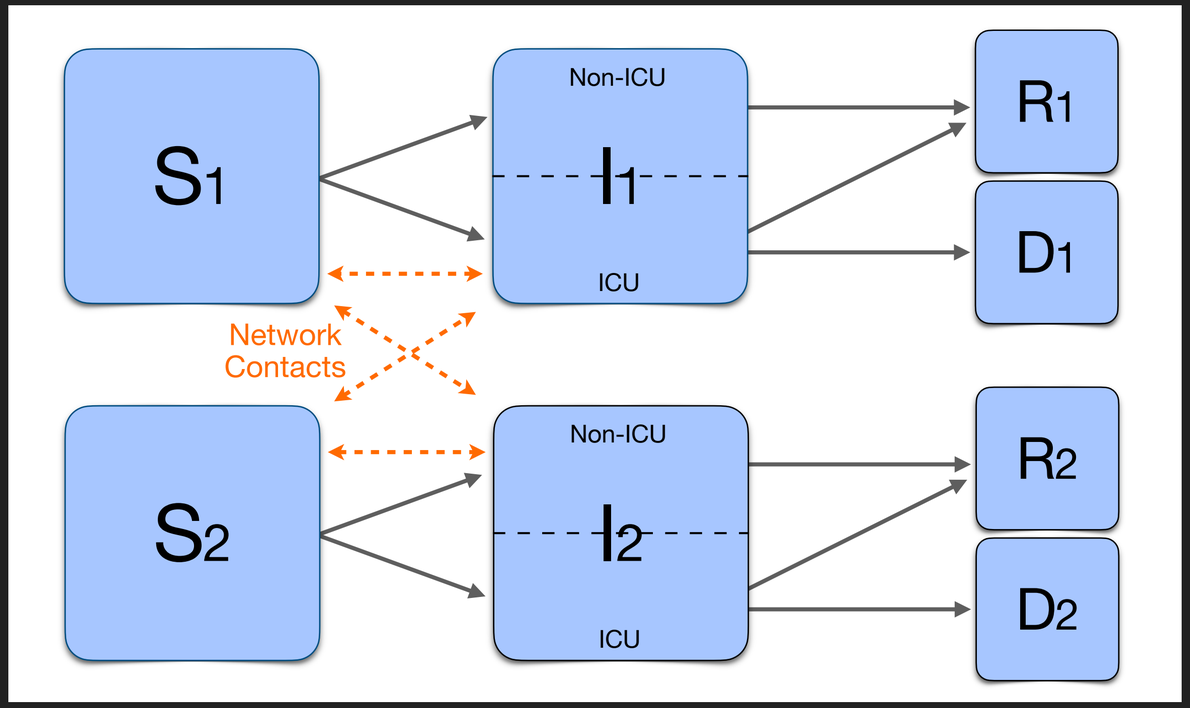

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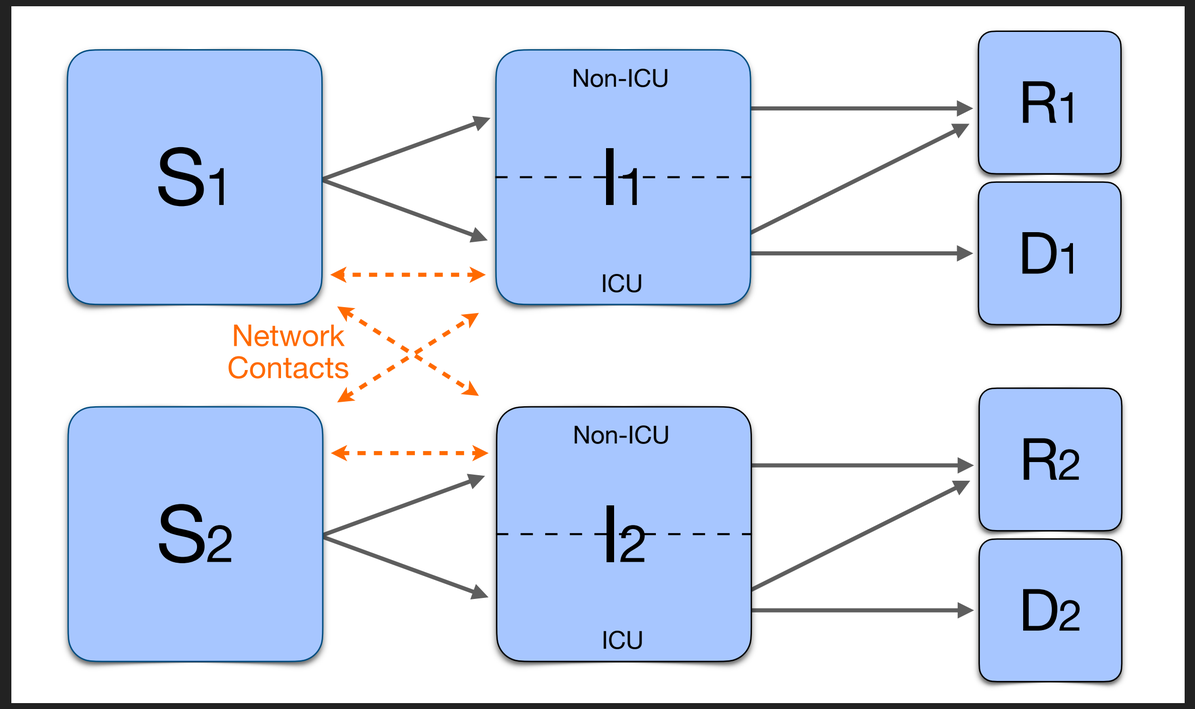

$$S_j(t) + I_j(t) + R_j(t) + D_j(t) = N_j$$

$$\text{new infections in group } j = \beta(1 - \theta_j L_j) S_j \sum_k \rho_{jk} \eta_k (1 - \theta_k L_k) I_k$$

MODEL

- j=1,2,...,J groups
- newly infected...
  - mild: $1 - \iota_j$
  - severe ("ICU"): ι_j
- all infected resolve at rate γ_j
  - mild: all recover
  - ICU: $\gamma_j = \delta_j^d(t) + \delta_j^r(t)$

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$$\delta_j^d(t) = \psi_j(H(t))$$

$$H(t) = \sum_j \iota_j I_j(t)$$

MODEL

- Testing + Isolating
  - Non-ICU τ_j
  - ICU ϕ_j
- Not isolated: $\eta_j \equiv 1 - (\iota_j \phi_j + (1 - \iota_j)\tau_j)$

- Recovered agents...
  - assumed immune
  - detected and separated κ_j (not locked down)

PRODUCTION AND LOCKDOWN

- Lockdown $L_j \in [0, \bar{L}_j]$
  - opportunity cost w_j
  - Effectiveness is imperfect: θ_j

- Fraction interacting infections

$$1 - \theta_j L_j(t)$$

VACCINE + CURE

- Assume…
  - vaccine + cure arrives at some T
  - after this infections drop to zero and stay there

- Extension: T stochastic

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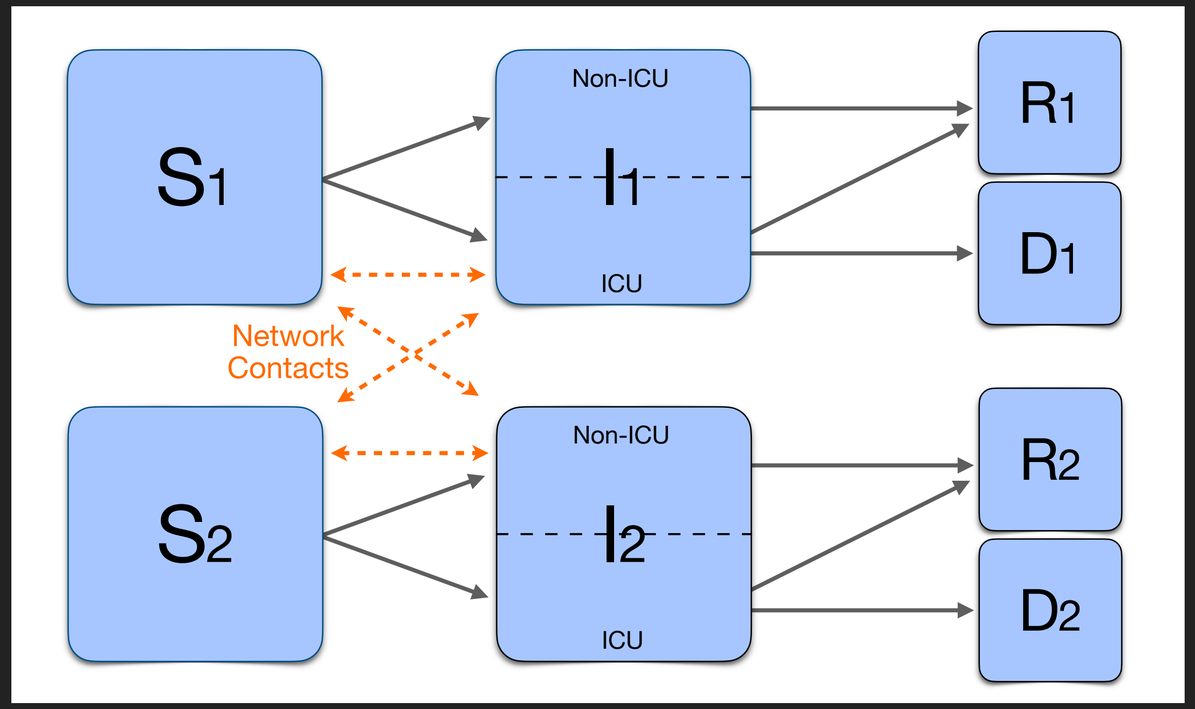

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TWO OBJECTIVES

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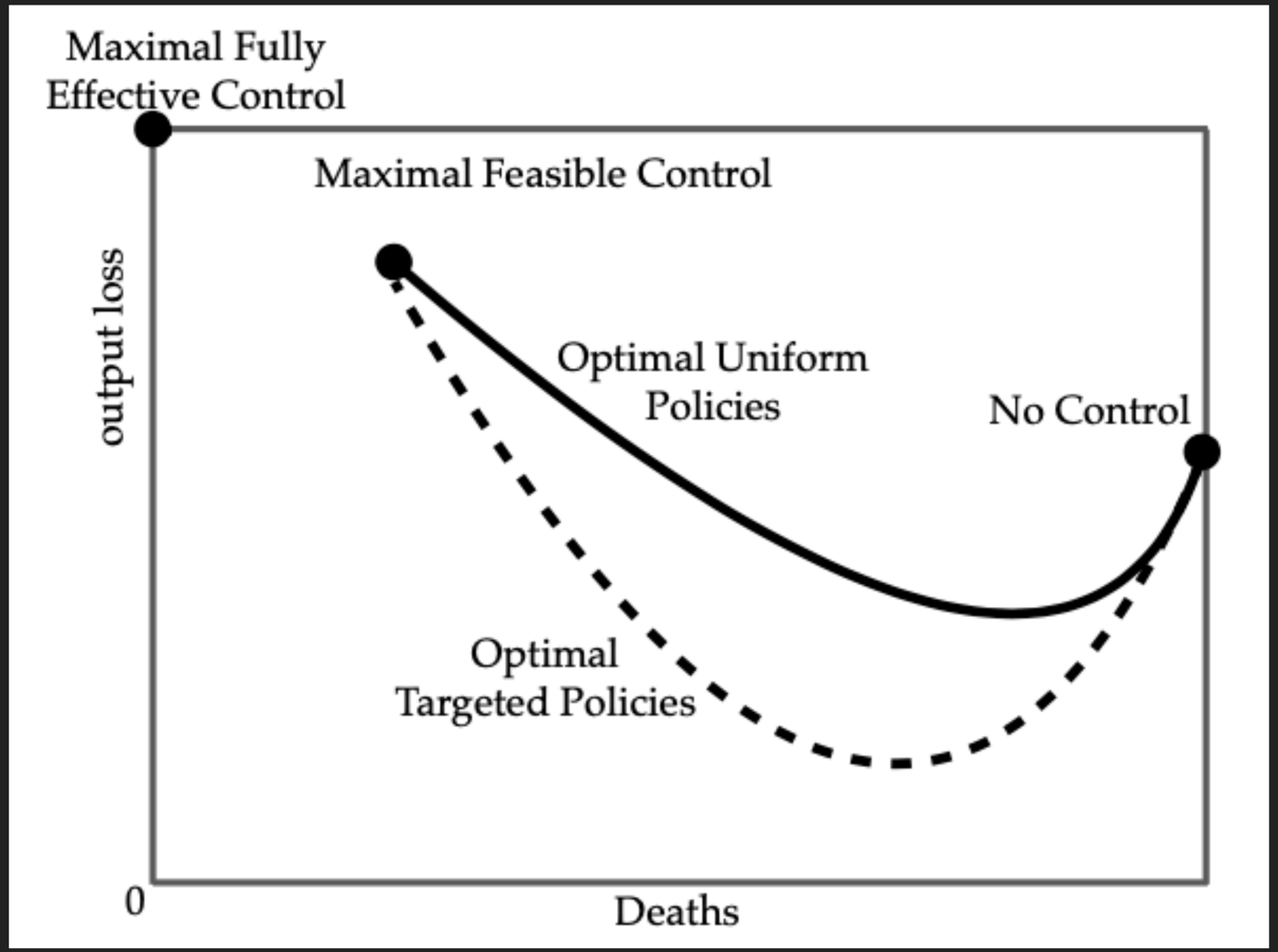

GAINS FROM TRAGETING

- Better tailoring… (not subtle)
  raise lockdown for old
  + lower lockdown for young
- Targeted herd immunity… (more subtle)
  even just lower lockdown for young can protect old

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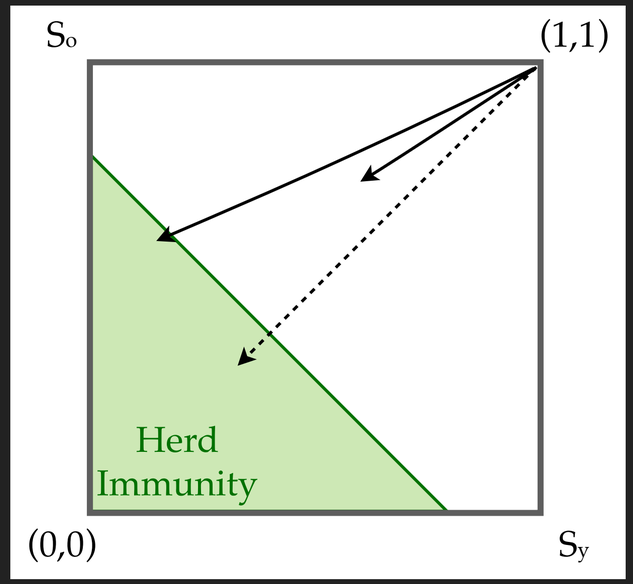
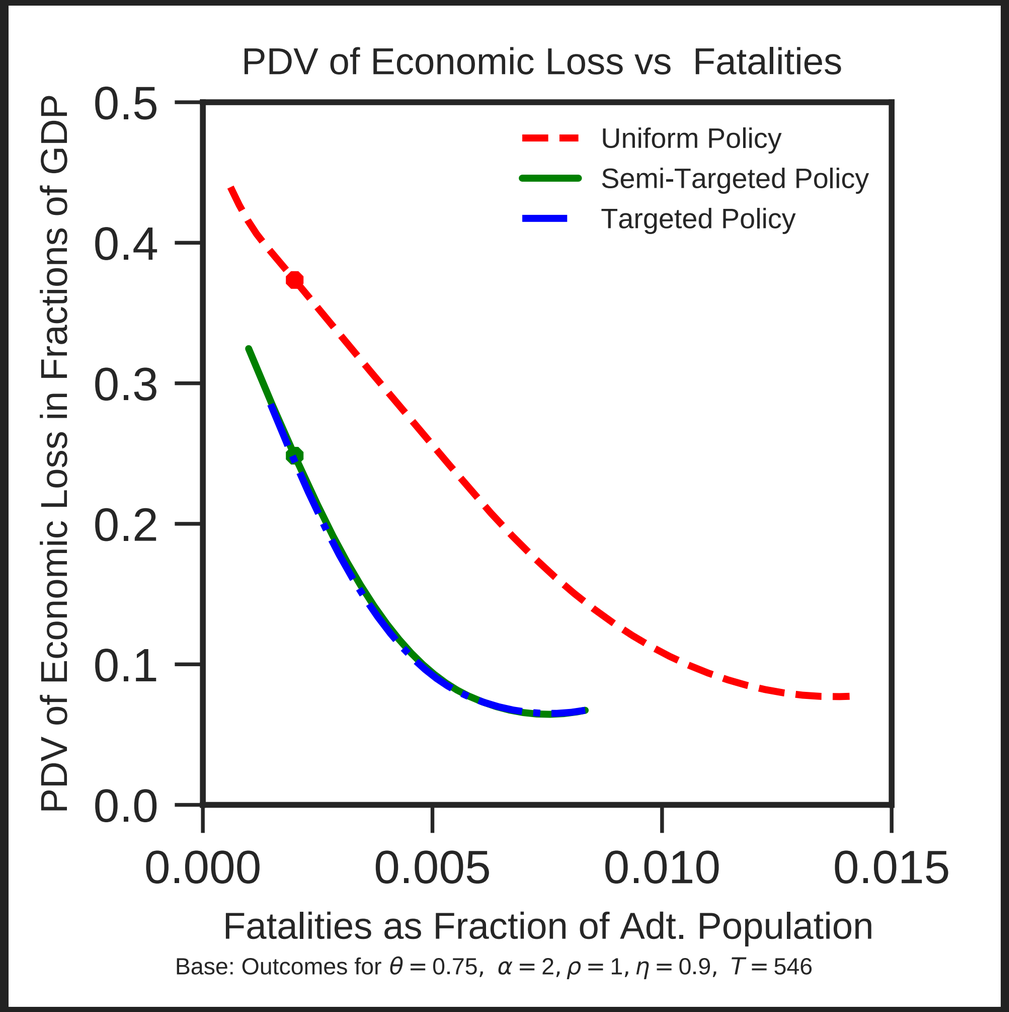


FRONTIER



Large gains for Semi-Targeting

Small gains for Full-Targeting

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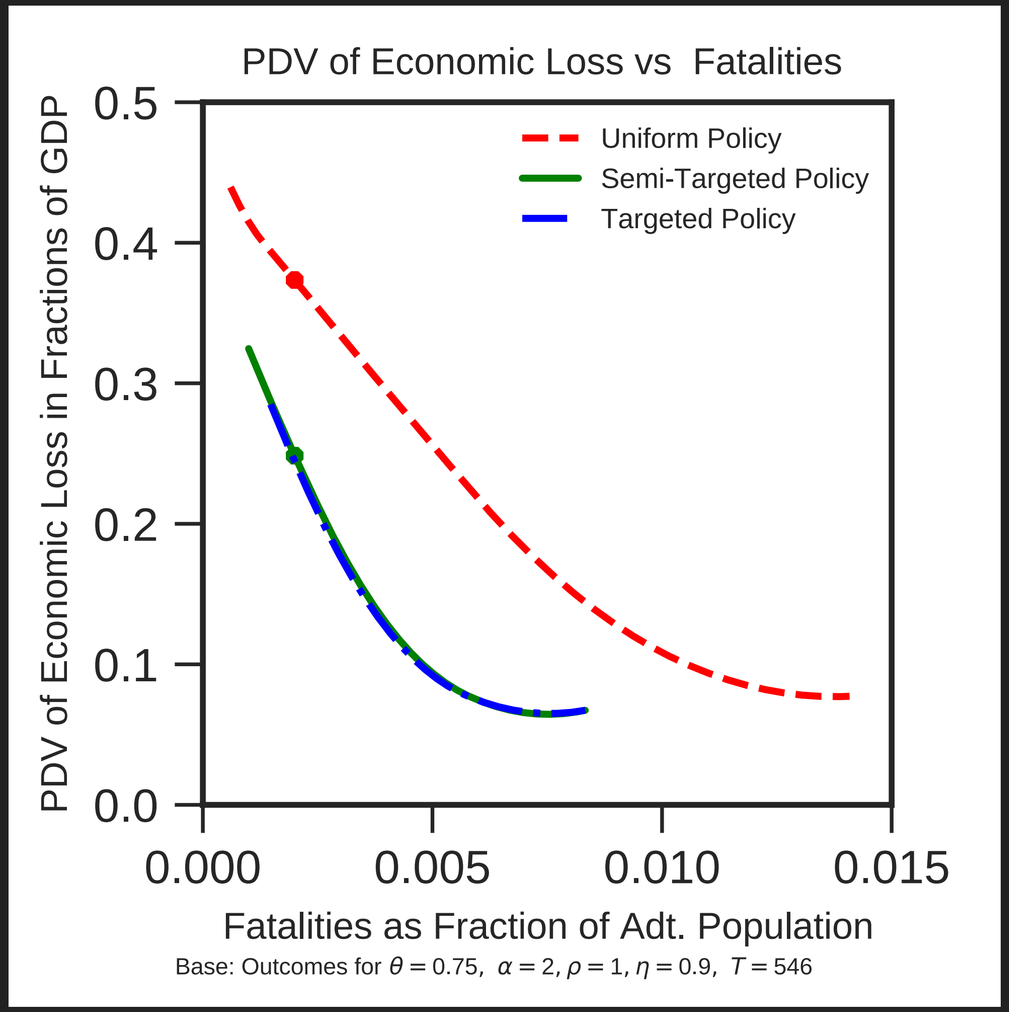

Safety-Focused
= 0.2% mortality

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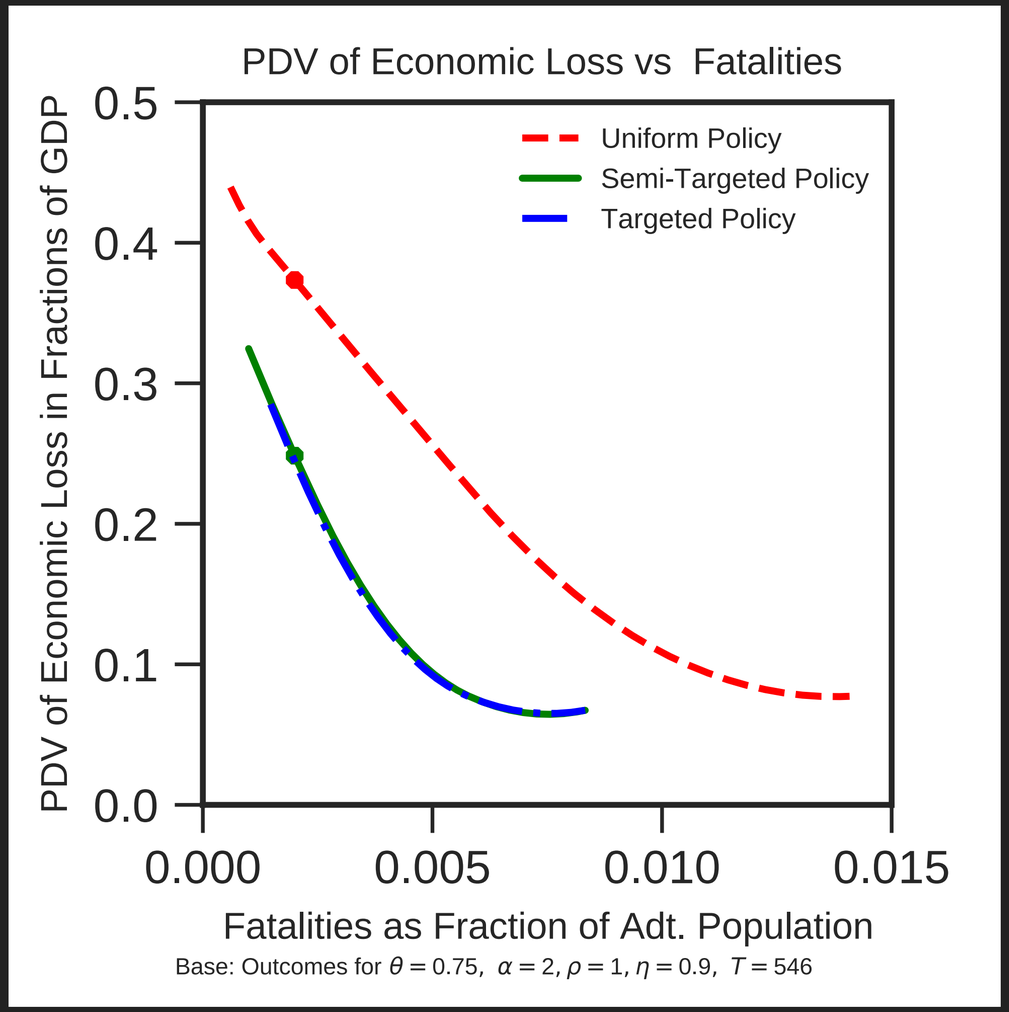


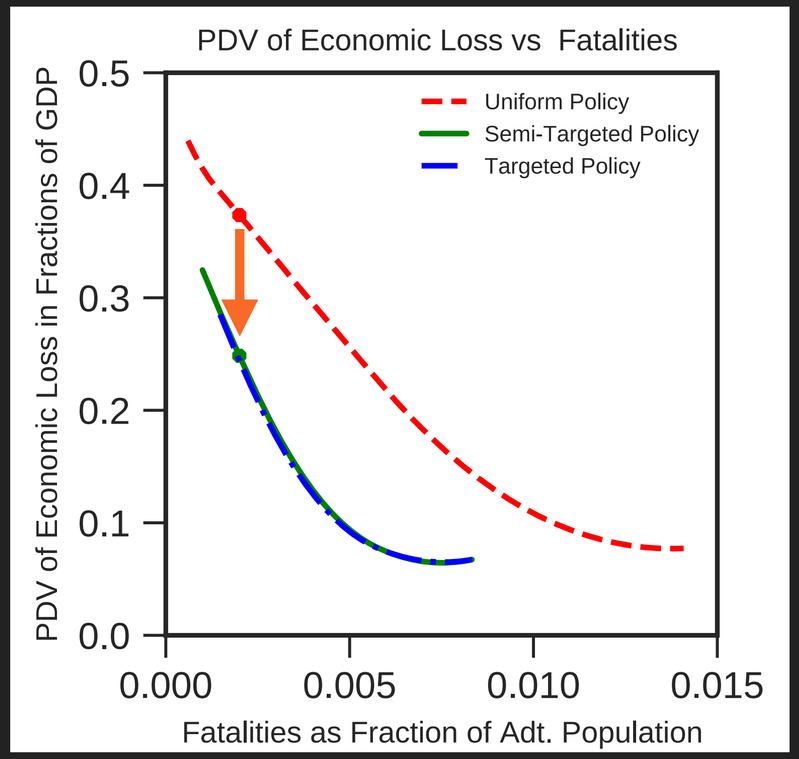
Large gains for Semi-Targeting

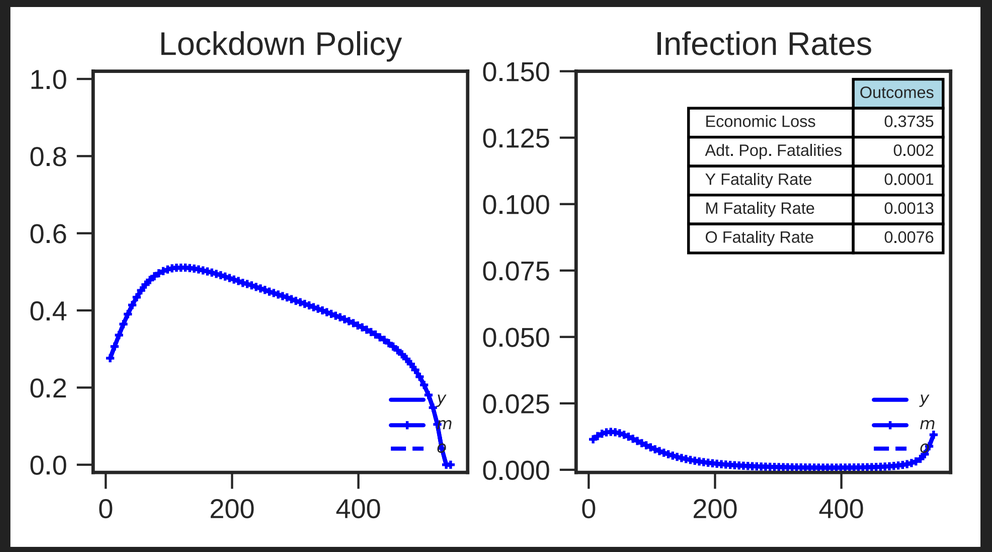
Small gains for Full-Targeting

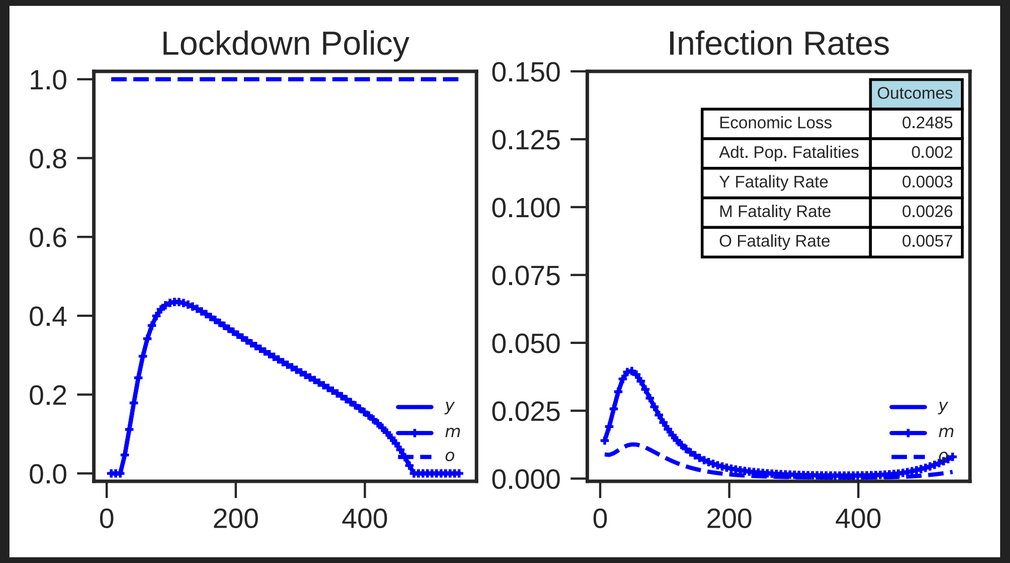
Safety-Focused
= 0.2% mortality

Economy-Focused
= 10% output loss

SAFETY FIRST

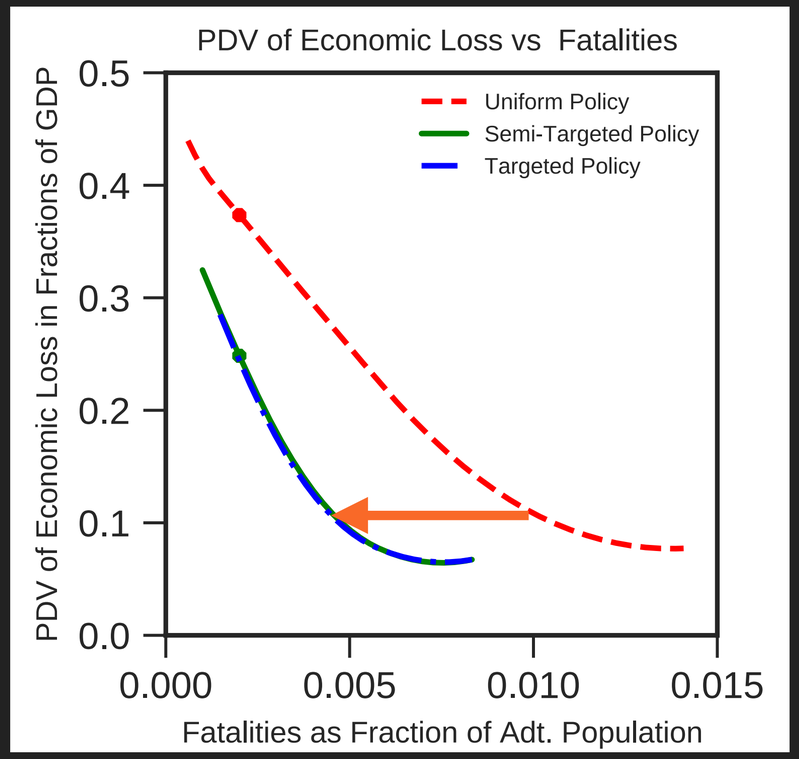


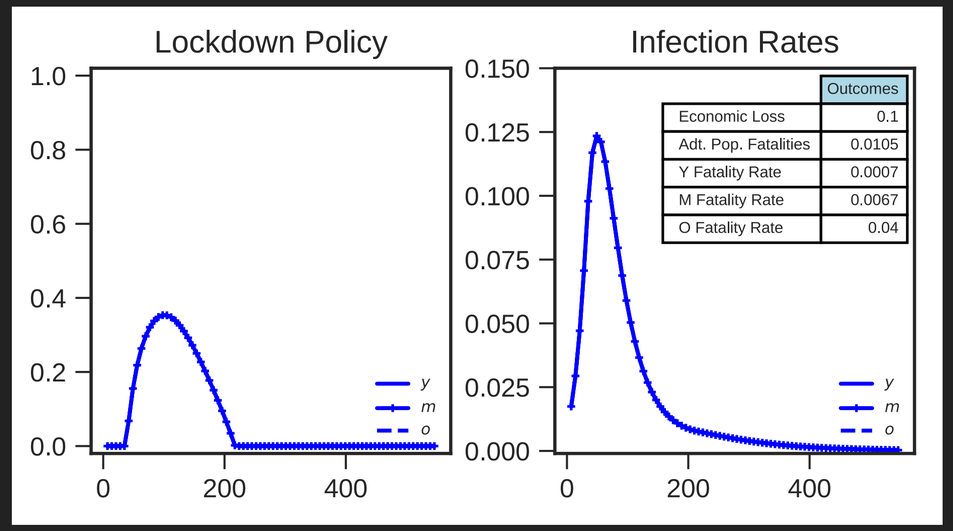


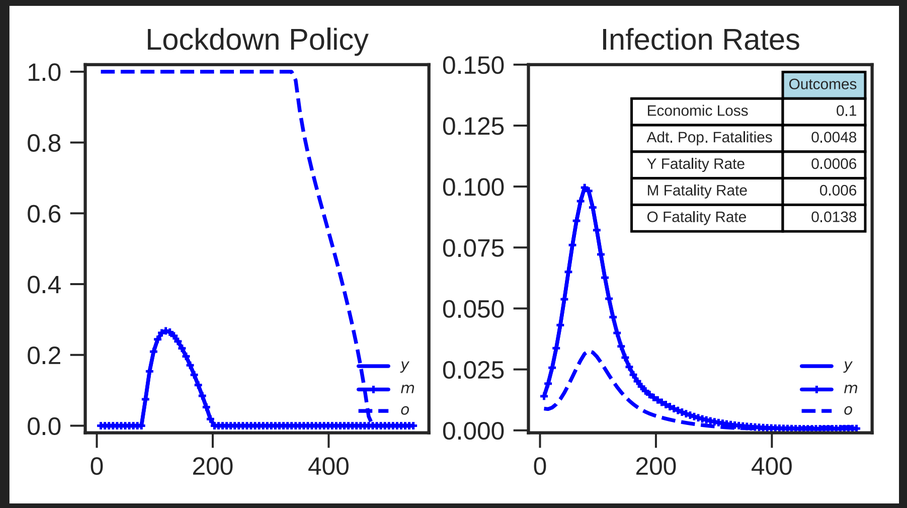


Big Improvements from Semi Targeting

ECONOMY FIRST

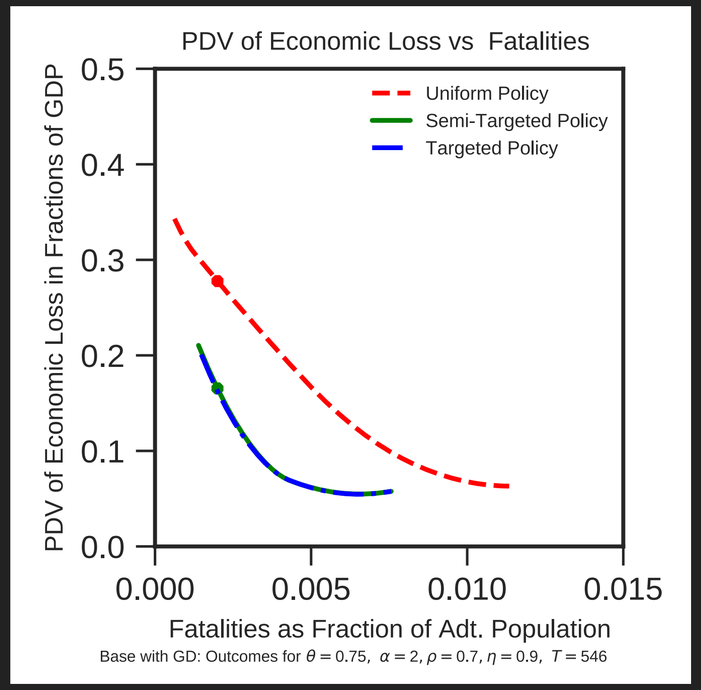


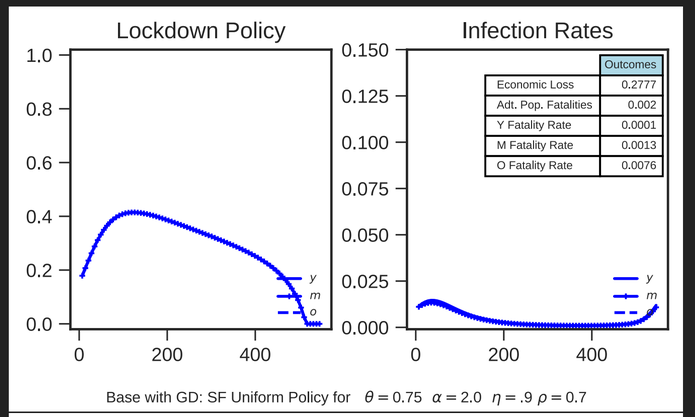


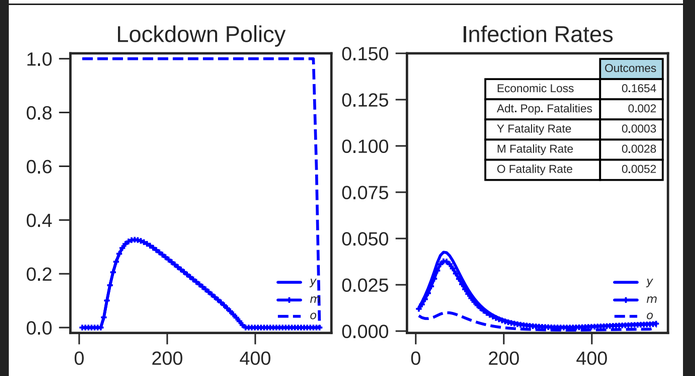


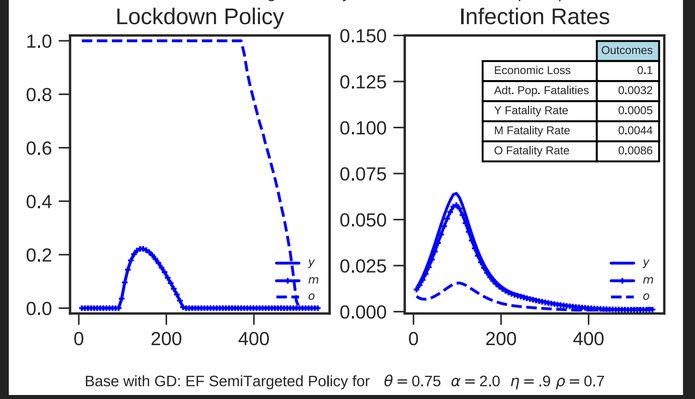
Big Improvements from Semi Targeting

GROUP DISTANCING (RHO=0.7; BASELINE = 1)







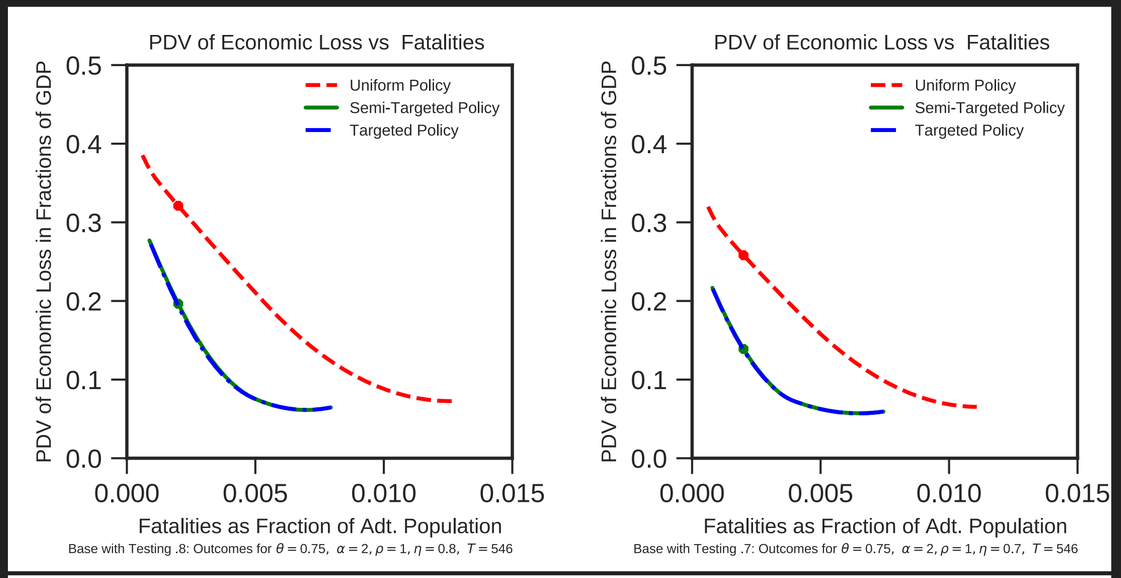


Valuable

especially with targeting!

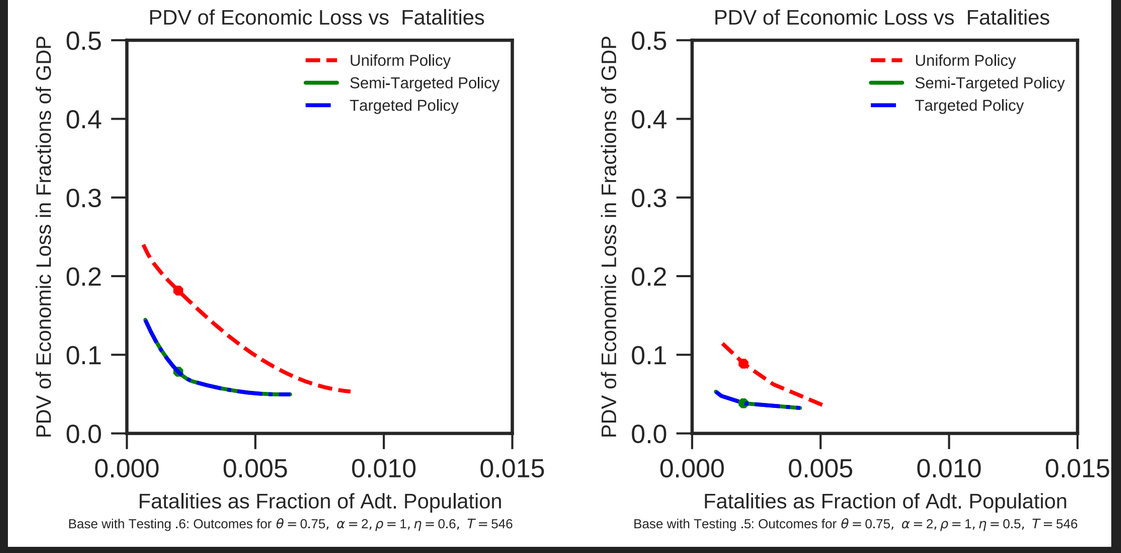
(matching technology matters here)

TESTING



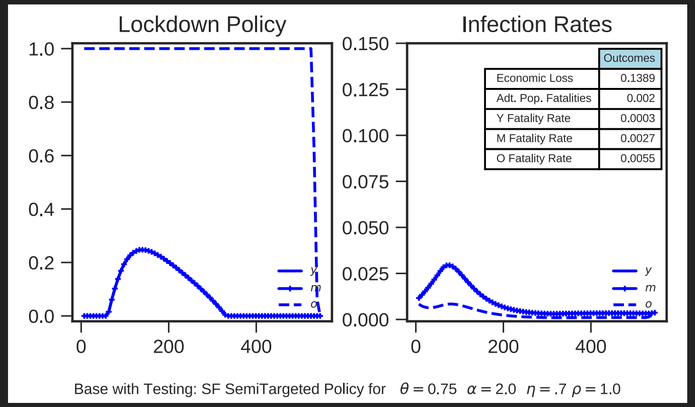
Base with Testing .8: Outcomes for $\theta = 0.75,\ \alpha = 2, \rho = 1, \eta = 0.8,\ T = 546$

Base with Testing .7: Outcomes for $\theta = 0.75,\ \alpha = 2, \rho = 1, \eta = 0.7,\ T = 546$



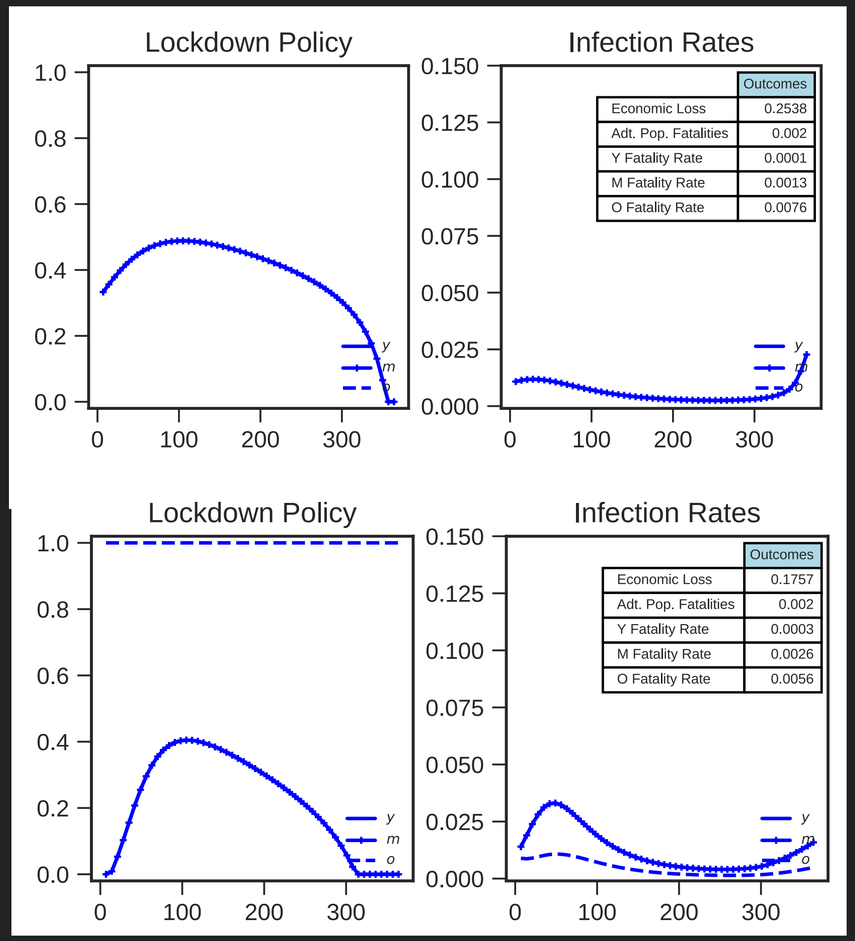
Base with Testing .6: Outcomes for $\theta = 0.75,\ \alpha = 2, \rho = 1, \eta = 0.6,\ T = 546$

Base with Testing .5: Outcomes for $\theta = 0.75,\ \alpha = 2, \rho = 1, \eta = 0.5,\ T = 546$



Base with Testing: SF SemiTargeted Policy for $\theta = 0.75\ \ \alpha = 2.0\ \ \eta = .7\ \rho = 1.0$

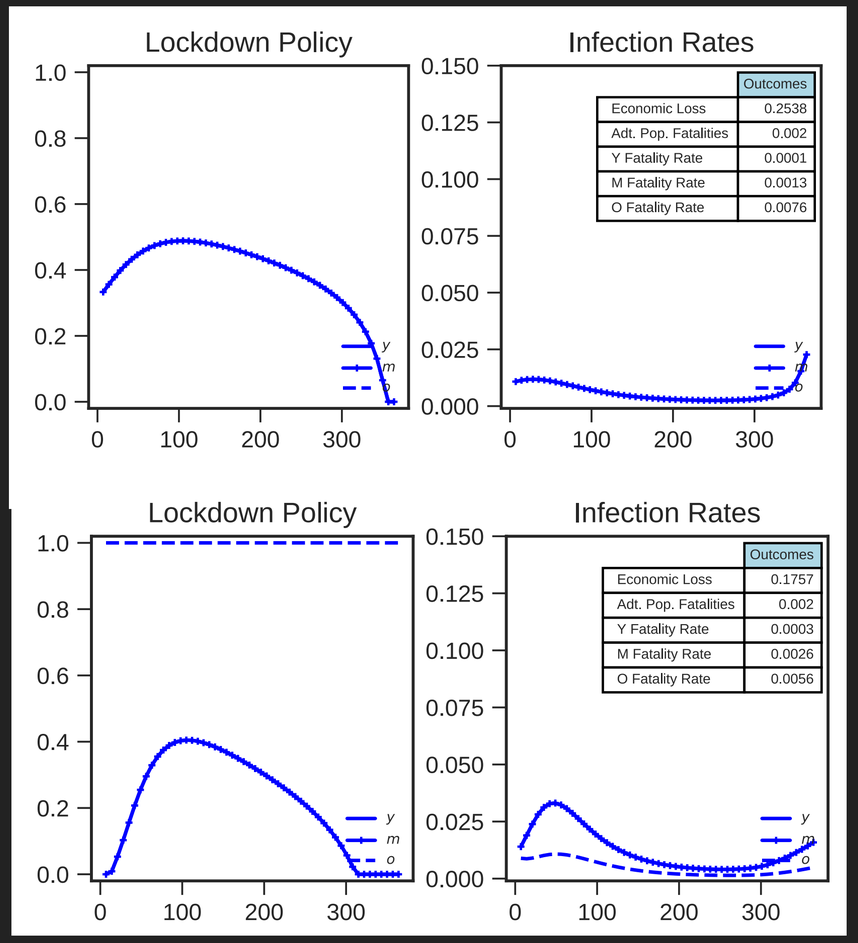
EARLIER VACCINE/CURE



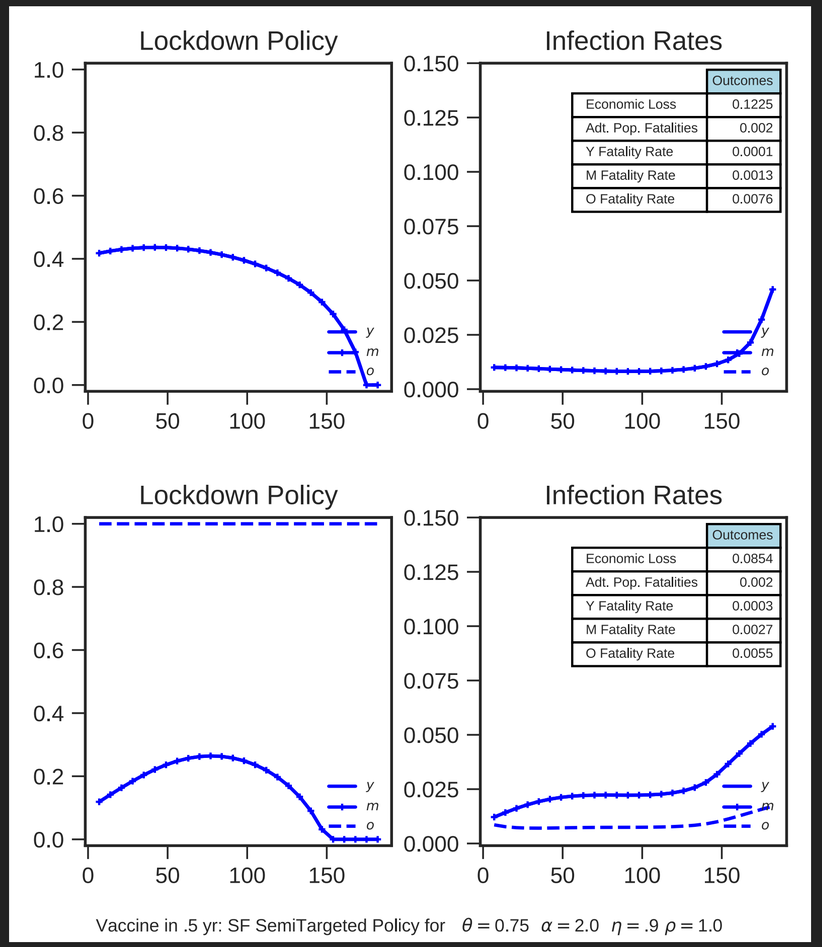
12 months

6 months

EARLIER VACCINE/CURE



12 months



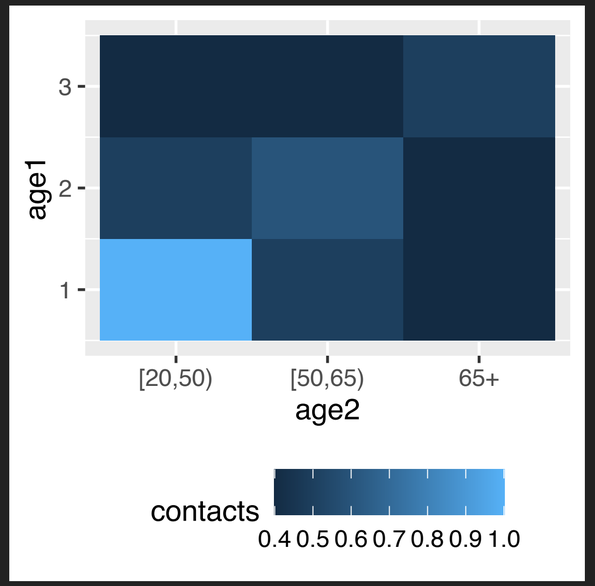
6 months

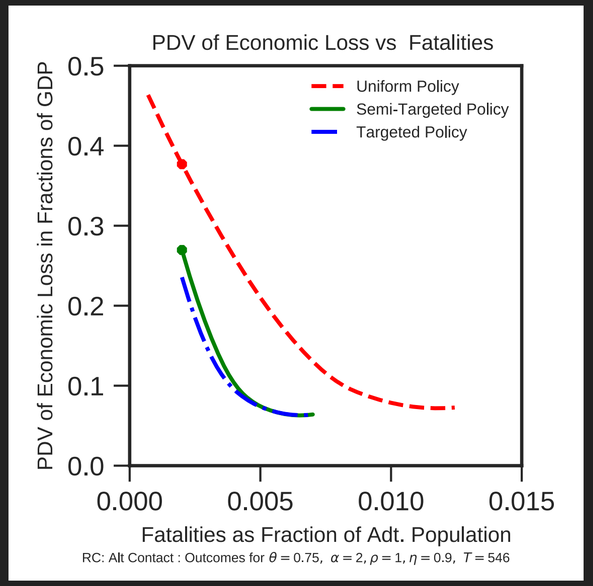
ROBUSTNESS

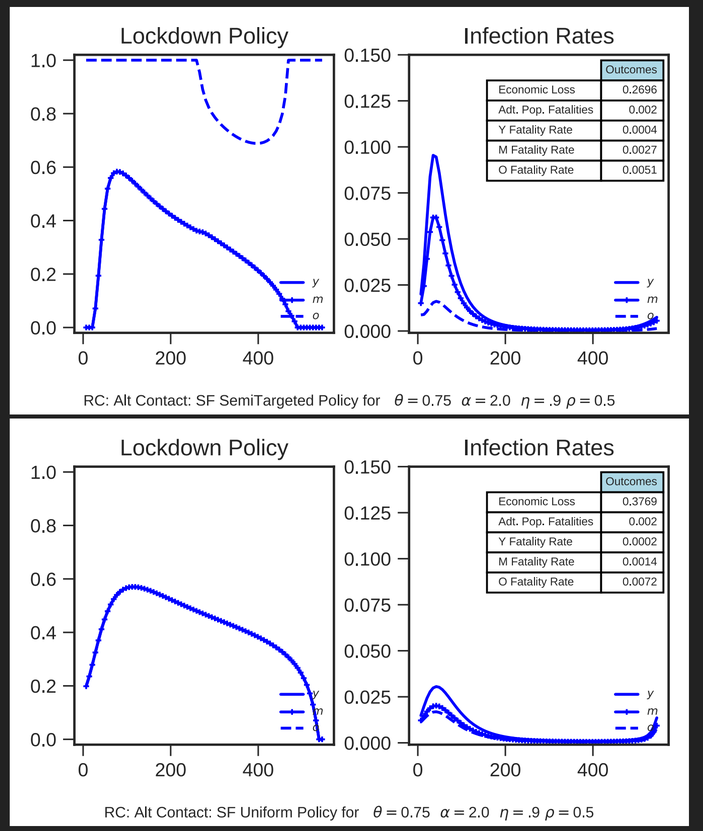
- ICU hard constraint
- higher mortality: South Korea
- lower transmission (e.g. masks)
- higher initial recovered
- lower effective lockdowns
- alternative group distancing
- alternative value for old in lockdown
- alternative work from home

CONTACT MATRIX CALIBRATION

- BBC Pandemic Project (more recent than POLYMOD)

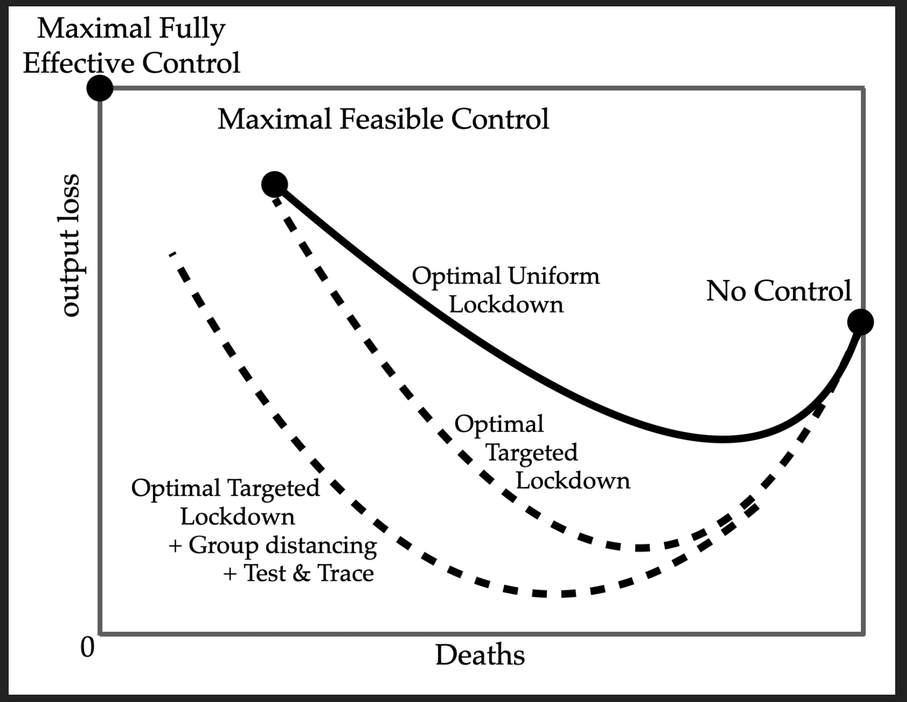






FINDINGS SUMMARY

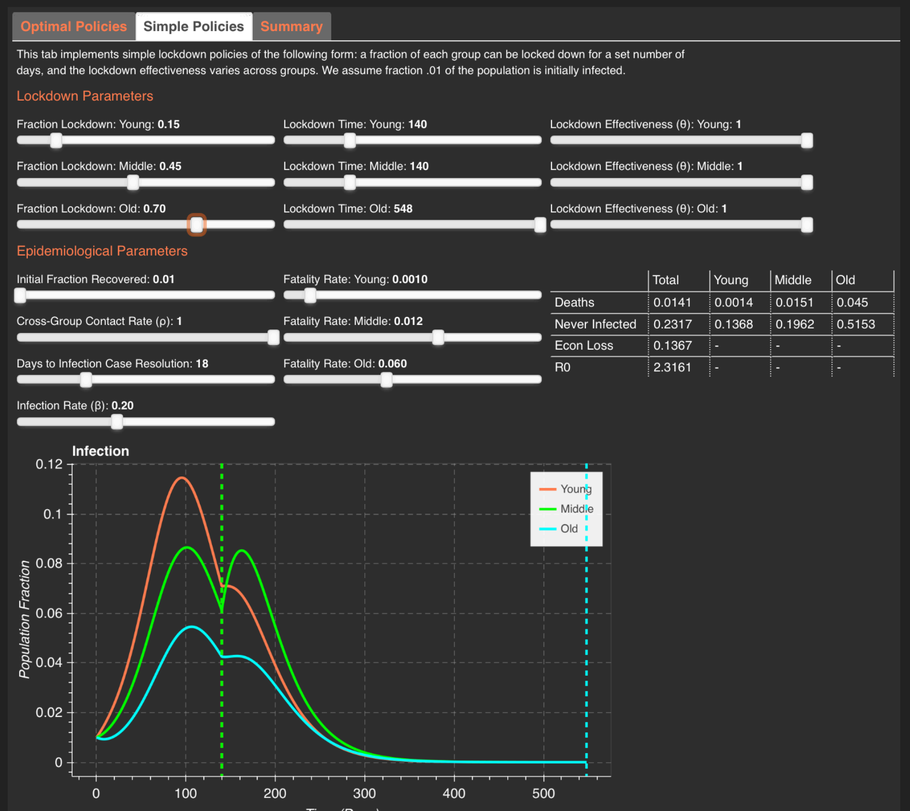
- Large gains from targeted policy
- Most gains from simple semi-targeted policies: treat 65+ group differentially
- Do not set zero lockdown for young immediately
- Testing important



INTERACTIVE DASHBOARD

https://mr-sir.herokuapp.com/main

(link provided in our paper)



NEXT STEPS…

- Parameters: update as better information
- Testing: capacity issues and build up over time

- Operationalize…
  - How to better isolate elderly?
  - Corp of workers: immune or isolated

- Our results today: targeted lockdown policies very beneficial

BEHAVIORAL RESPONSES

- Behavioral responses…
  - crucial to understand no intervention
  - but generally do not affect planning solutions
  - affect implementation
- Targeting may be easier with behavioral responses