Source: News Center Maine

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1865

NSF

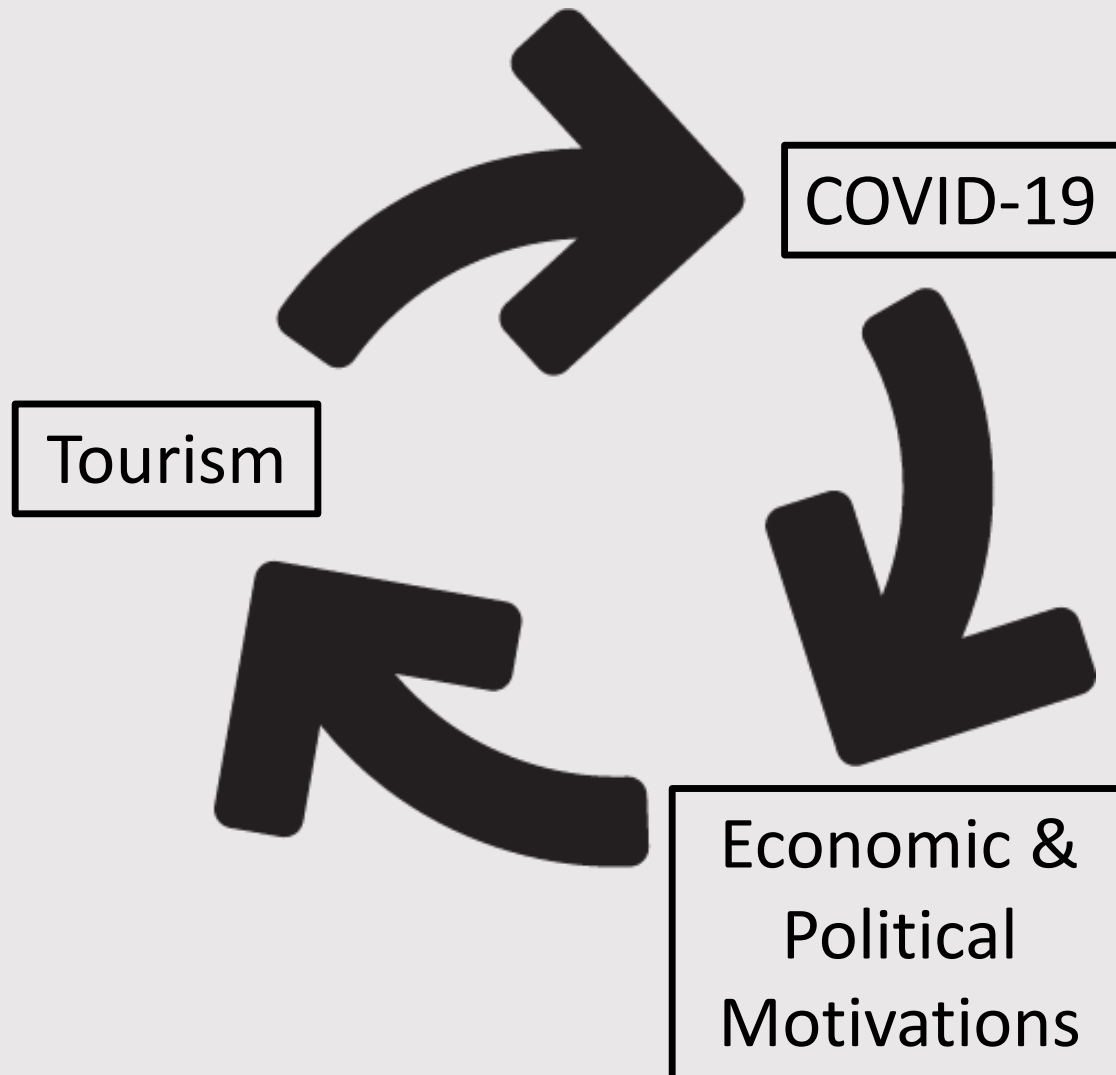**Economic and Political Drivers of COVID-19 Policy in 2020**

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Sandra De Urioste-Stone

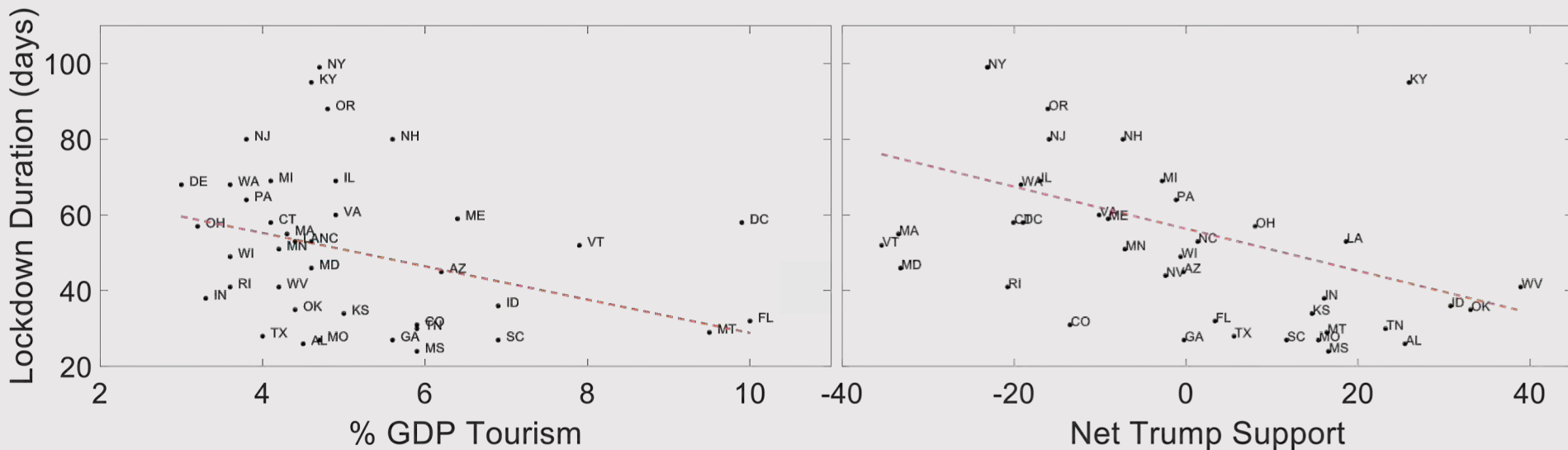# Introduction

COVID-19

Tourism

Economic & Political Motivations

Research Objectives

1 What were the main motivators of COVID-19 mitigation policy in 2020?

2 How did differences in public attitude contribute to the severity of the epidemic?

3 How can we quantify and answer these questions scientifically?

Shelter-in-place Orders

(Lockdown Duration) ~ (% GDP Tourism) + (Trump Support)

$R^2 = 0.34$, F = 9.74, df = 2,38, p < 0.001

Other tested factors: population density, urbanicity, income, education, climate, latitude and longitude

Hypotheses

- In March 2020, COVID-19 was most severe in counties with high population density and high rates of travel

- From April onward, COVID-19 was most severe in counties with high economic dependence on tourism and low economic and political motivation

- Social distancing more effective in urban than rural counties

Statistical Test

- At each week of 2020, test relationship between disease reproduction rate and socioeconomic predictors

- Filter out effects of climate, population density, etc.

COVID-19 Cases Over Time
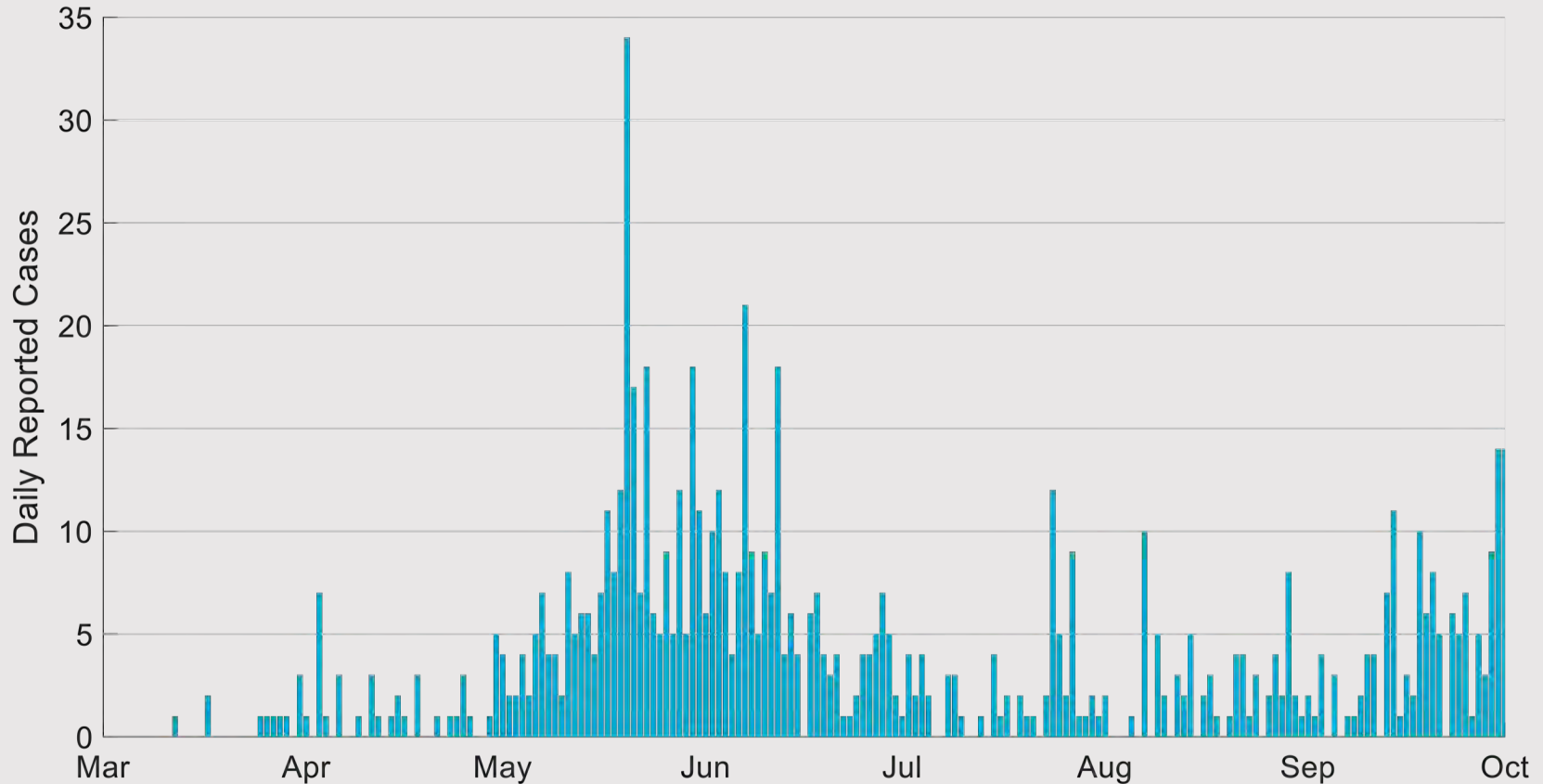
- Daily confirmed COVID-19 cases in Kennebec County
- Doesn't tell us a whole lot

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More Interesting: R_t

- R_0: pure reproduction number
  - ~2.5 for original COVID-19, 5 for Delta variant, 8 for Omicron variant
- R_t: actual reproduction number based on human behavior and mitigation efforts
  - Typically between 0 and 3
- Goal: compute evolution of R_t for each county since beginning of pandemic
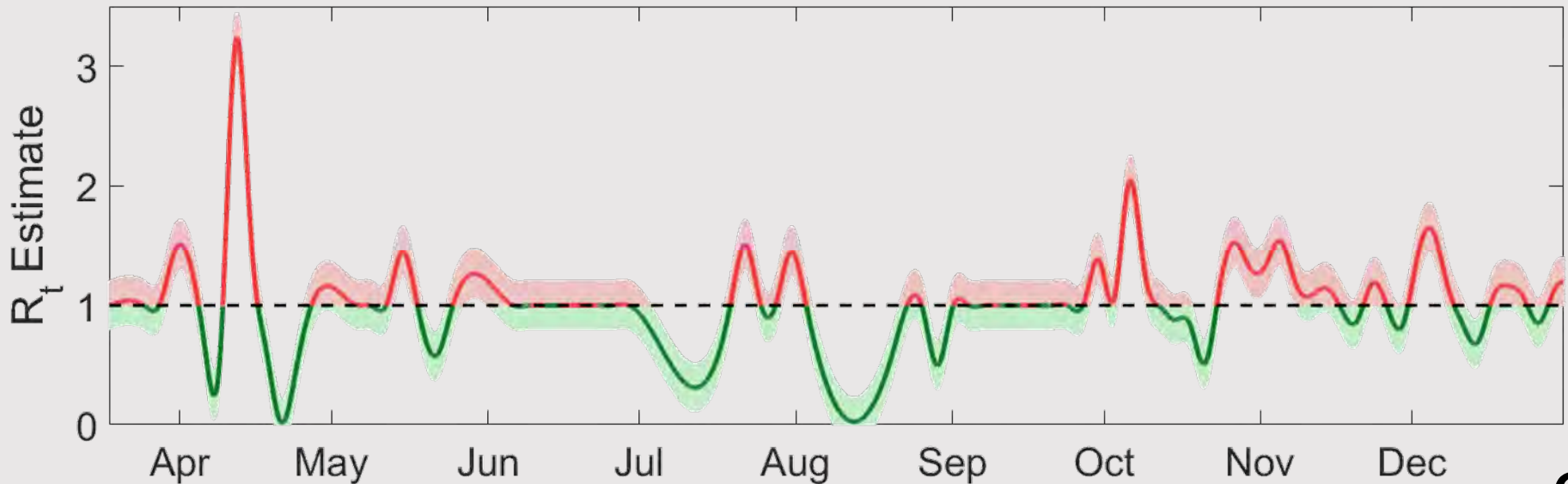- Compare R_t to demographics and policy choices

Step 1: Clean the data
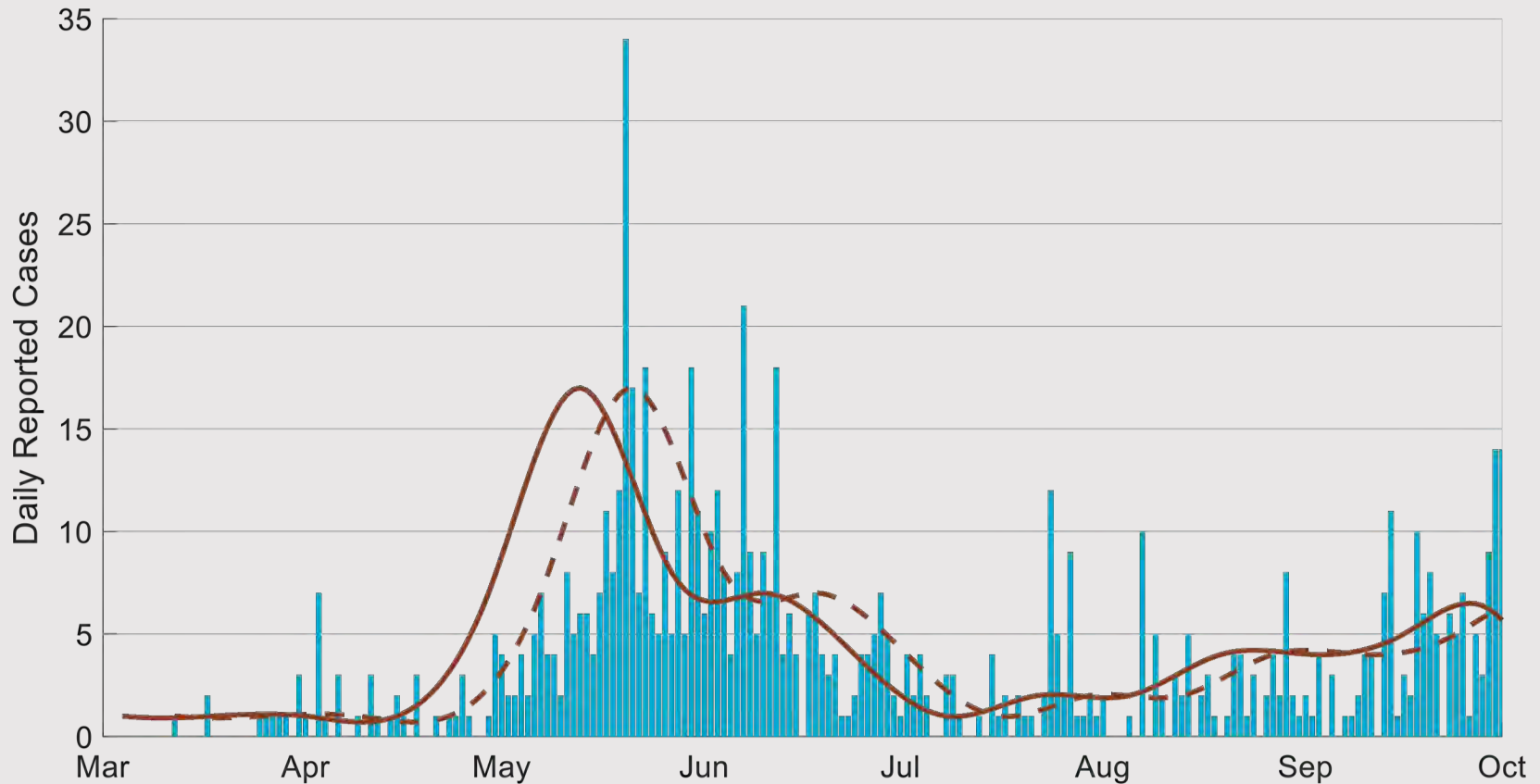
- Smooth the data over one-week blocks
- Adjust for testing delays
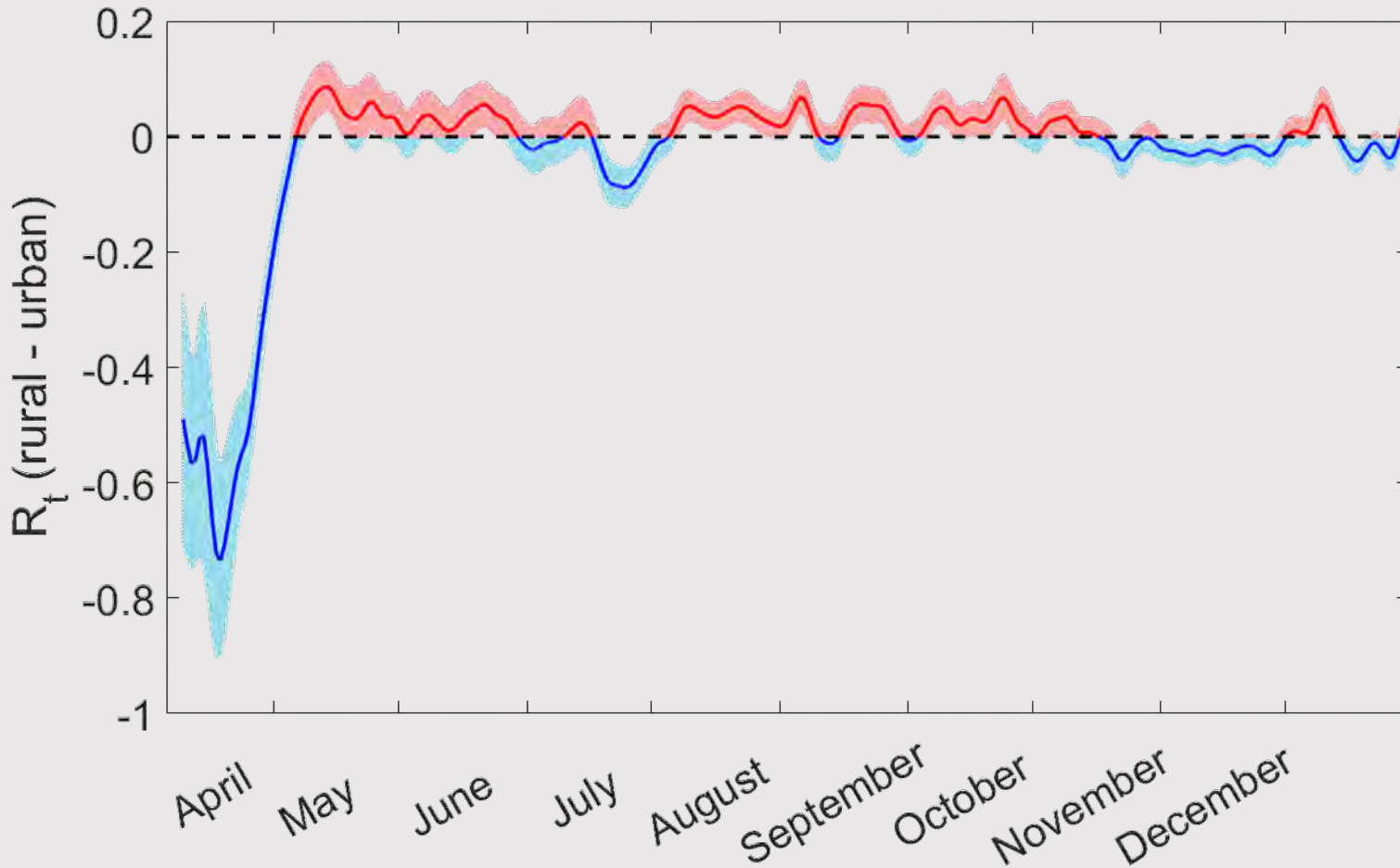
Step 2: Post-hoc Analysis of R_t

- Assume infection rate λ follows a Poisson distribution: $L(\lambda|k) = \dfrac{\lambda^k e^{-\lambda}}{k!}$

- What value of R_t most correctly predicts number of cases over next two weeks?

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Map of counties with $R_t > 1$: March 15 vs. June 15


Legend:
- March 15, 2020
- June 15, 2020
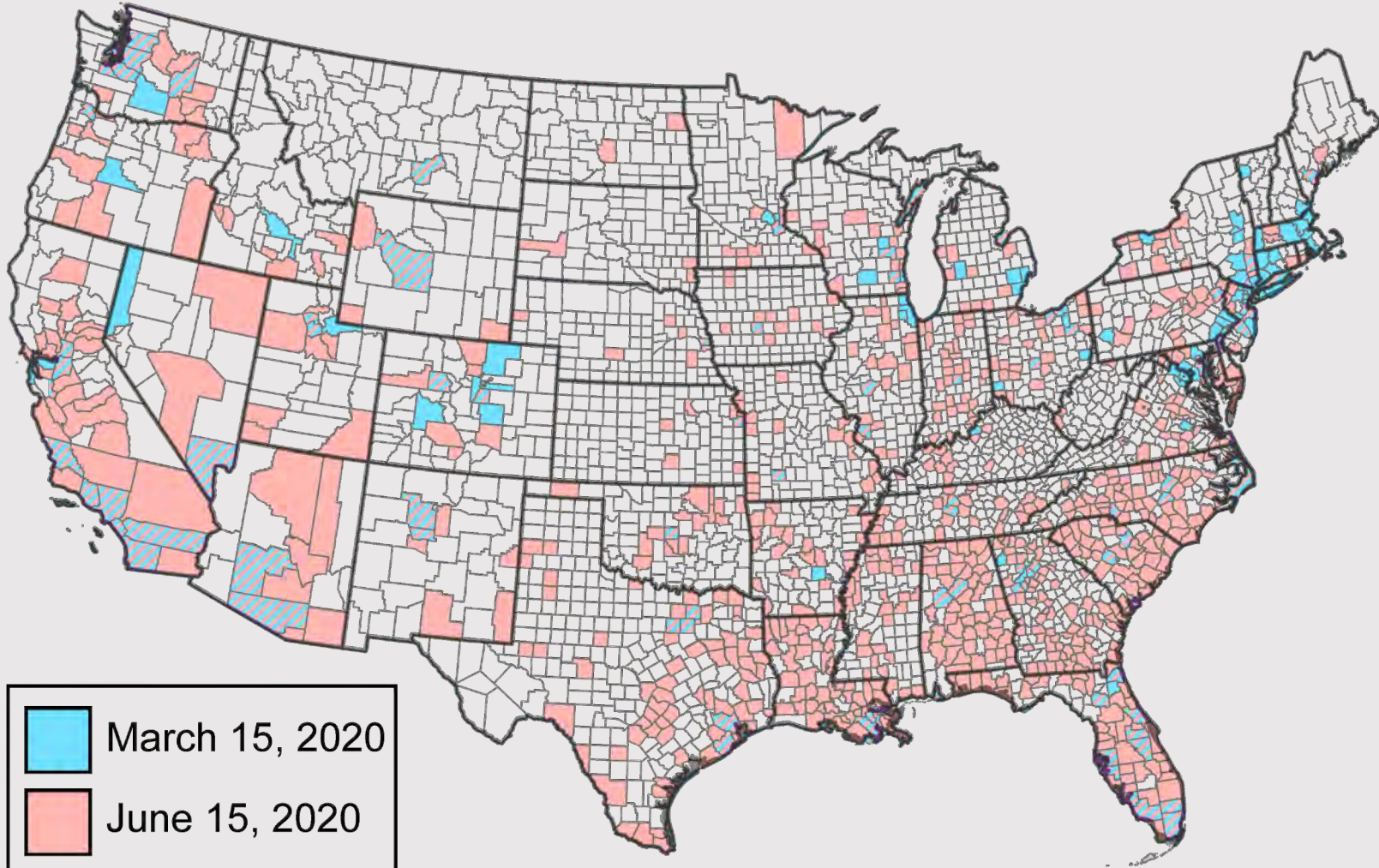
R$_t$: Rural vs. Urban

Student's t-test

- Each week of 2020, run a statistical model:

$$R_t = (ruralness) + (\%GDP\ tourism) + (net\ Trump\ support)$$

- Other predictor variables: population density, income, education, religion, health care access, temperature, precipitation, and lockdown status

- A "Student's t-test" score is a nondimensional measure of correlation between a predictor variable and the R_t value for a given week

- If the score is above of a certain threshold, then there is a meaningful correlation between the predictor and R_t

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Statistical Correlation Test
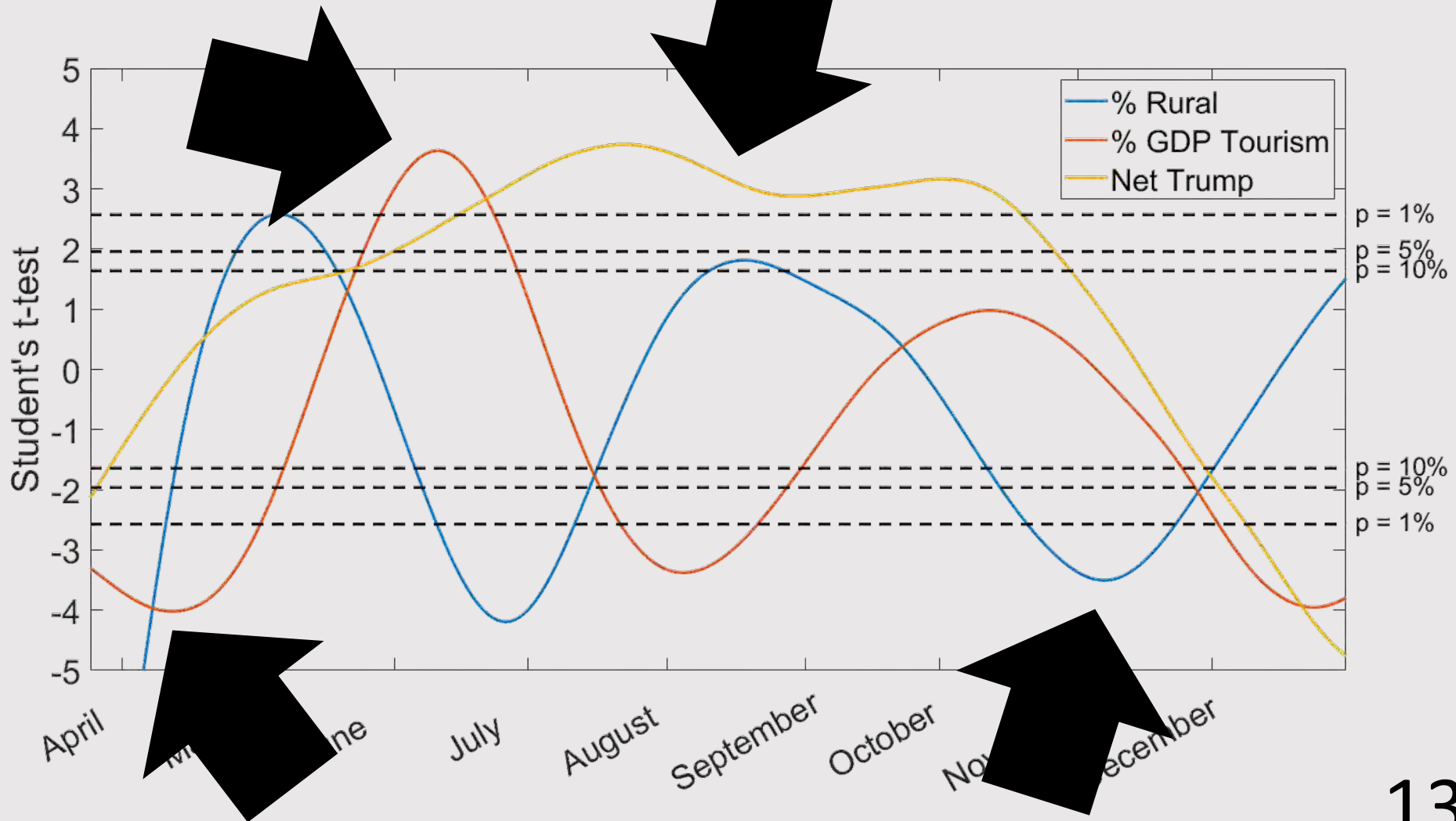
Conclusions

- Outbreak events and human behavior are interrelated

- During early outbreak, population density and urbanicity were strongest predictors of COVID risk

- Economic and political considerations outweighed human case data in policy decisions

- Over summer and fall, counties with apparent economic or political incentives to ignore the pandemic suffered from more severe and frequent COVID outbreaks

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Focus on Maine

- Maine is divided into eight "tourism regions" and sixteen counties

- Tourism comprises 6.4% of Maine's GDP

- Nonessential businesses were closed from April 2 to May 31

- Cruise traffic was closed from April 8 to July 1

Source: www.exploremaine.org

Statistical Correlation Test (Maine)

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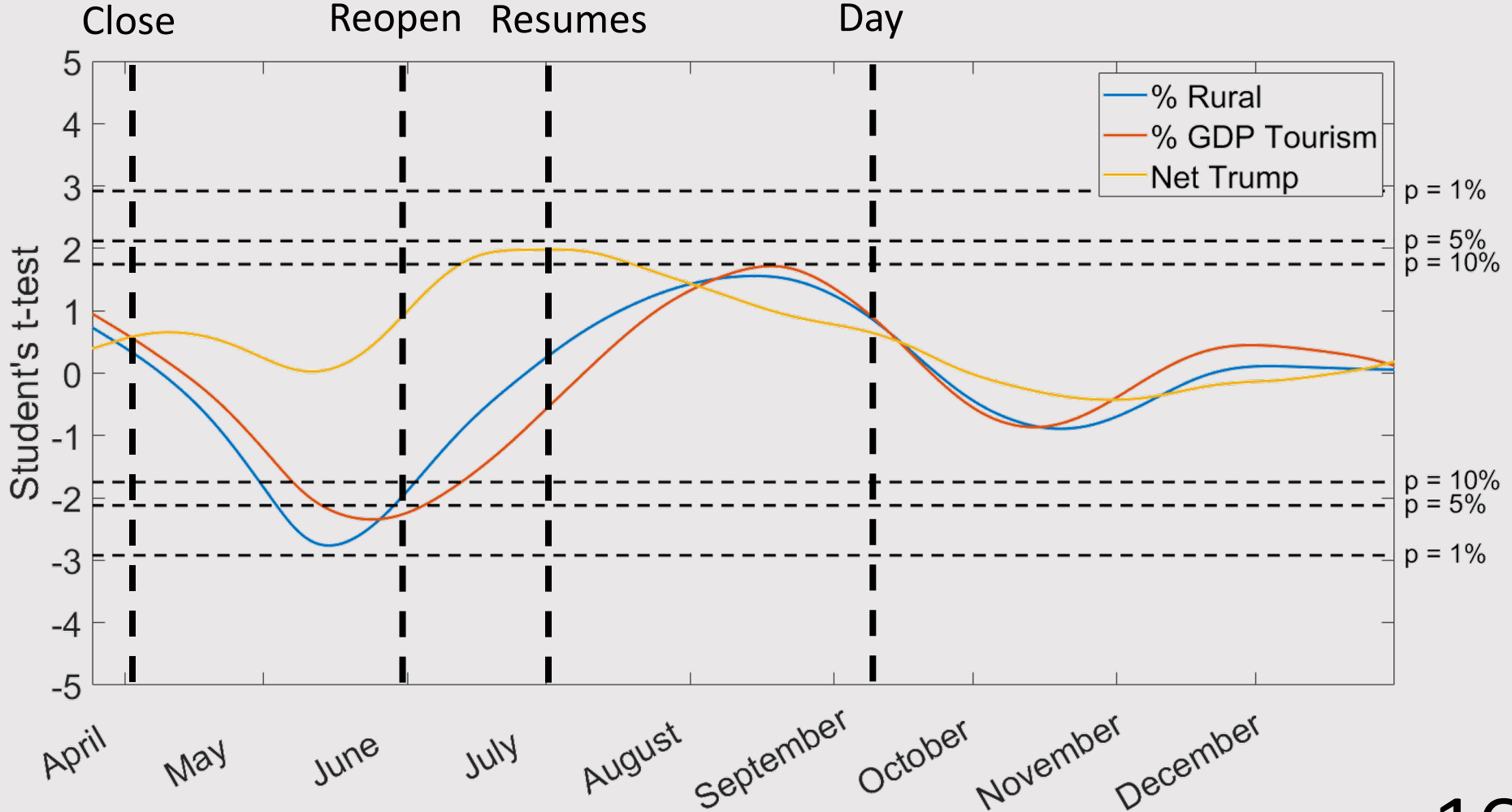
Conclusions

- During initial business closure, COVID-19 spread faster in urban counties like Cumberland and Androscoggin

- When businesses reopened, counties with high Trump support took fewer precautions and were more infectious

- When tourism resumed, counties with high economic dependence on tourism had highest R_t values

- At the end of tourism season, no significant difference in R_t between counties

Acknowledgements

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