Shafi, Saahir and
Mallinson, Daniel J. (2023)

DISPROPORTIONATE POLICY DYNAMICS IN CRISIS AND UNCERTAINTY:

AN INTERNATIONAL COMPARATIVE ANALYSIS OF POLICY RESPONSES TO COVID-19

ACCESS REPLICATION DATA: https://doi.org/10.7910/DVN/MABPEC

Replication Project by
Criomhthann Morrison

TABLE OF CONTENTS

Presentation Outline

1. Paper Overview
2. Data Used
3. Noteworthy Errors
4. Research Questions
5. Twist: Subsetting by Over-Under Response
6. Examples from Results
7. Final Remarks

PAPER OVERVIEW

Pooled Panel Linear Regression

a.k.a. “pooled OLS”.
“Multiple linear regression for panel data”
(accounts for time-based dimensionality)

Fixed-Effects Models

Assumes unobserved effects covary with the regression variables (versus random-effects models)

Income Supports + Debt Relief

Results indicate these policies are associated with reduction in the rate of COVID-19 deaths lasting up to 4 weeks.

Broad Policy Interventions

e.g. containment, health, and economic policies, associated with reductions in the rate of COIVD-19 deaths up to 1-week.

DATA USED

Oxford COVID-19 Government Response Tracker (OxCGRT)

Four indices from 23 indicators of policy responses

- Government Response Index
- Economic Support Index
- Containment Health Index
- Stringency Index

World Development Indicators (WDIs)

Development Indicators as control variables

- Total Population (65yrs and Over)
- Population Density
- GDP Per Capita
- etc.

NOTWORTHY ERRORS

Errors in Replication Code

Minor typos and serious exclusions.

Errors in Published Paper

Minor plotting errors and more serious contradictory reporting with replicated results.

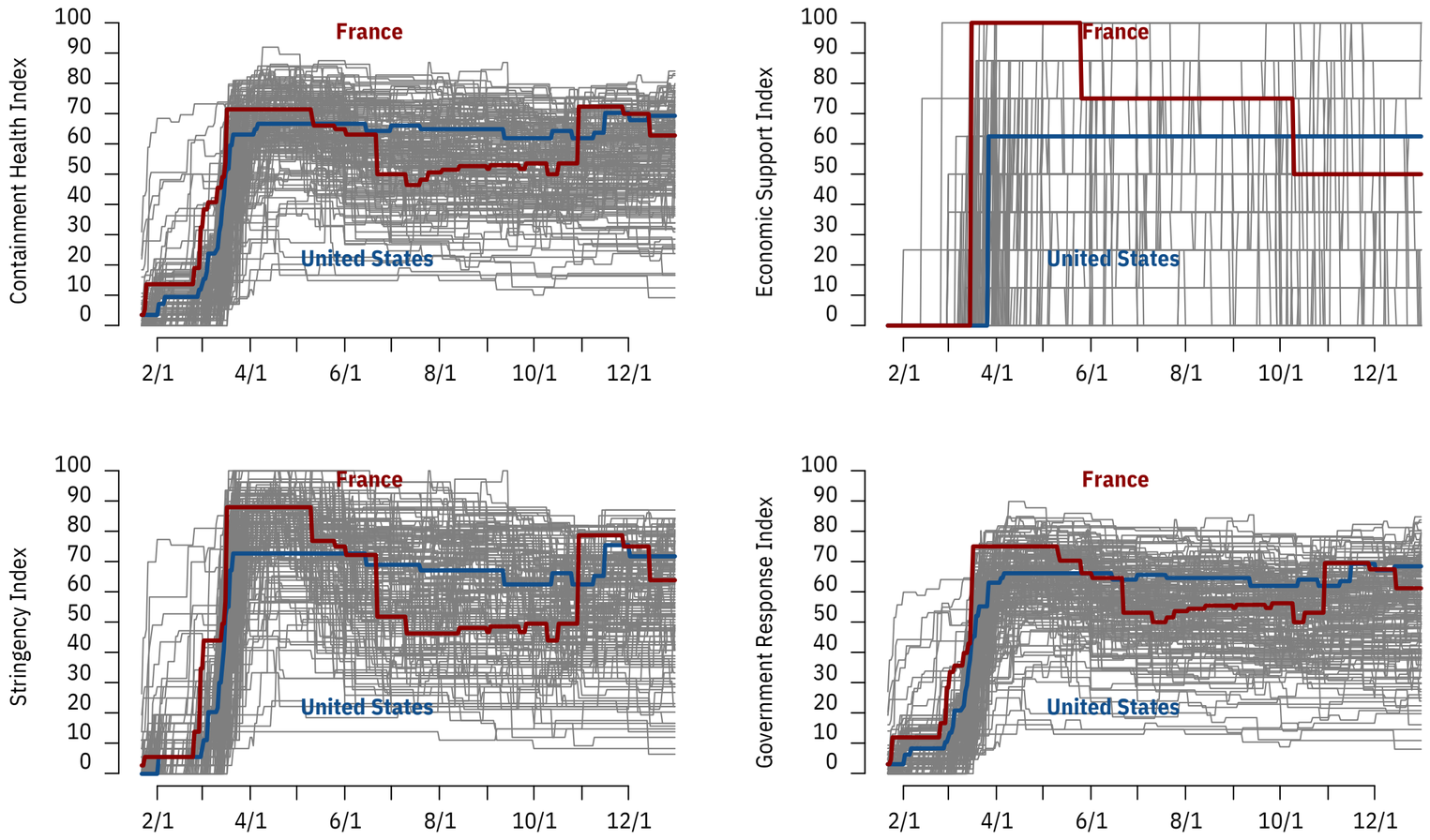
RESEARCH QUESTIONS

1

A Have countries pursued consistently disproportionate policy responses throughout the pandemic?

B Is there evidence that countries have pursued intentional or nonintentional disproportionate policymaking?

Figure 1: COVID-19 Policy Response Indices from January to December 2020 [Corrected]

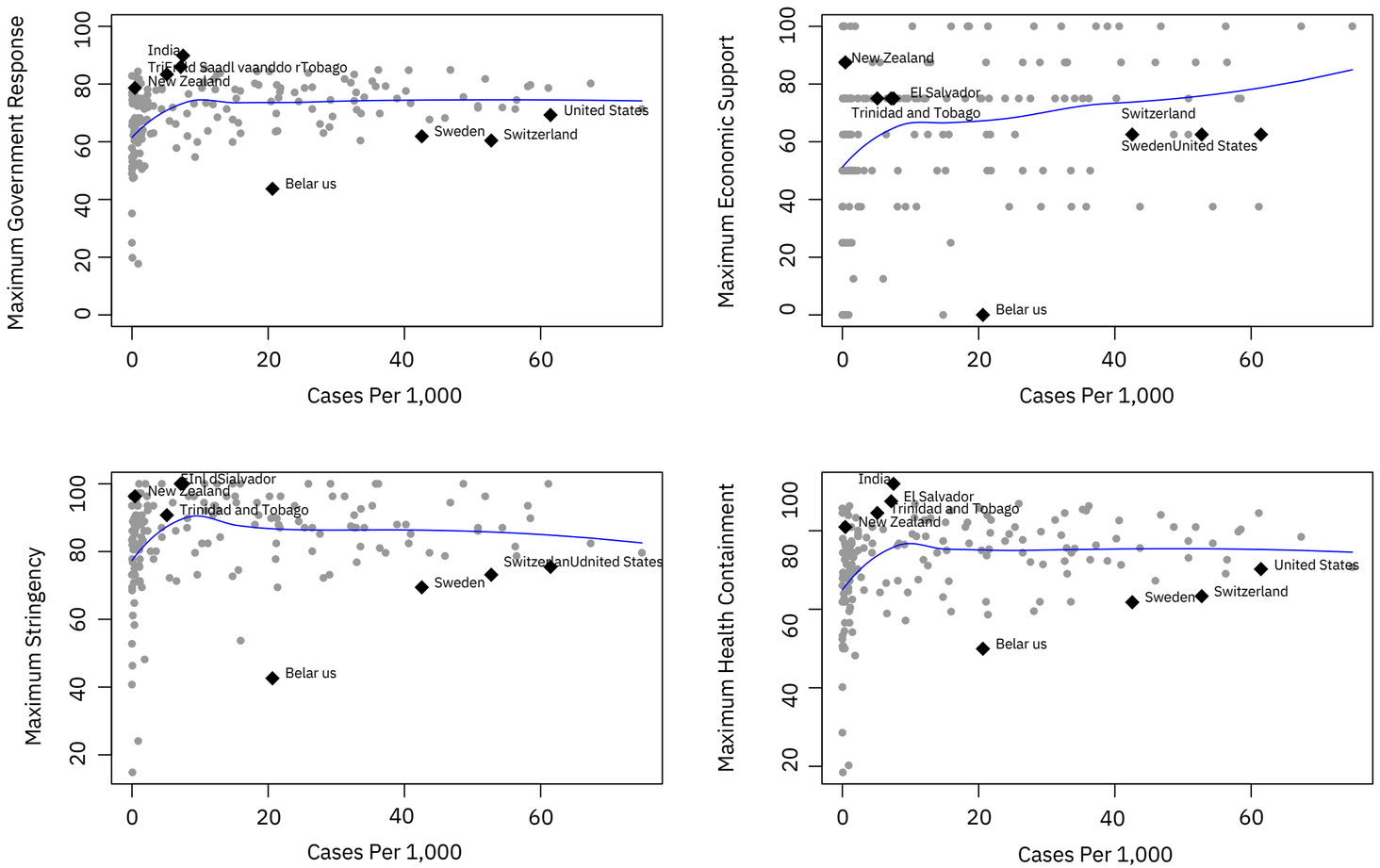


- Significant variation in the policy responses over the first year of the COVID-19 pandemic, highlighting France and the US as examples (see Figure 1)
- Correlation between response and daily cases indicative of intentionality? Or reactivity?
- No statistical analysis is conducted to substantiate this causal claim.

RESEARCH QUESTIONS 2

Are countries with more stringent policy responses more effective in managing the public health crisis than countries with less stringent policy responses?

Figure 2: Policy Over- and Under-Response to COVID-19 [Replicated]

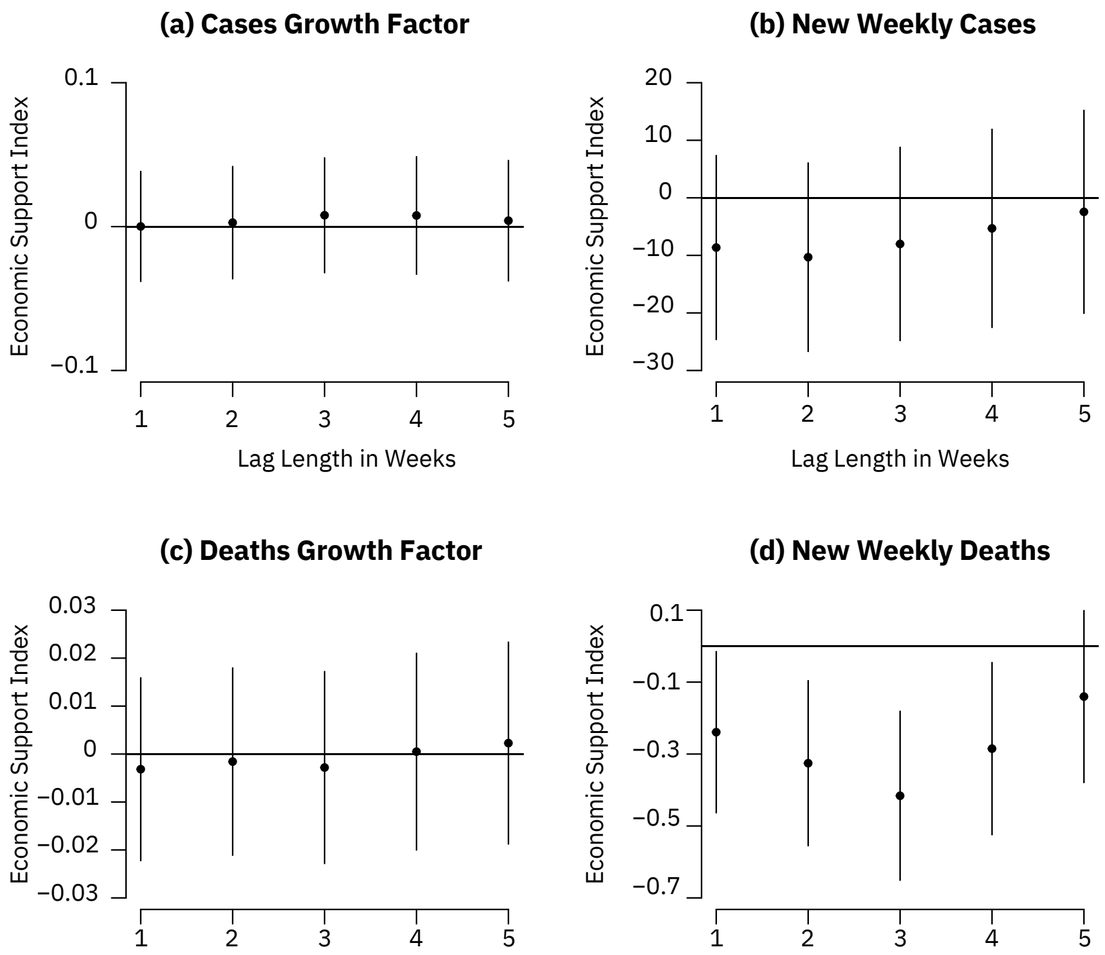


- Results are inconclusive, though potential issues in:
  - relative nature of Risk-Response Ratio
  - doesn't capture quality of <u>implementation</u>
  - doesn't capture <u>socio-political contexts</u>
- Latter two points highlight absence of important variables regarding decision-making and the true dynamics between policy responses and outcomes.

RESEARCH QUESTIONS 3

Which types of policies — containment, economic, or health — have proven most effective in managing the public health crisis?

Figure 3: Economic Support Index Coefficients across Four COVID-19 Outcomes, Lagged 1–5 Weeks [Replicated]



- Figure 3 illustrates that the largest log-odds coefficient for Economic Support Index on New Weekly Deaths lags by 3 weeks, and still holds up to 4 weeks.
- Results for most other policy measures are less notable.

- Do aggregated global-level results mask differences for subsets of countries, for example Over- and Under-Responders? Or variation in social and political contexts?
- The authors acknowledge that precisely these dimensions are not captured within this analysis!

THE TWIST: SUBSETTING BY OVER-/UNDER-RESPONSE

Snippet 1: Membership by Each Index

```r
## Assigning membership groups of Over- and Under-Response # "Above" and "Below"####
# Calculate residuals for each point in each plot
new_si <- data.frame("country" = max.si$country)
new_gri <- data.frame("country" = max.gri$country)
new_chi <- data.frame("country" = max.chi$country)
new_esi <- data.frame("country" = max.esi$country)
new_si$residuals <- resid(loess.ms)
new_gri$residuals <- resid(loess.gri)
new_chi$residuals <- resid(loess.chi)
new_esi$residuals <- resid(loess.esi)

# Create dummy variables for membership based on residuals
new_si$si_membership <- factor(ifelse(new_si$residuals > 0, 1, 0),
                               labels = c("Below", "Above"))
new_gri$gri_membership <- factor(ifelse(new_gri$residuals > 0, 1, 0),
                                 labels = c("Below", "Above"))
new_chi$chi_membership <- factor(ifelse(new_chi$residuals > 0, 1, 0),
                                 labels = c("Below", "Above"))
new_esi$esi_membership <- factor(ifelse(new_esi$residuals > 0, 1, 0),
                                 labels = c("Below", "Above"))

##### NEW DATA FOR PLOTTING ####
# Prepare new data frame for plotting
new_data <- data
new_data$country <- new_data$CountryName # Rename for merging
# Merge membership dummy variables
new_data <- merge(new_data, new_si[c("country", "si_membership")], by = "country")
new_data <- merge(new_data, new_gri[c("country", "gri_membership")], by = "country")
new_data <- merge(new_data, new_chi[c("country", "chi_membership")], by = "country")
new_data <- merge(new_data, new_esi[c("country", "esi_membership")], by = "country")
```

Table 1: Hausman Test - GRI (Author's Model)

Outcome	Chi-squared	Degrees of Freedom (df)	p-value
Cases Growth Factor	2.1981	4	0.6994
New Weekly Cases	0.69163	4	0.9524
Deaths Growth Factor	4.8157	4	0.3067
New Weekly Deaths	84.324	4	$< 2.2 \times 10^{-16}$

Note: The null hypothesis is that the models are consistent. The alternative hypothesis is that one model is inconsistent.

Table 2: Hausman Test - GRI (Updated Model)

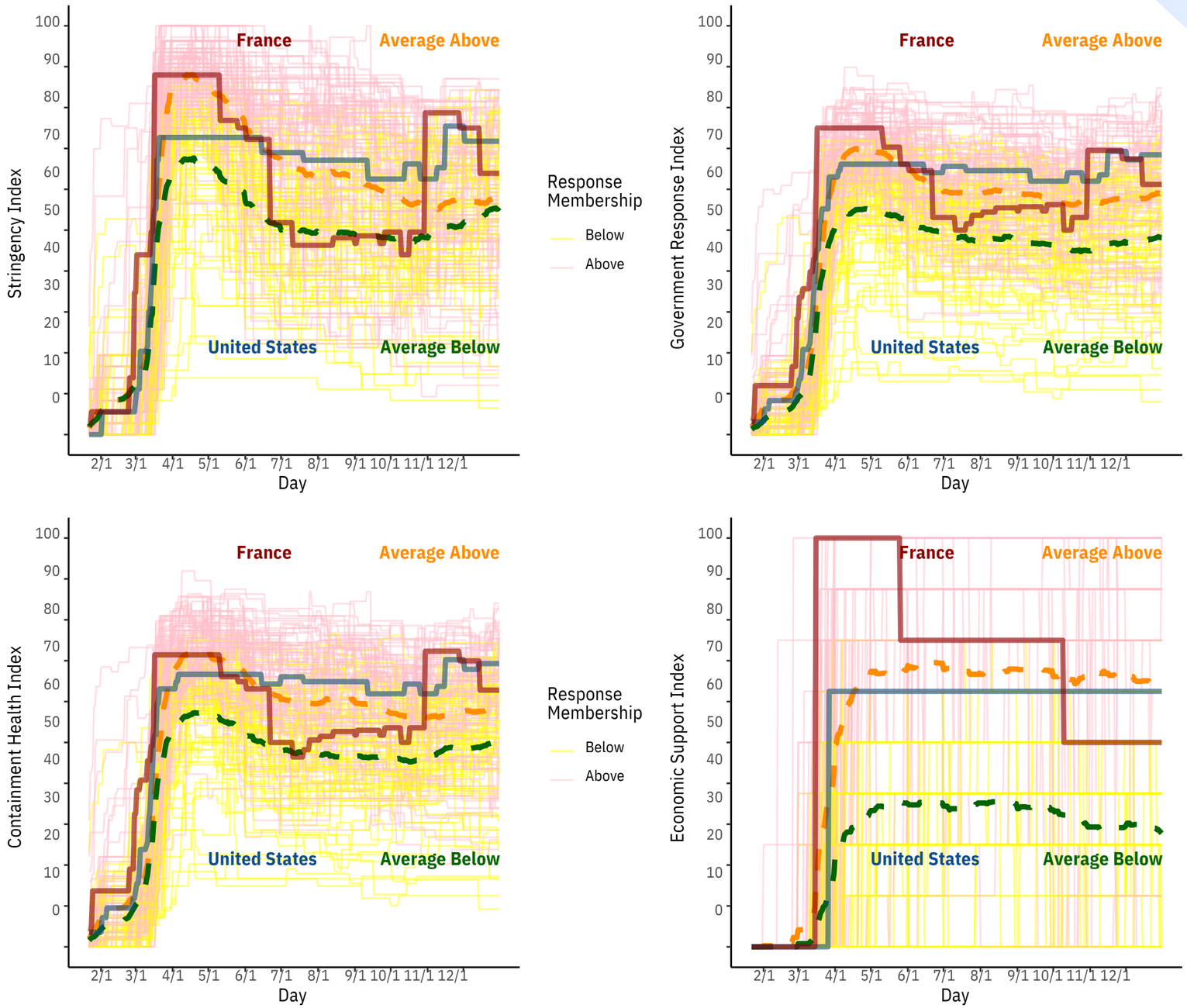
Outcome	Chi-squared	Degrees of Freedom (df)	p-value
Cases Growth Factor	559.31	4	$< 2.2 \times 10^{-16}$
New Weekly Cases	0.16971	4	0.9966
Deaths Growth Factor	125.9	4	$< 2.2 \times 10^{-16}$
New Weekly Deaths	490.94	4	$< 2.2 \times 10^{-16}$

Note: The null hypothesis is that the models are consistent. The alternative hypothesis is that one model is inconsistent.

Figure 4: COVID-19 Policy Response Indices from January to December 2020 (Updated)

Visual differences across indices

Average lines for countries "Above" and "Below" ie Over- and Under-Responders



EXAMPLE: GOVERNMENT RESPONSE INDEX

Figure 5: GRI Coefficients across Four COVID-19 Outcomes, Lagged 1–5 Weeks (Authors' Models)

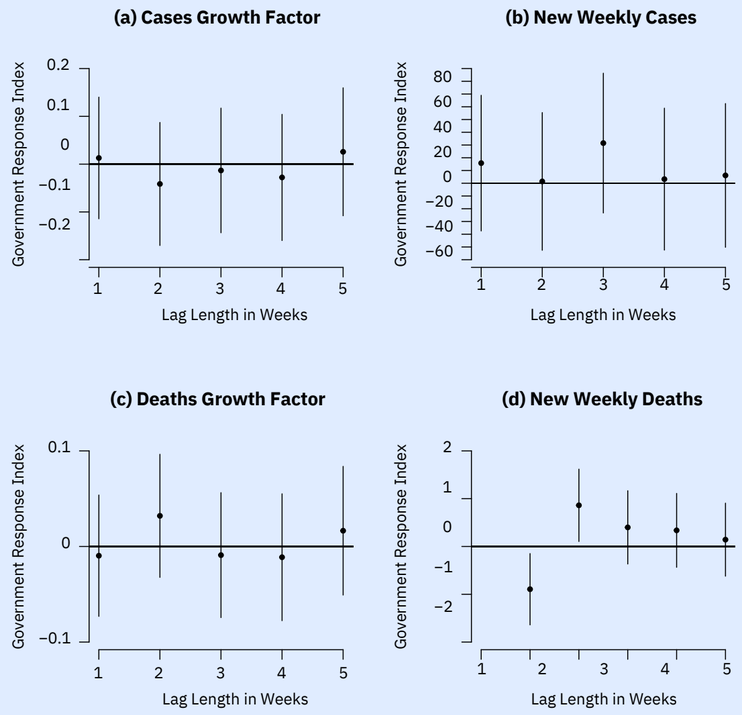


Figure 6: GRI Coefficients across Four COVID-19 Outcomes, Lagged 1–5 Weeks (Over-Response Subset)

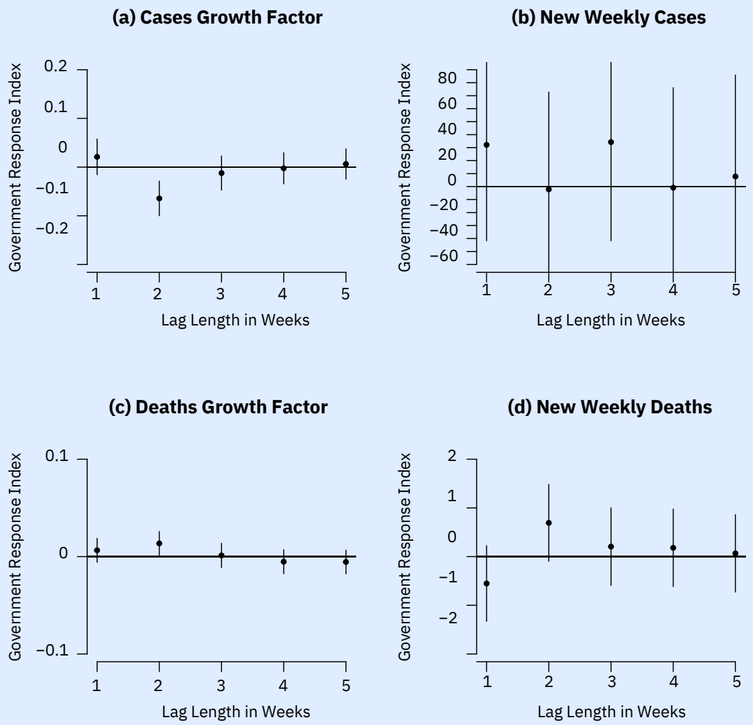
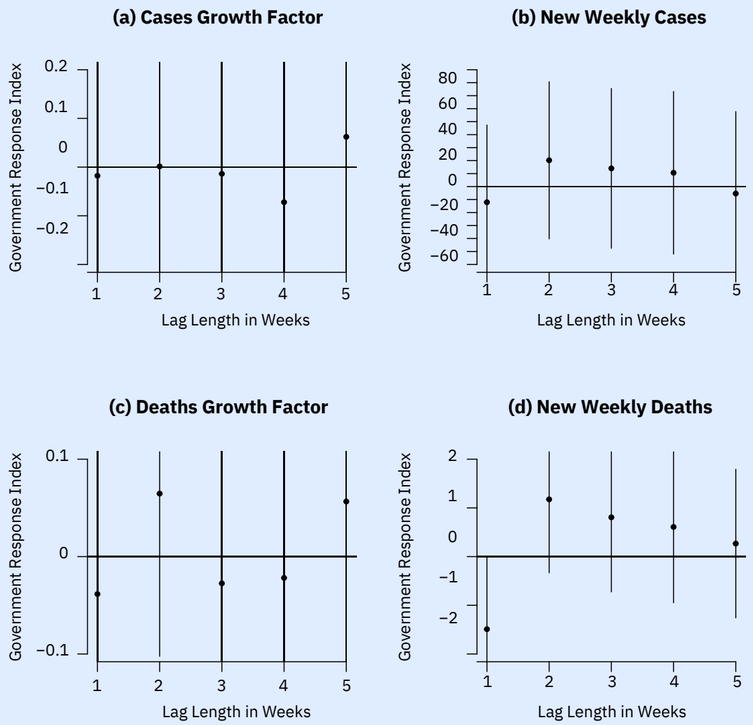
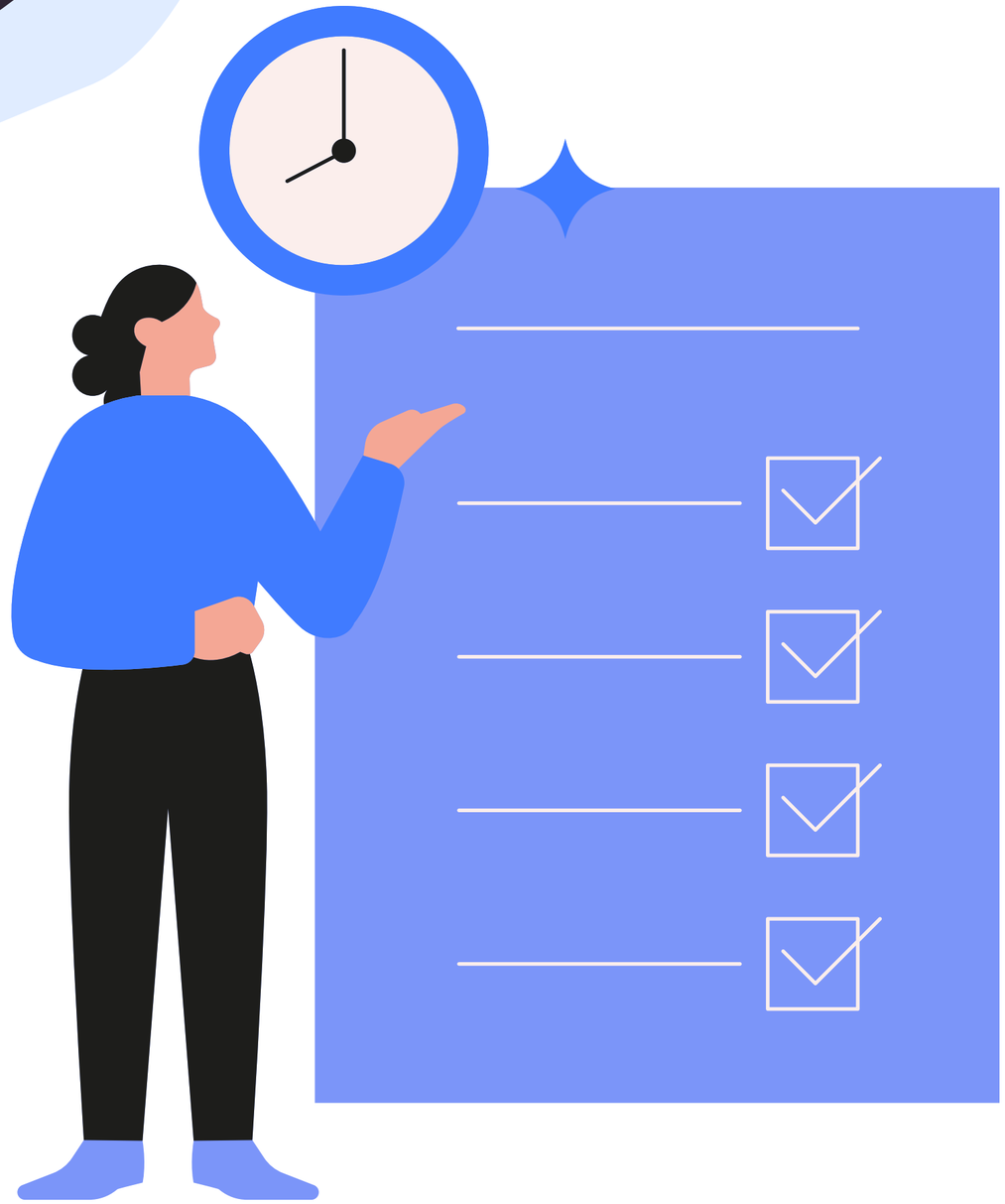


Figure 6: GRI Coefficients across Four COVID-19 Outcomes, Lagged 1–5 Weeks (Under-Response Subset)





FINAL REMARKS

New evidence for differences between Over- and Under Responses in Economic, Containment, an Stringency Policies
(counter to the authors' findings)

Use of fixed-effects models may not be empirically sound
(replicated results do not support reported evidence in paper)

Socio-political factors should be included in future analysis
(also recommended by authors)