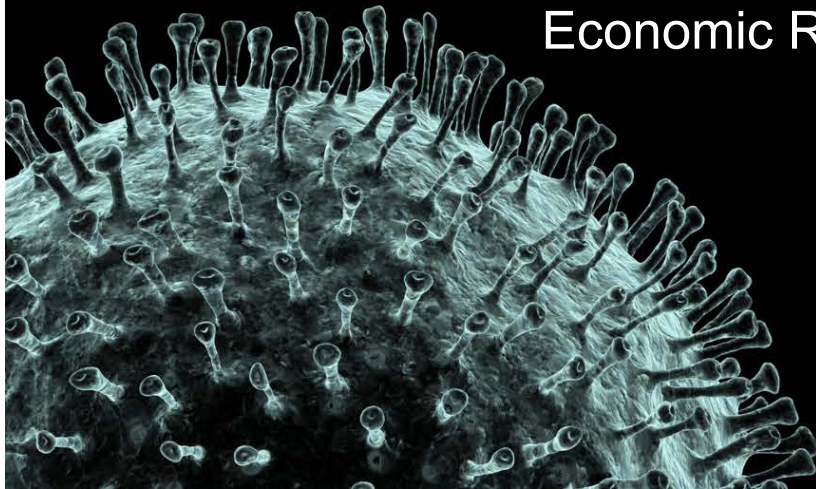


# COVID-19 Conversations



**Kent Smetters, PhD**

Boettner Chair Professor, University of  
Pennsylvania's Wharton School  
Faculty Research Fellow, National Bureau of  
Economic Research



[COVID19Conversations.org](https://COVID19Conversations.org)

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PENN WHARTON  
UNIVERSITY of PENNSYLVANIA

## Budget Model

# Coronavirus Policy Responses:

Health and Economic Effects of State Reopenings

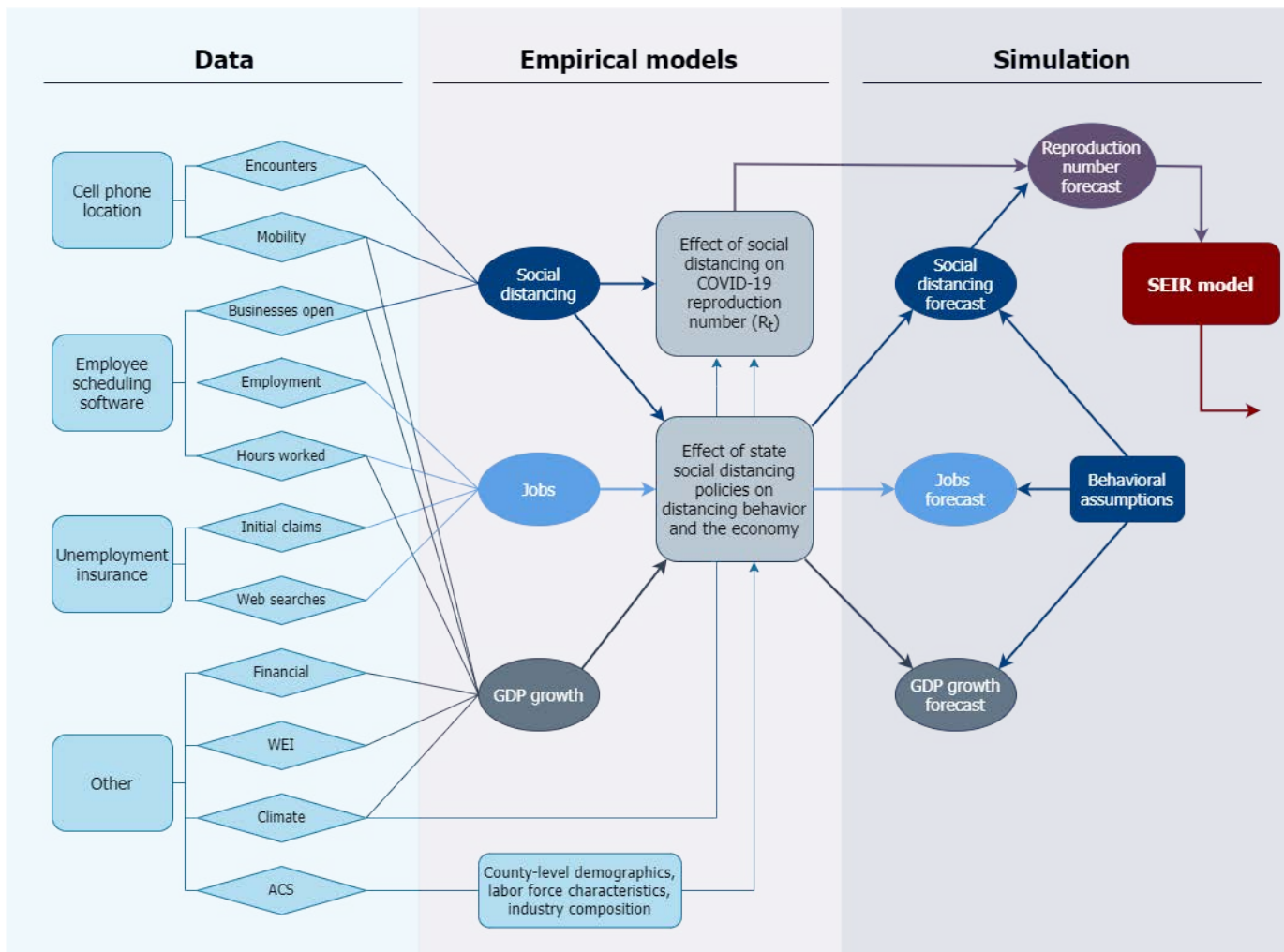
Alex Arnon, John Ricco, and Kent Smetters

<https://budgetmodel.wharton.upenn.edu/>

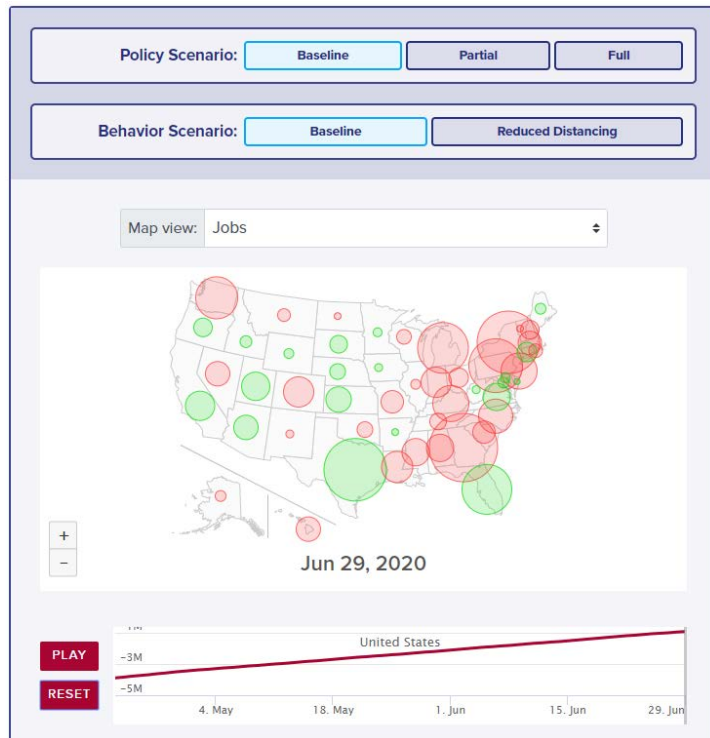
May 26, 2020

# Context

- At one point almost every U.S. state had imposed lockdown orders to stem the spread of the coronavirus.
- Most states now beginning to relax, easing “stay at home” orders and restrictions on nonessential businesses and activities.
- Can have economic benefits, there will also be a public health cost in more people contracting the virus and dying.



# Simulator Interface



<https://budgetmodel.wharton.upenn.edu/issues/2020/5/1/coronavirus-reopening-simulator>

# Estimation Strategy

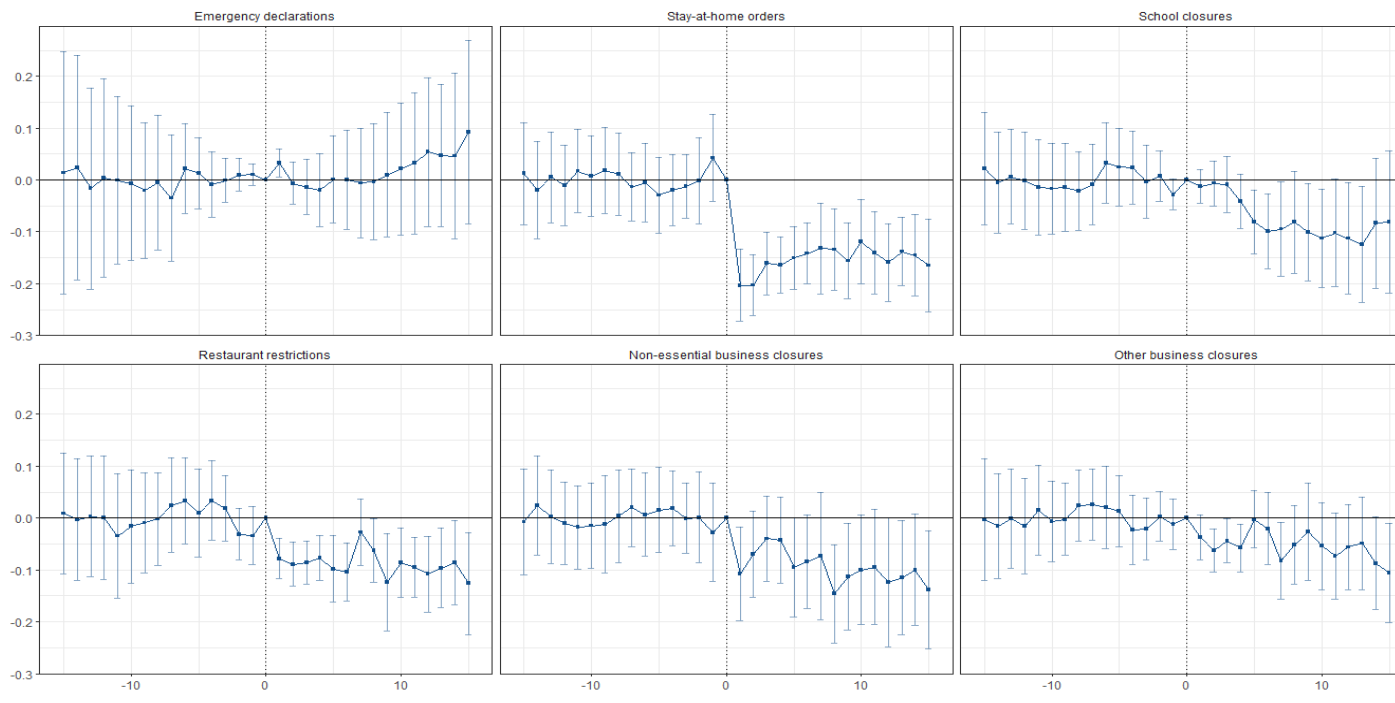
- Principal Component Analysis: extract a (daily) common factor for these variables that we think is social distancing
- Expands on Lewis, Mertens and Stock (2020)
- For GDP/employment, we also combining principal component with *weekly* GDP/employment data in order to generate *daily* data

Diff-in-diff across **time** and across **treatment**, with numerous controls (e.g., number of confirmed cases, density, population, age, etc.)

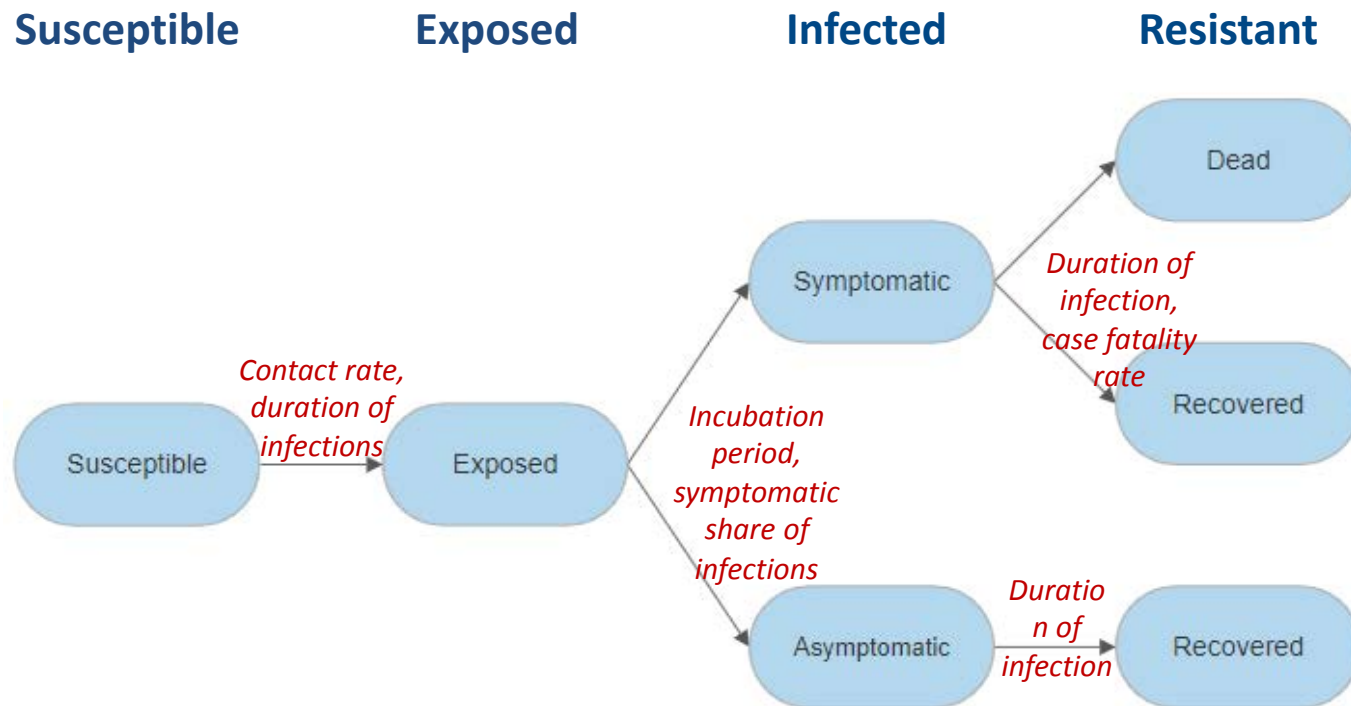
1. For each metric of social distancing policies, we compare states that *did* and *did not* implement the policy—the first “difference”
2. Then we examine how this difference between groups changes as the policy is implemented —the second “difference”

# Validation (pre- vs. post-period)

Estimated policy effects on social interactions  
Log scale

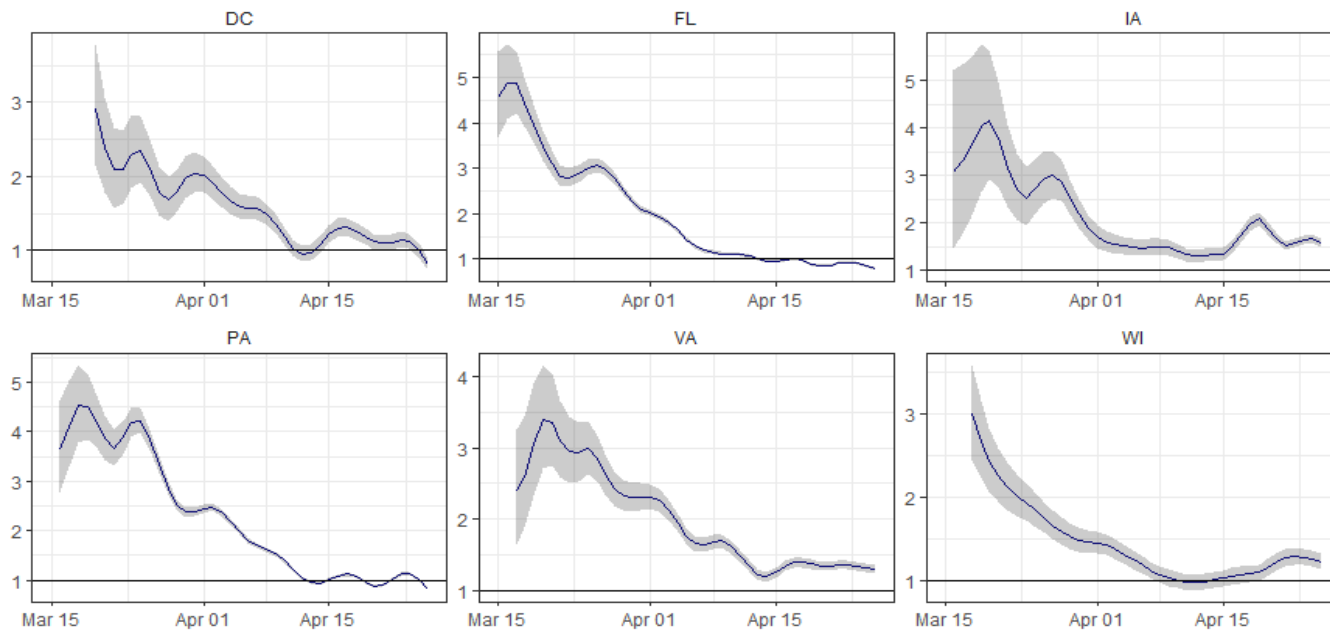


# SEIIR Model





- Estimates of  $R$ : fallen dramatically in every state, but some remain above 1



- Results

State: United States

Projection Type	Policy Scenario	Behavior Scenario	Cumulative Cases	Cumulative Deaths	Change in Net Jobs (millions) over forecast window	Year-over-Year GDP (% change)
Baseline (levels)	Baseline Policy	Baseline Behavior	2,756,545	153,816	1.6 million	-4.3%
<b>Difference from baseline*</b>	<i>Lift Remaining Stay-At-Home Orders</i>	<i>Baseline Behavior</i>	+170,031	+9,121	+0.0 million	+0.0 p.p.
	<i>Full Reopening</i>	<i>Baseline Behavior</i>	+805,748	+43,356	+8.8 million	+2.5 p.p.
	<i>Baseline Policy</i>	<i>Reduced Social Distancing</i>	+529,948	+28,141	+1.2 million	+3.2 p.p.
	<i>Lift Remaining Stay-At-Home Orders</i>	<i>Reduced Social Distancing</i>	+1,567,252	+83,773	+1.2 million	+3.2 p.p.
	<i>Full Reopening</i>	<i>Reduced Social Distancing</i>	+8,622,554	+469,791	+10.2 million	+5.7 p.p.

\* Difference from baseline calculated by taking the level under the scenario and subtracting the baseline level.