

The Effect of COVID-19 Restrictions During the Delta Wave

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Motivation

- ▶ Ongoing public debate about the effectiveness of COVID-19 restrictions (such as mask mandates)
- ▶ Lots of sword rattling from both sides
- ▶ Delta wave and subsequent restrictions can give lots of insight into where, when, and why COVID cases occur

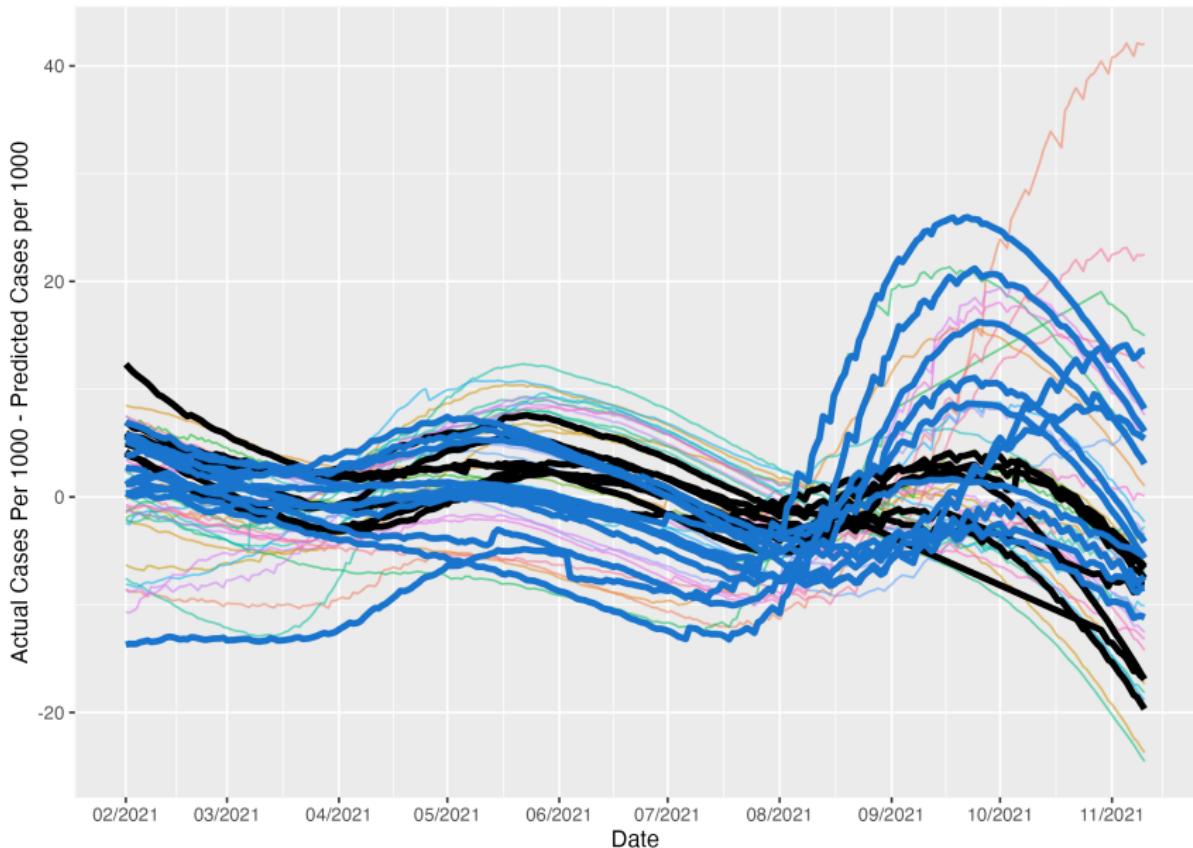
Research Question

How did case rates in states with more COVID restrictions compare to case rates in states with less COVID restrictions during the Delta wave?

- ▶ Method uses state fixed effects to compare states' predicted case rates over time based on their own populations and vaccination rates
- ▶ Most previous analyses focus on COVID restrictions in 2020 and find that, in general, mask mandates "work" in slowing the spread of COVID (original variant)

Sneak Peek of the Results

States with less restrictions have higher residuals during Delta



Data

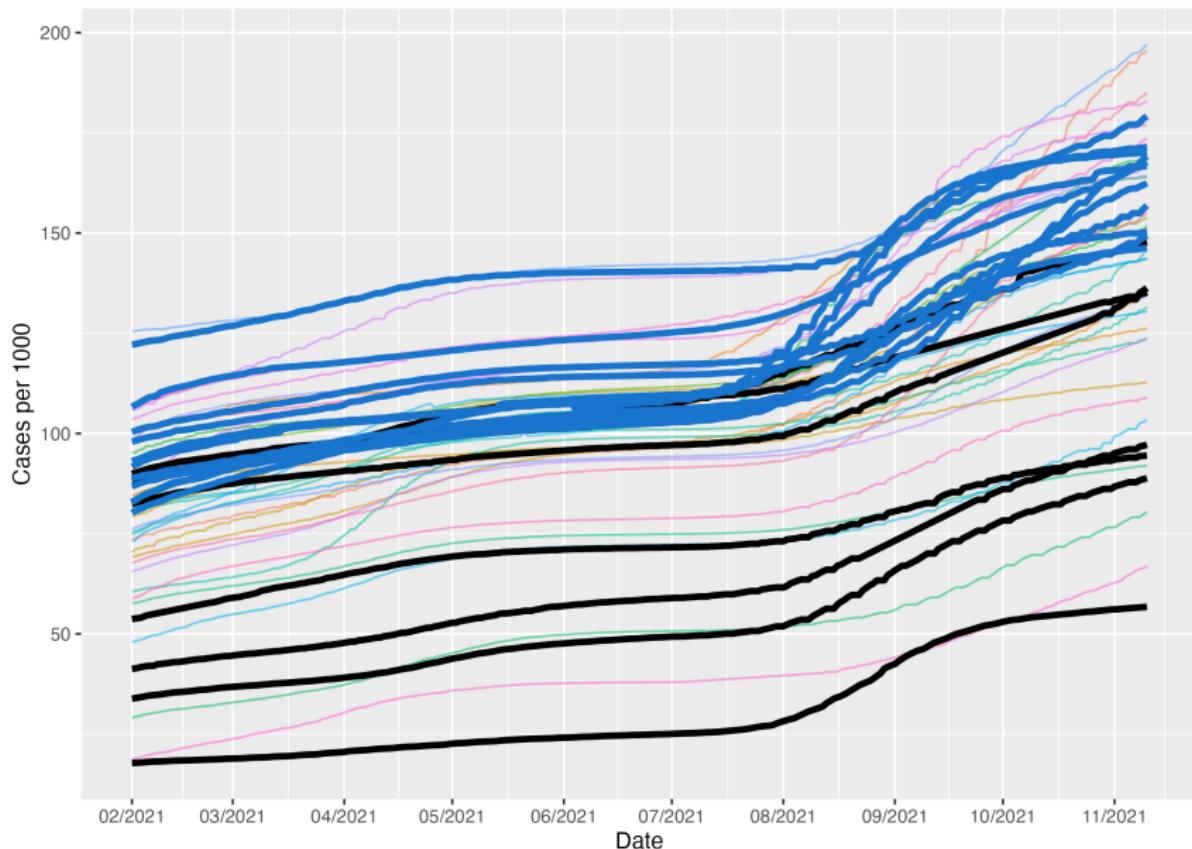
- ▶ County level case data: New York Times
- ▶ Population data (state and county level): U.S. Census Bureau
- ▶ State level demographic data: U.S. Census Bureau
- ▶ State level vaccination data: Our World in Data
(compiled from multiple sources)
- ▶ County level vaccination data: CDC

Research Design

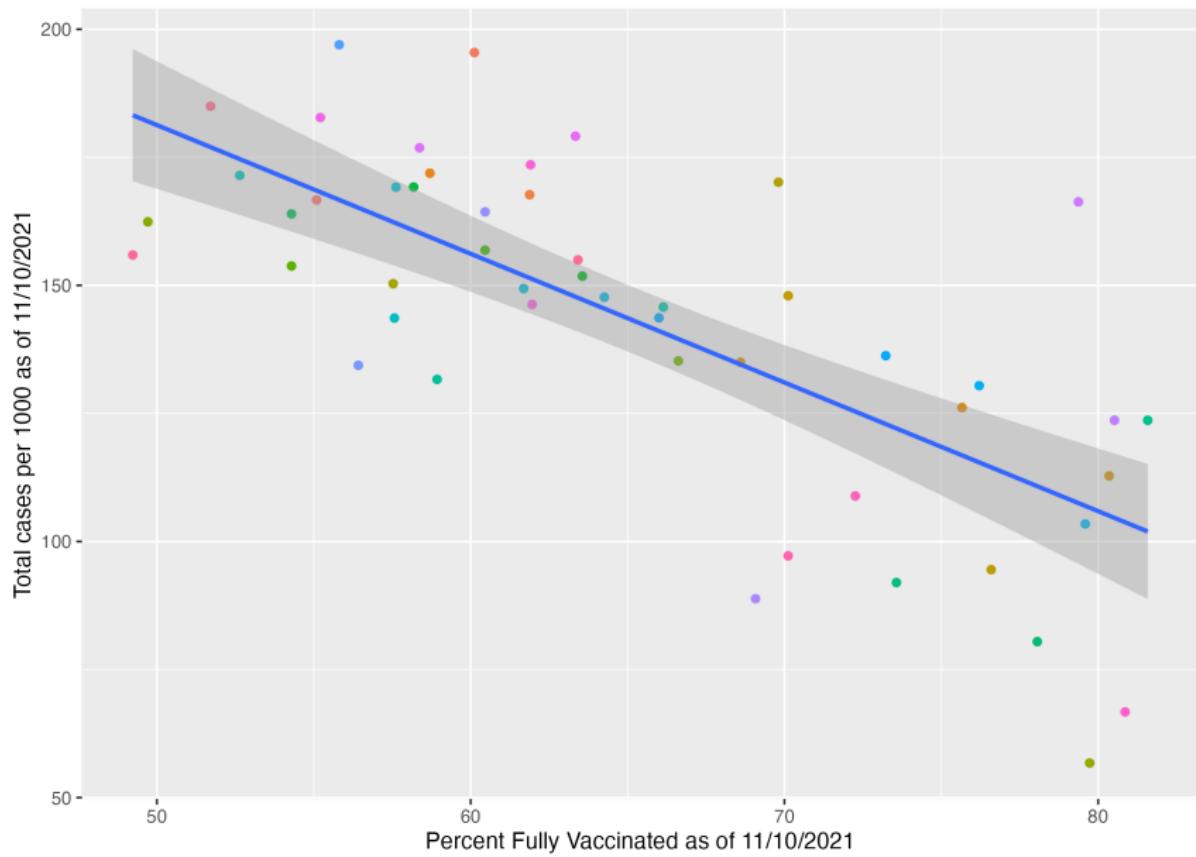
- ▶ Join data by state and date
- ▶ Use cases per 1000 people as dependent variable
 - ▶ 95% of variation in total cases is due to variation in population
- ▶ Regress cases per 1000 on vaccination rates over time, with state-level fixed effects
- ▶ Focus on several states with more restrictions and compare to several states with less restrictions
- ▶ Main Model:

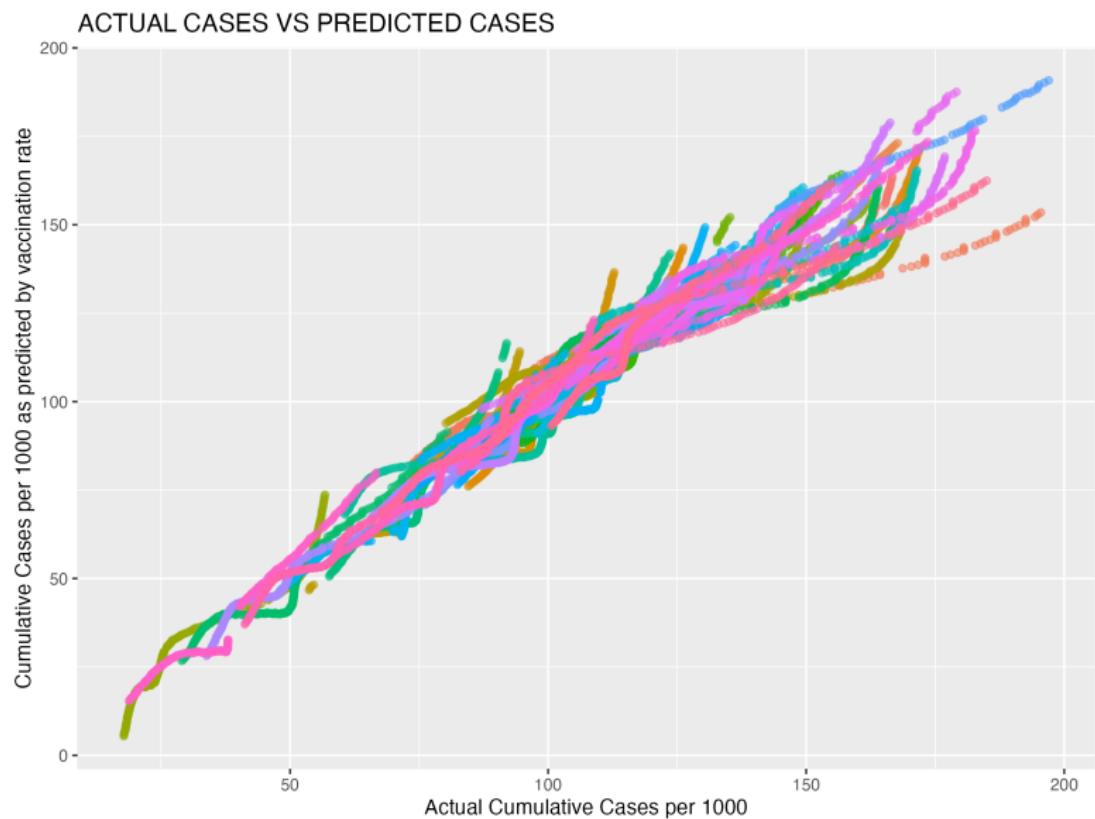
$$\hat{\text{cases per 1000}}_{it} = \hat{\beta}_0 + \hat{\beta}_1 \% \text{vaccinated}_{it} + \hat{\beta}_2 \text{state}_i + \hat{\beta}_3 \text{date}_t$$

STATES WITH LESS RESTRICTIONS HAVE HIGHER CUMULATIVE CASES PER 1000

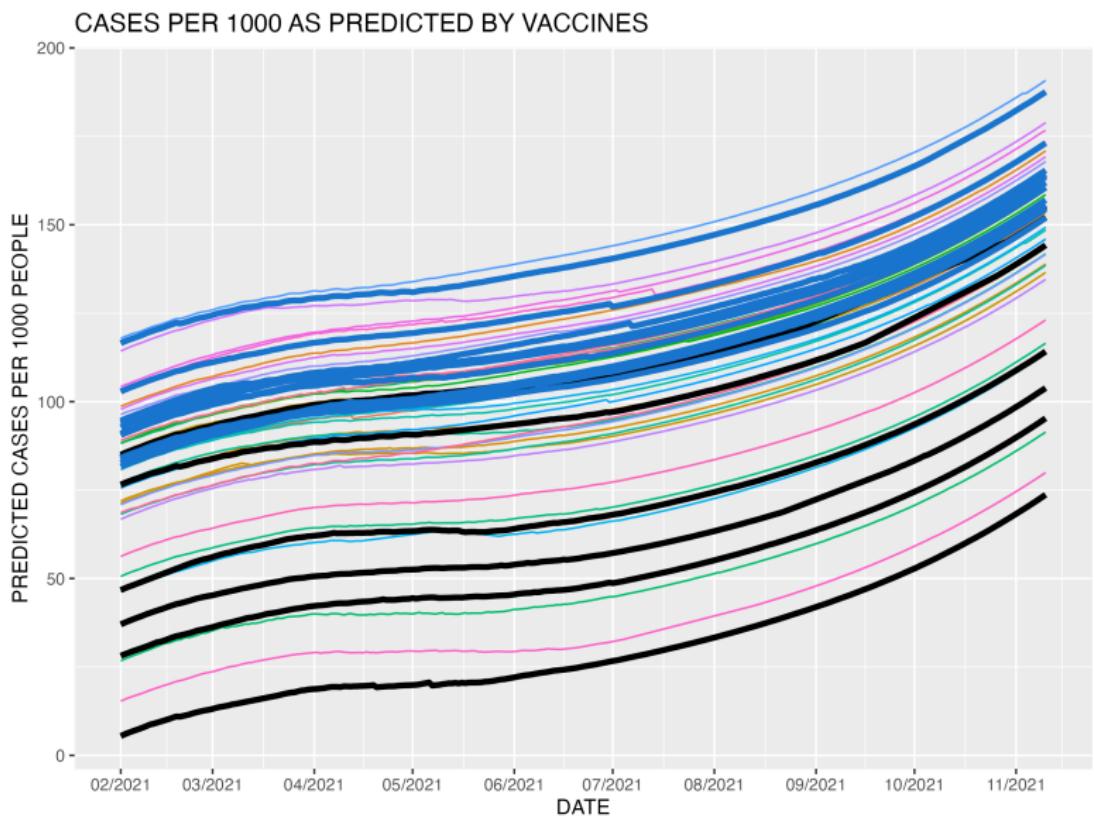


HIGHER VACCINATION RATES PREDICT LOWER CUMULATIVE CASES PER 1000



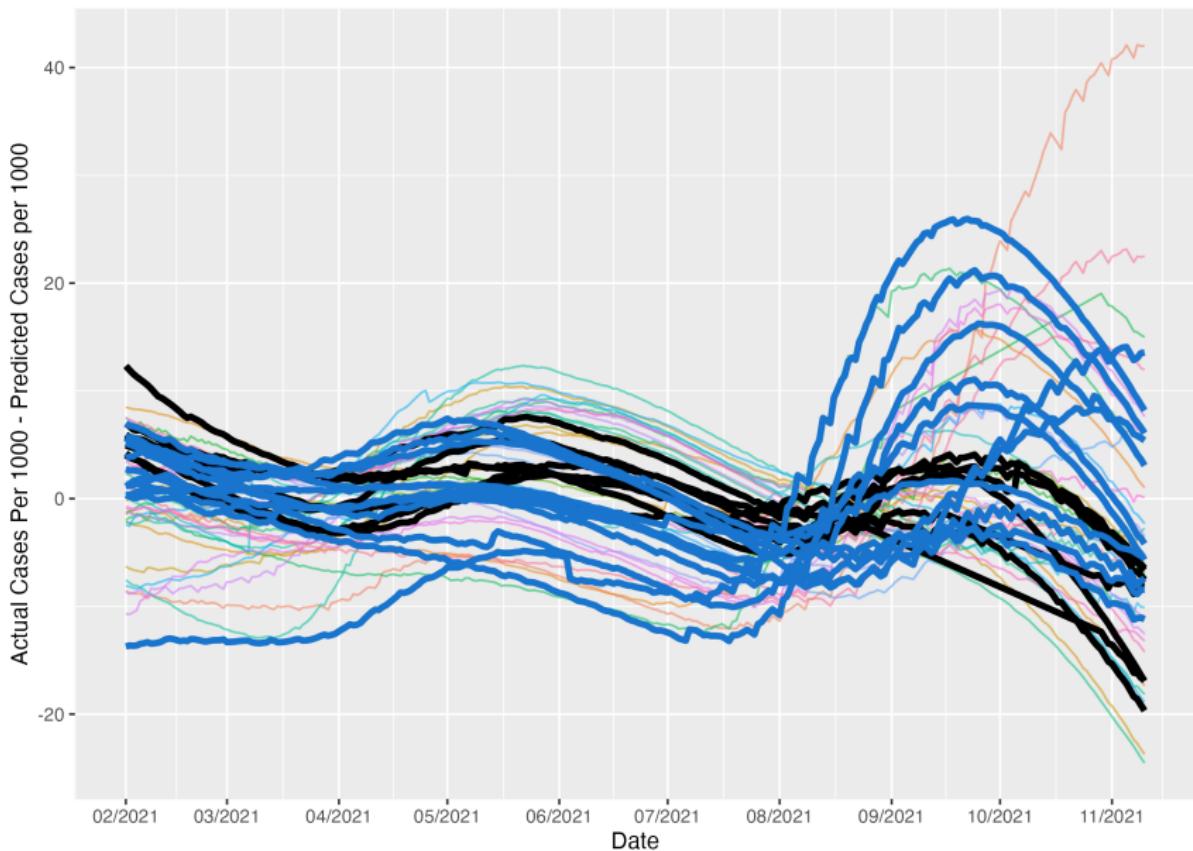


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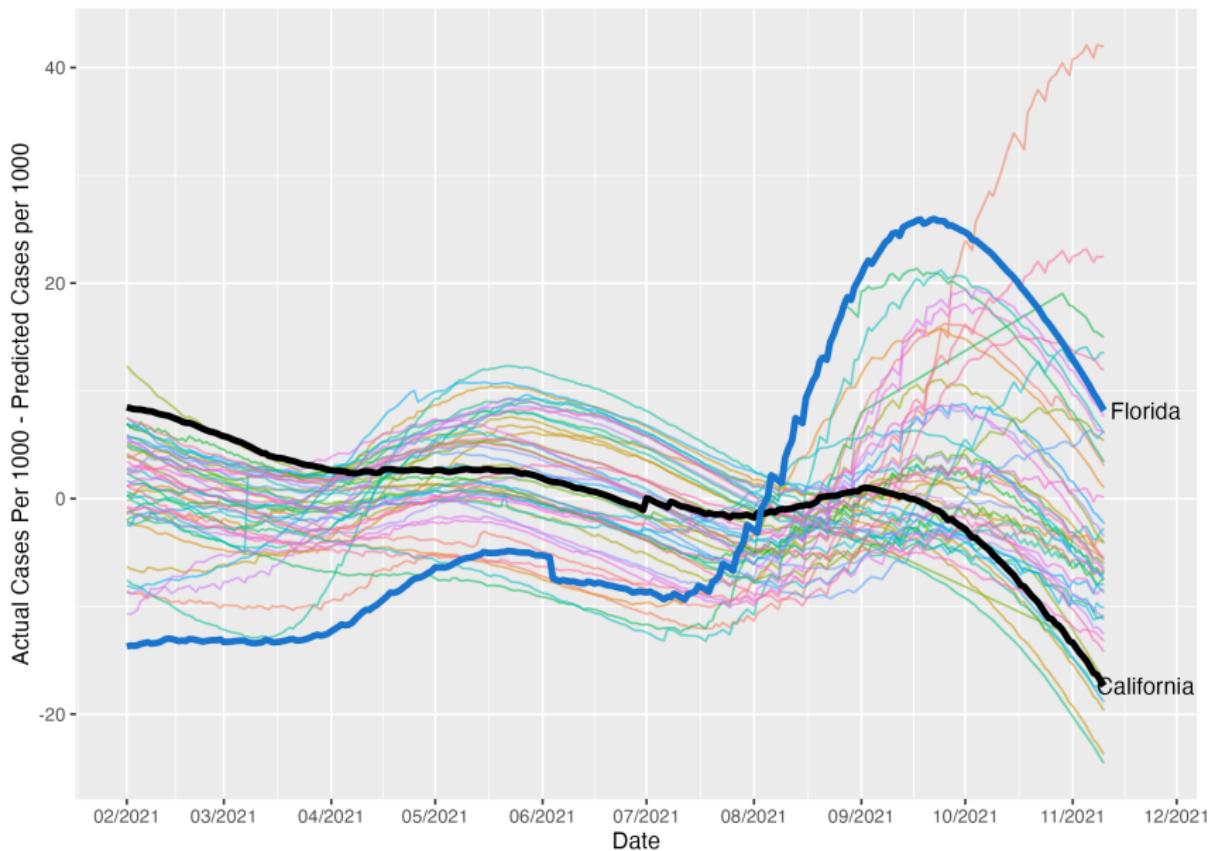


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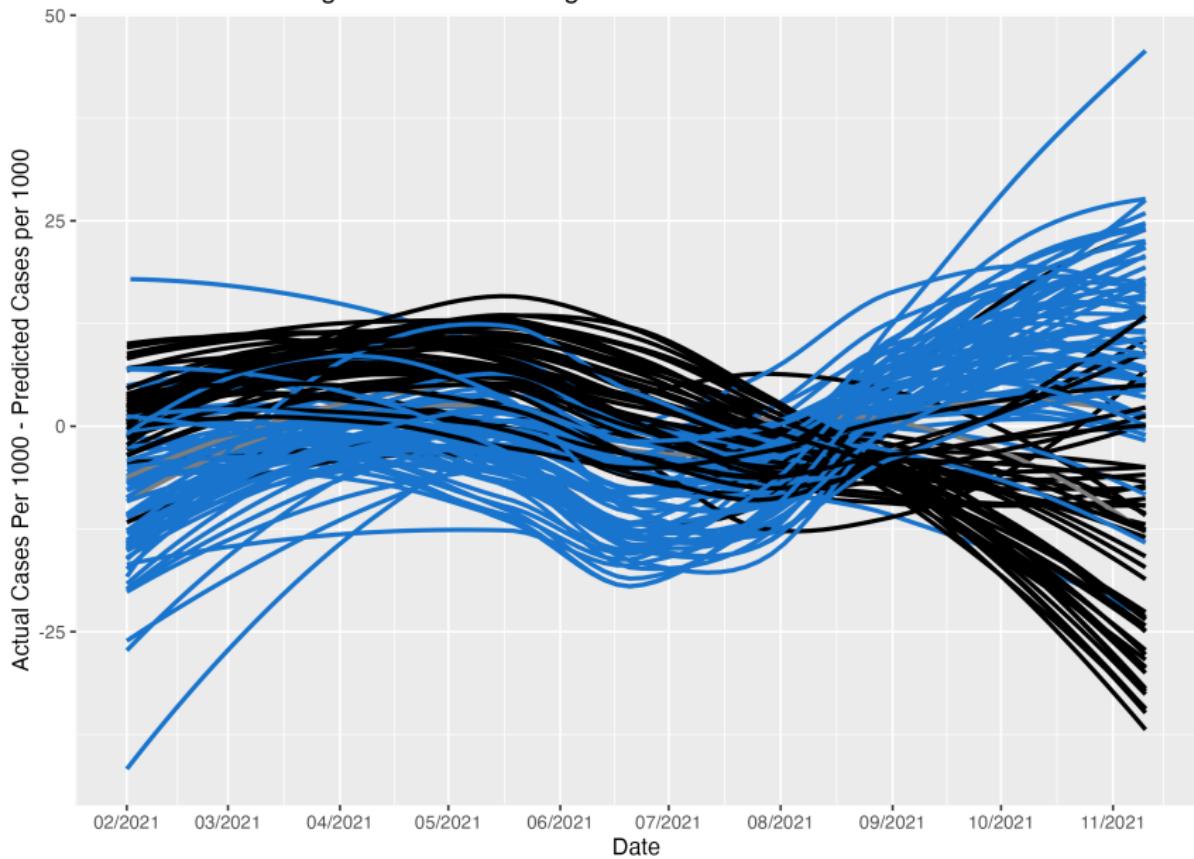
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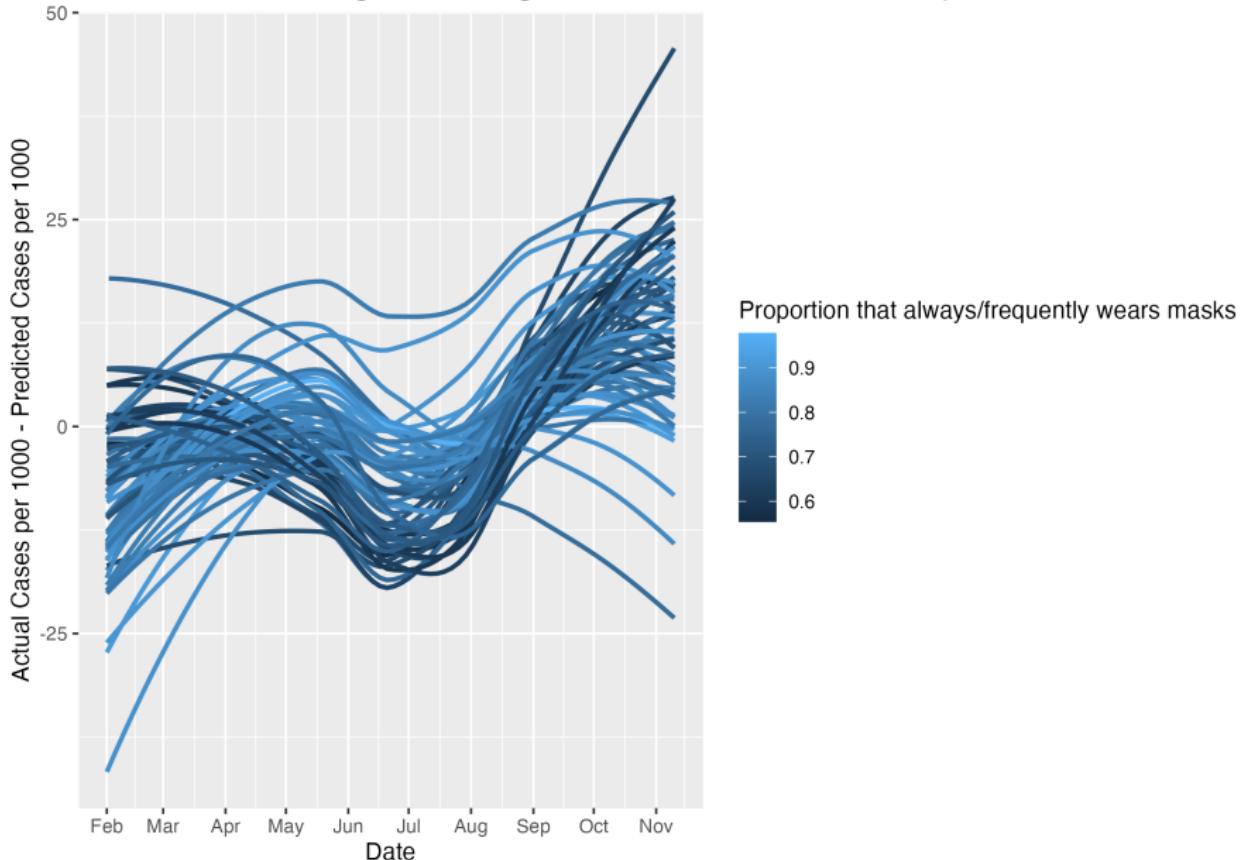
Specific Case: California vs Florida



FL Counties have higher residuals during Delta than CA counties

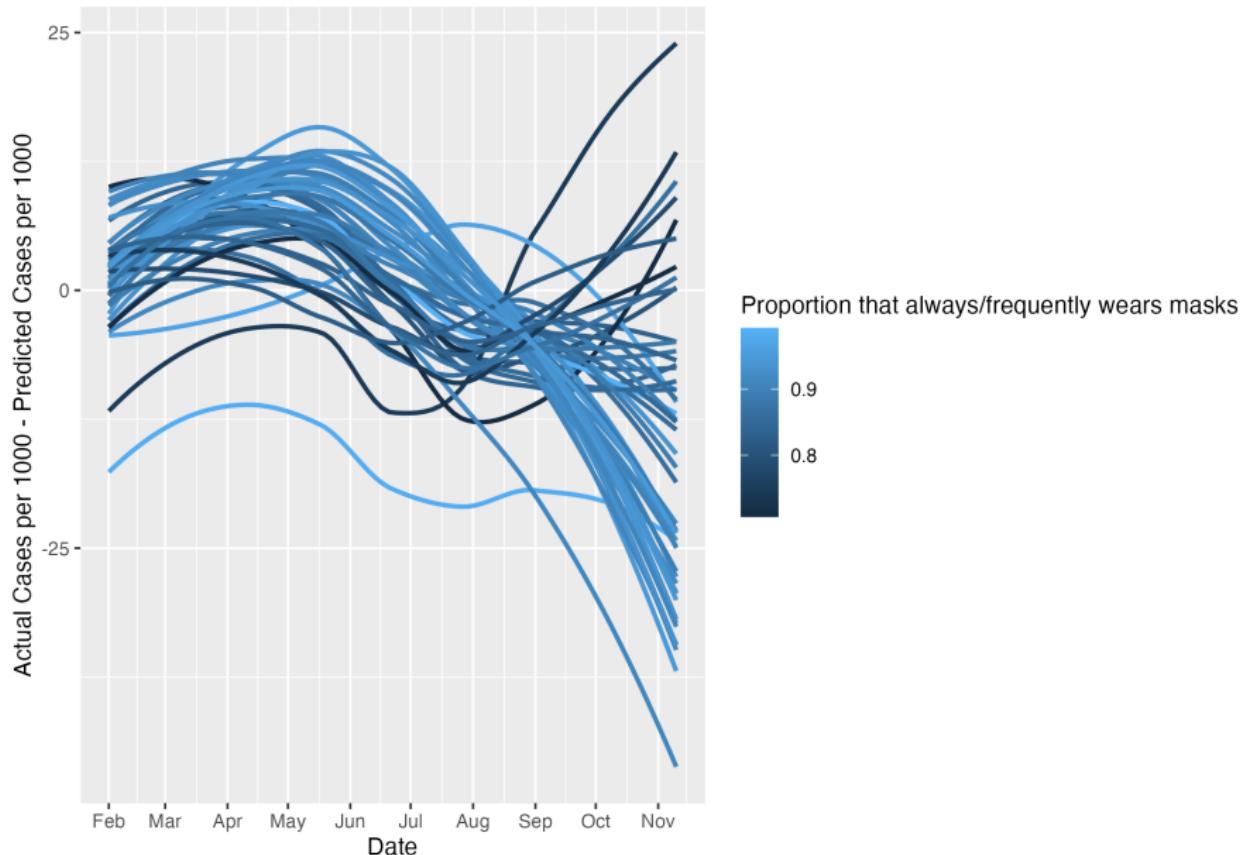


Counties in FL with high mask usage have lower case rates than expected



Mask usage estimates are from the New York Times. Months are in 2021.

Counties in CA with high mask usage have lower case rates than expected



Mask usage estimates are from the New York Times. Months are in 2021.

Takeaways

- ▶ States with less COVID restrictions generally had “worse” outcomes during the Delta wave
- ▶ Mask usage appears to “work” in keeping case rates low
- ▶ How do I conclude that mask *mandates* work?
 - ▶ We’re all wearing masks, aren’t we?
 - ▶ If mask mandates increase mask usage, mask mandates have a causal effect on case rates
 - ▶ Difficult to directly determine causal effect of mandates on mask usage because mandates are likely endogenous
- ▶ Are case rates even the correct target?