3 - Digital trace data (2/2):

Linking excess mortality to Google mobility data during the COVID-19 pandemic

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23 February 2022

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MAX-PLANCK-INSTITUT FÜR DEMOGRAFISCHE FORSCHUNG

Agenda

1. Q&A
2. Case study: Google mobility and excess mortality
3. **Break**
4. Dissect study

Q&A

- Questions about the assignment
- Questions about digital trace data
- Other?

Case study: Google mobility and excess mortality

Introduction

Background

- Non-pharmaceutical interventions to contain COVID-19

Goal

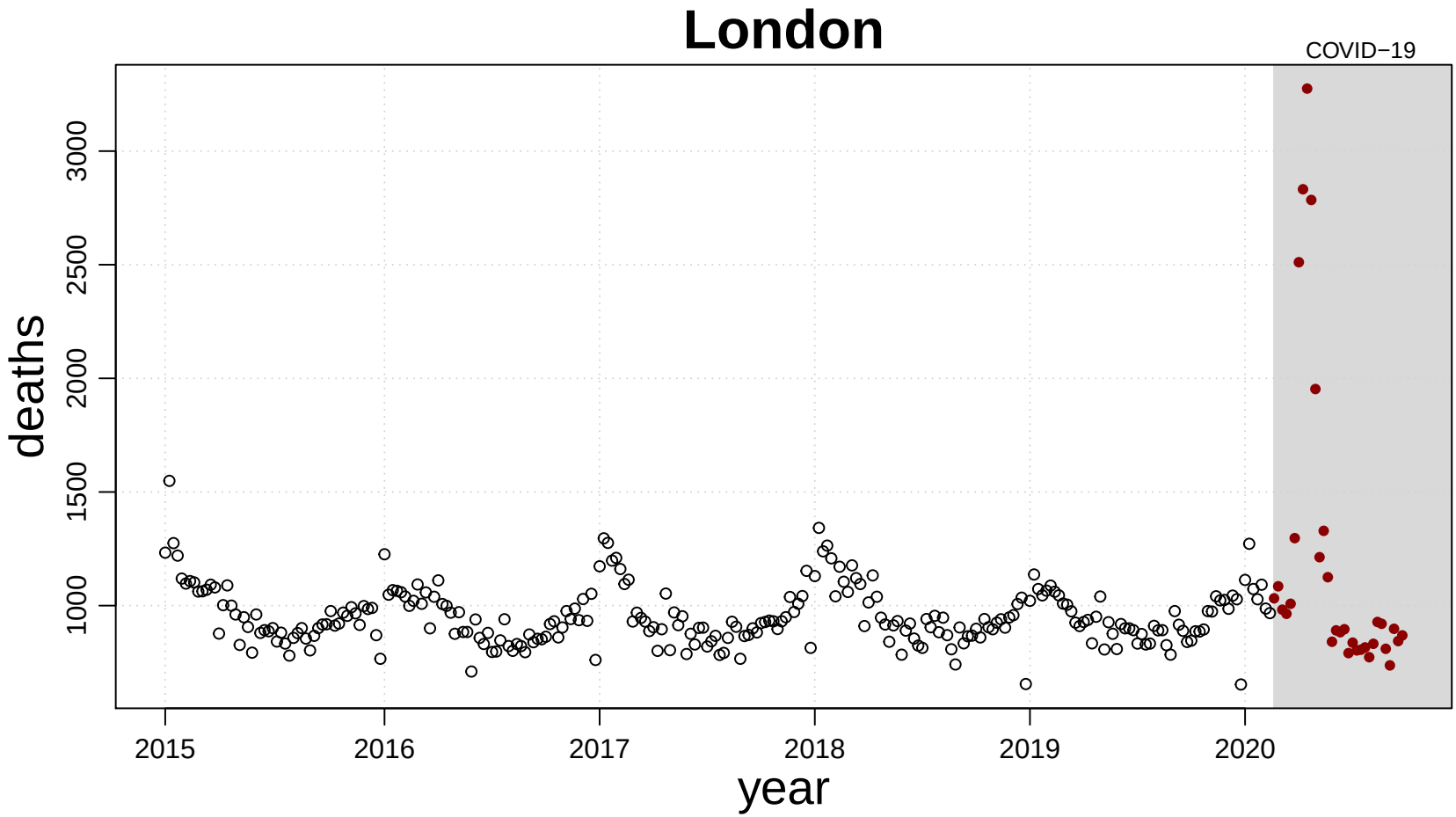
- Assess effectiveness of NPIs in reducing mortality burden

Approach

- Excess mortality and human mobility at regional level in England and Wales (Feb-Aug 2020)
- Cross-sectional analysis and mixed-effect regression models

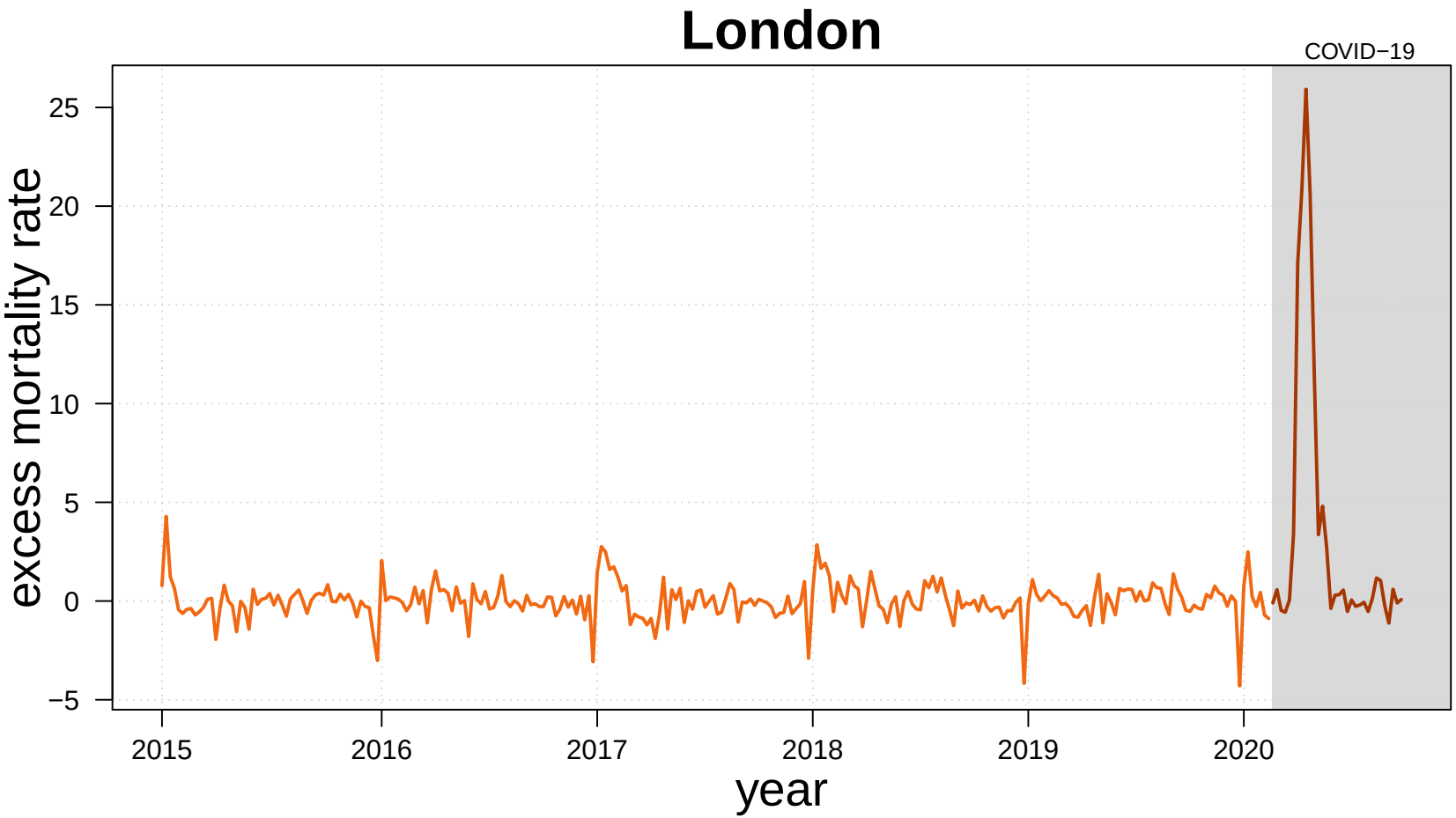
Basellini, U., Alburez-Gutierrez, D., Del Fava, E., Perrotta, D., Bonetti, M., Camarda, C. and Zagheni, E. (2021). "Linking excess mortality to Google mobility data during the COVID-19 pandemic in England and Wales". SSM - Population Health, 14. DOI: j.ssmph.2021.100799.

Mortality data: death counts



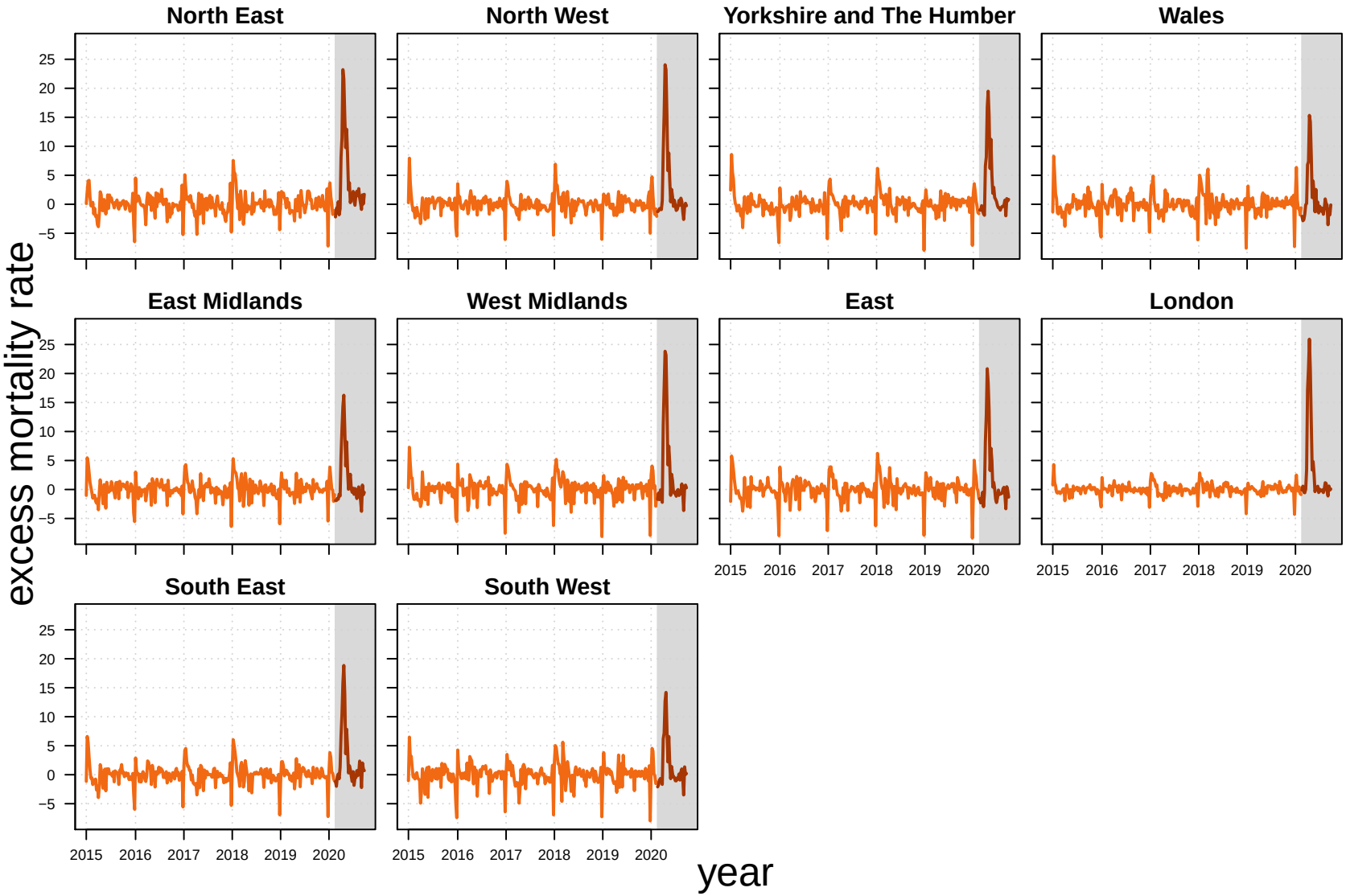
Weekly deaths registered in the region of London. Week 1, 2015 – Week 39, 2020. *Source: ONS (2020)*

Mortality data: excess mortality rate



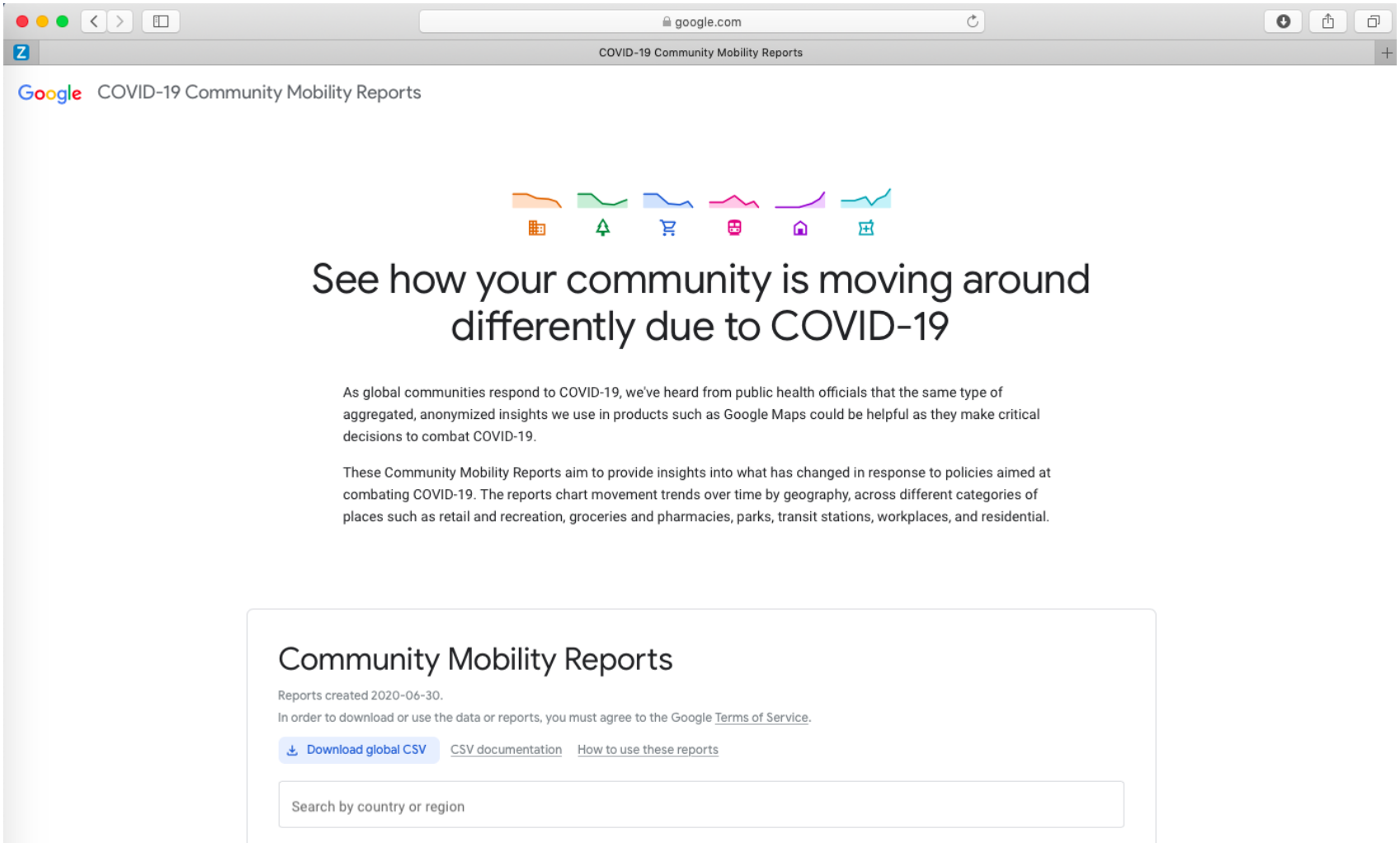
Excess mortality rate (per 100,000 individuals) in the region of London. Week 1, 2015 – Week 39, 2020. *Source: elaborations of data from ONS (2020)*

Excess mortality rate by region



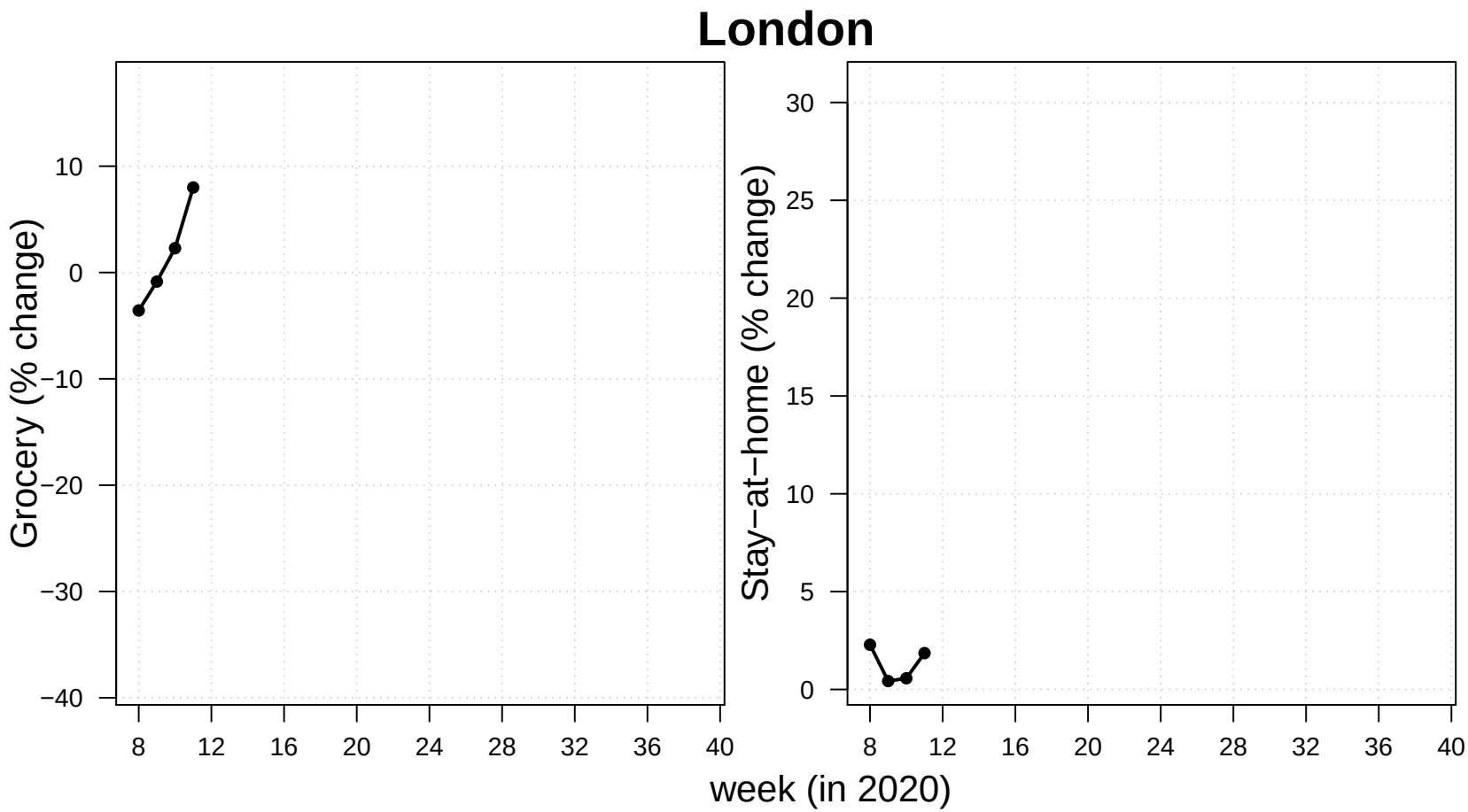
Excess mortality rate (per 100,000 individuals) by region. Week 1, 2015 – Week 39, 2020. *Source: elaborations of data from ONS (2020)*

Mobility data: Google Community Reports



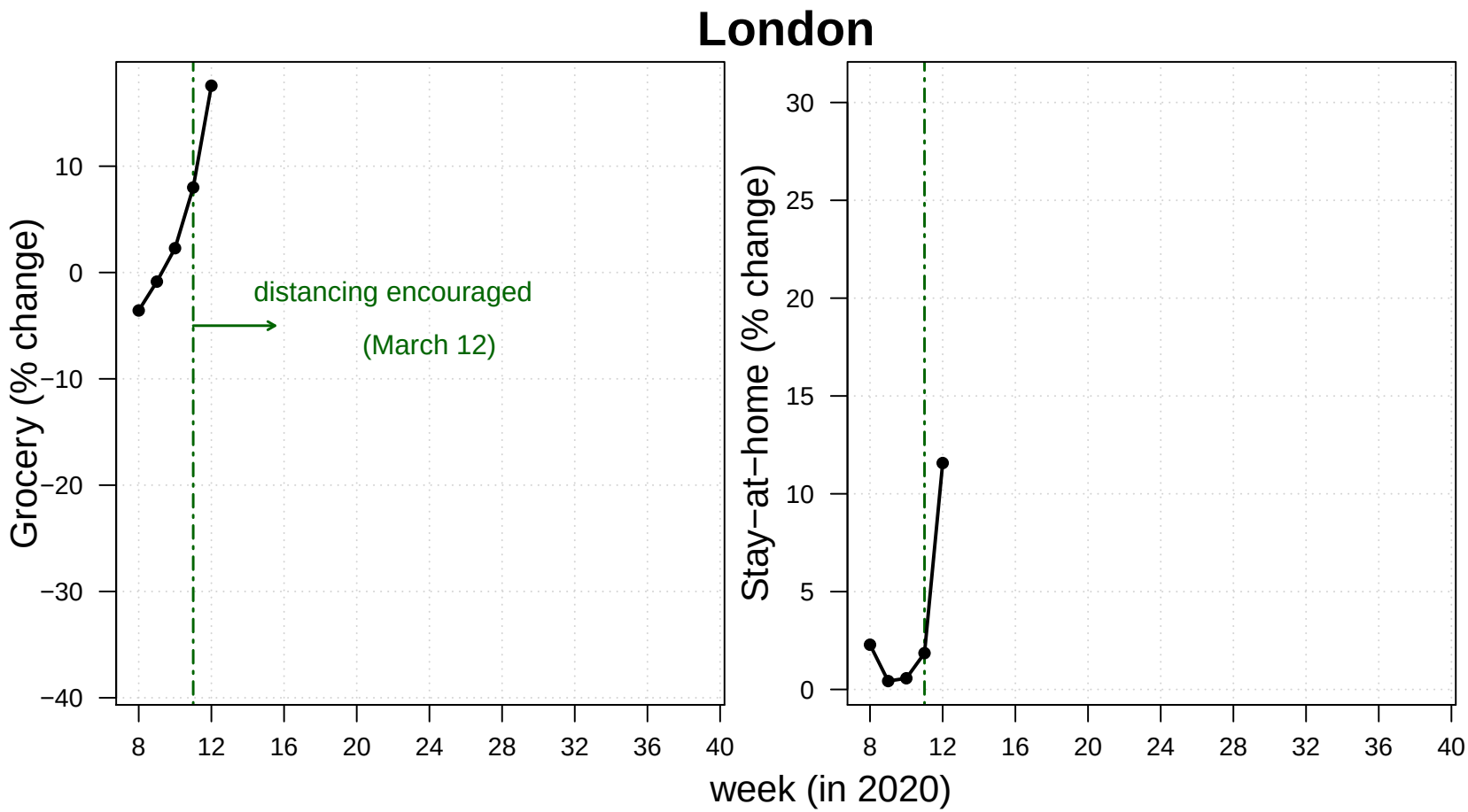
Available at https://www.google.com/covid19/mobility/

Mobility data: grocery & stay-at-home



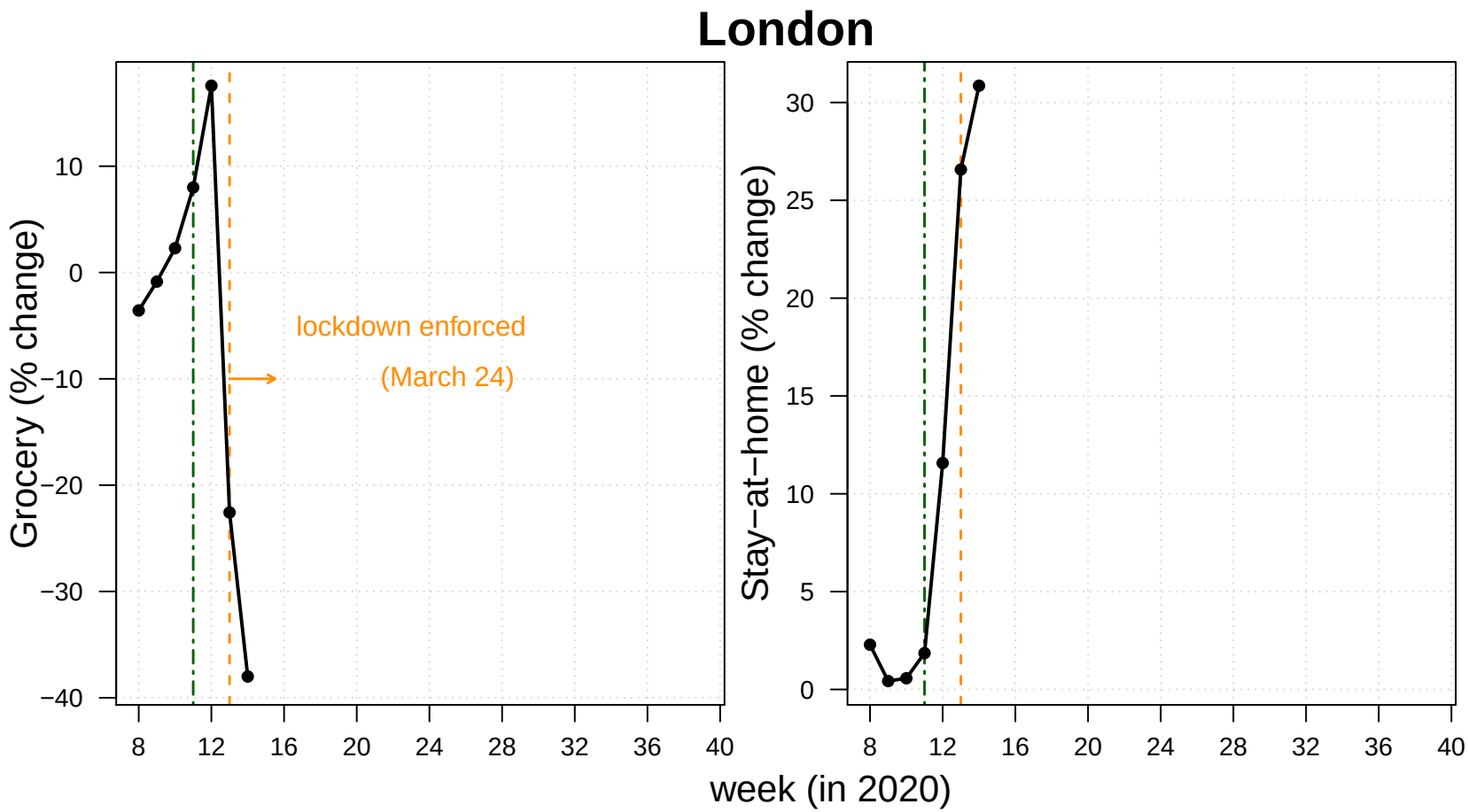
Relative change in visits to groceries and pharmacies and time spent at home with respect to start of 2020. Region of London, weeks 8–11, 2020 (15 February – 13 March). *Source: elaborations of data from Google (2020)*

Mobility data: grocery & stay-at-home



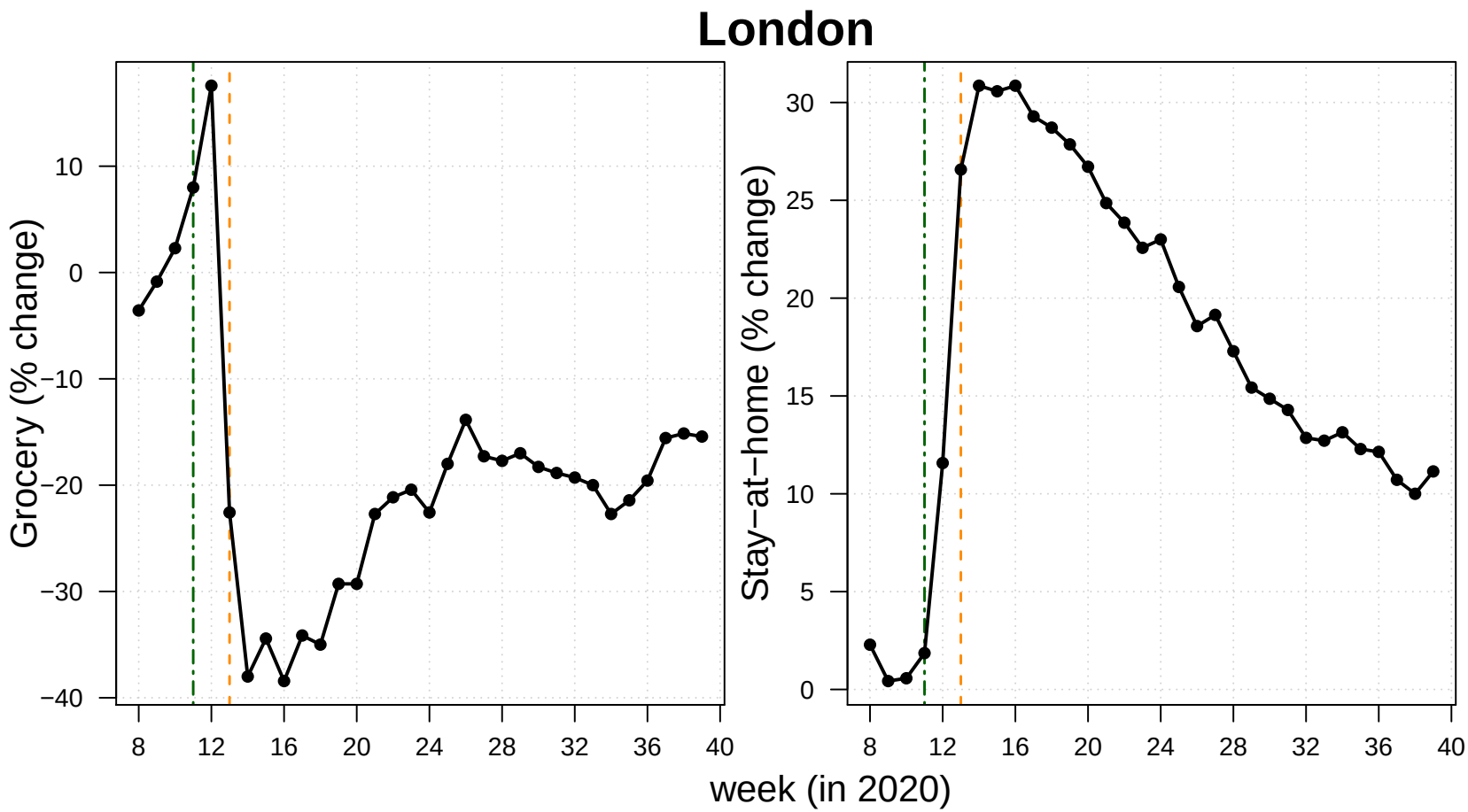
Relative change in visits to groceries and pharmacies and time spent at home with respect to start of 2020. Region of London, weeks 8–12, 2020 (15 February – 20 March). *Source: elaborations of data from Google (2020)*

Mobility data: grocery & stay-at-home



Relative change in visits to groceries and pharmacies and time spent at home with respect to start of 2020. Region of London, weeks 8–14, 2020 (15 February – 04 April). *Source: elaborations of data from Google (2020)*

Mobility data: grocery & stay-at-home

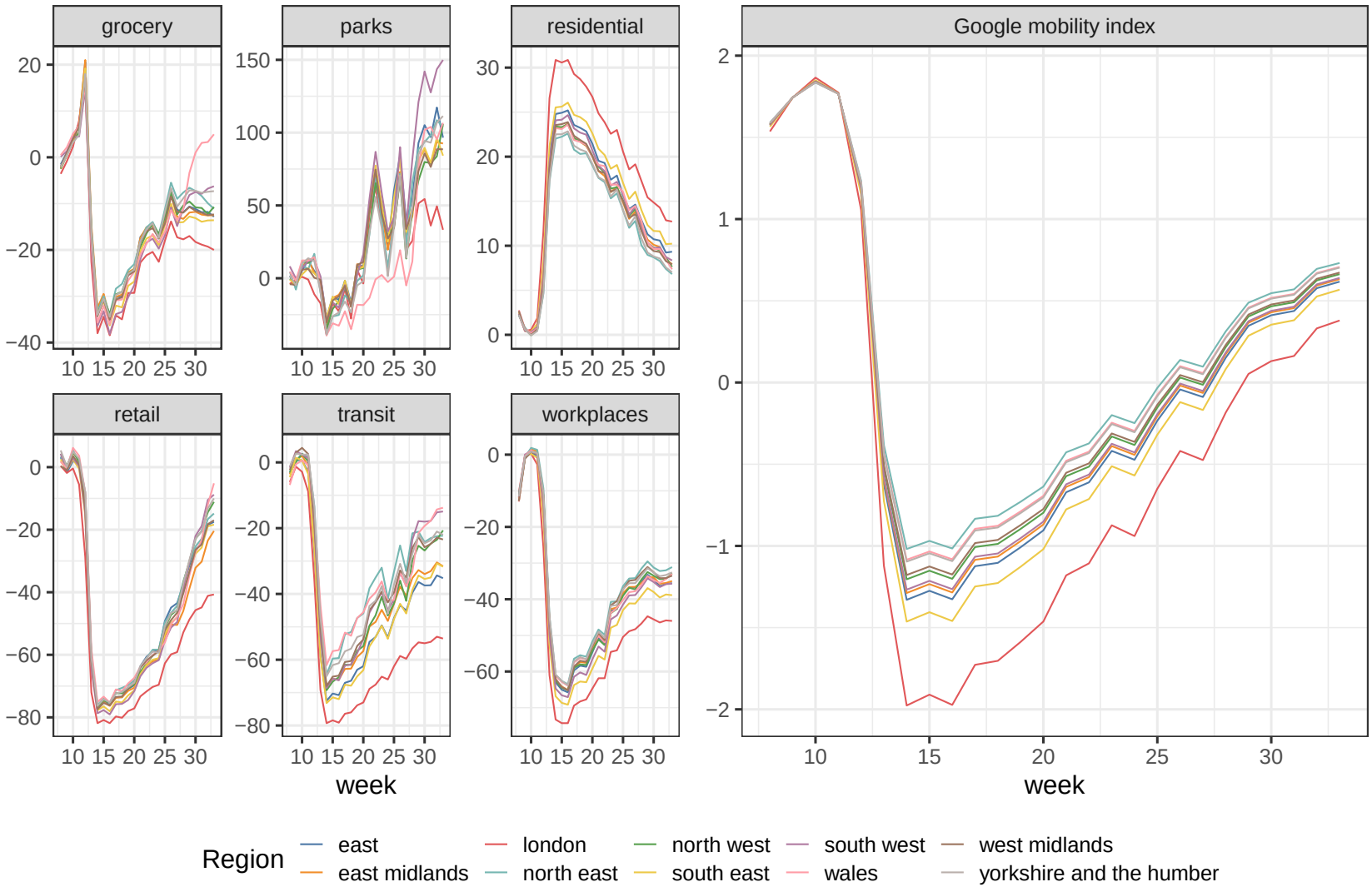


Relative change in visits to groceries and pharmacies and time spent at home with respect to start of 2020. Region of London, weeks 8–39, 2020 (15 February – 25 September). *Source: elaborations of data from Google (2020)*

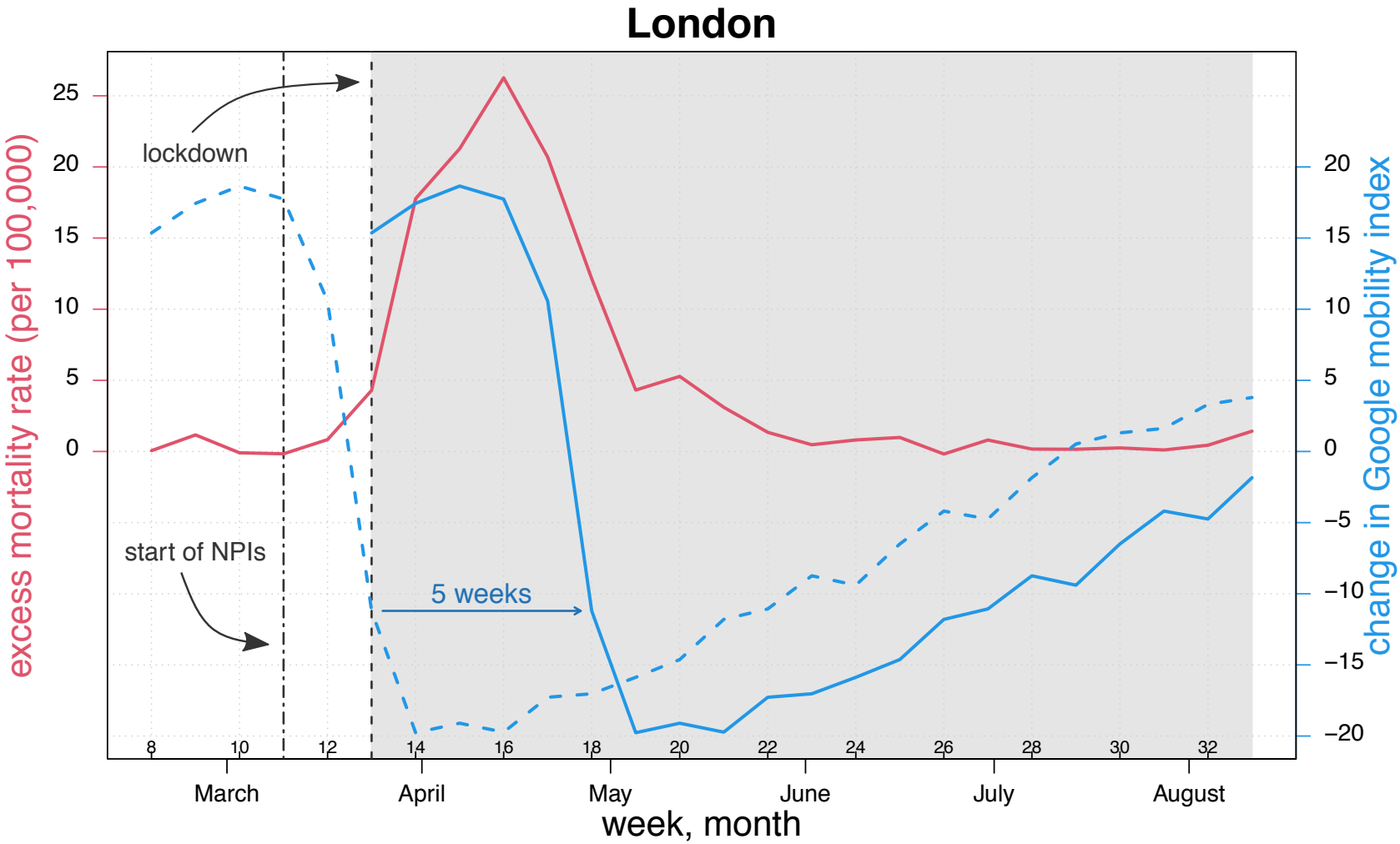
Google mobility index

1. Reduce dimensionality of mobility data retaining variation
2. [Category, regions, time] $\rightarrow$ [regions, time]
3. Multilinear principal component analysis (first component)
4. `rTensor` package

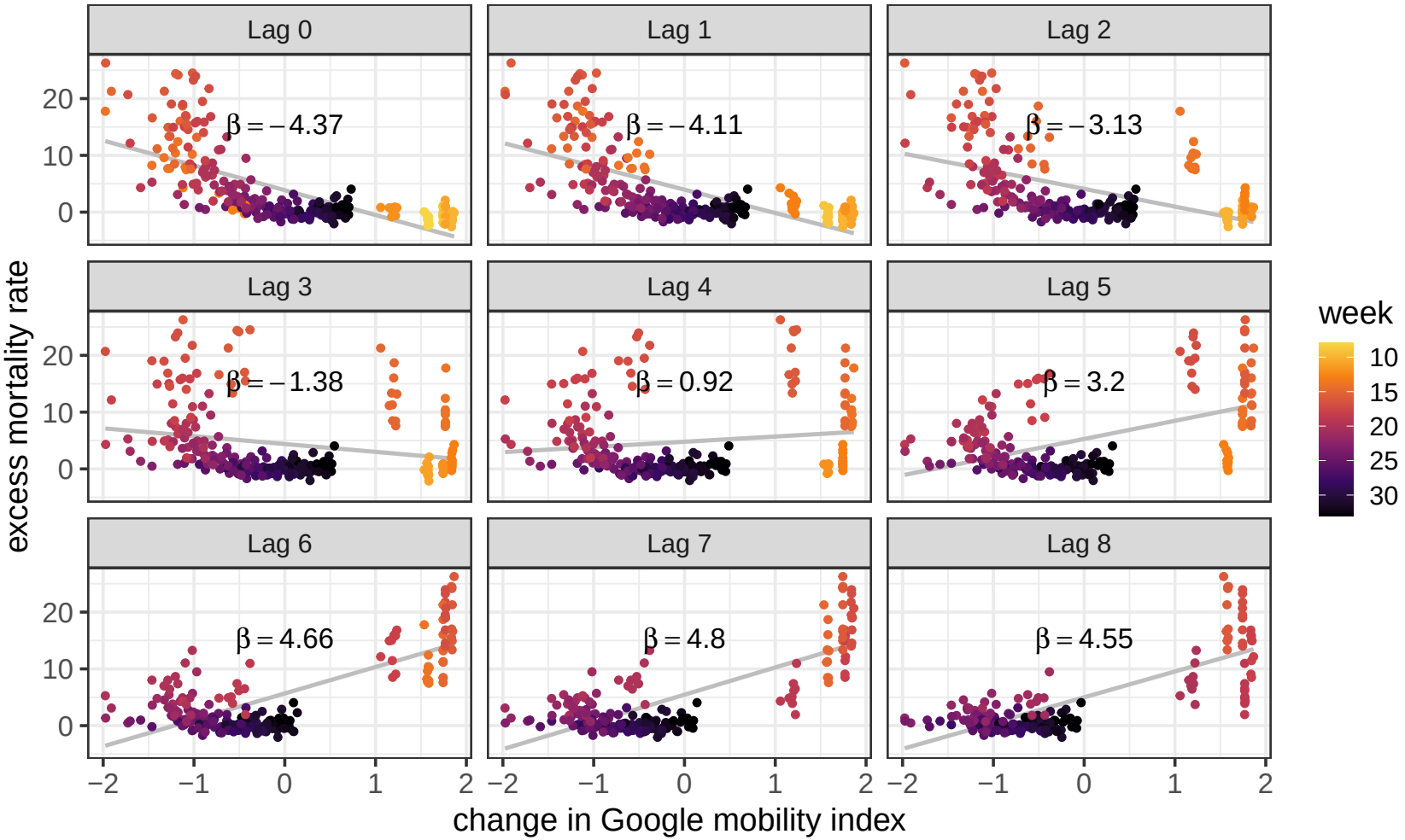
Google mobility index



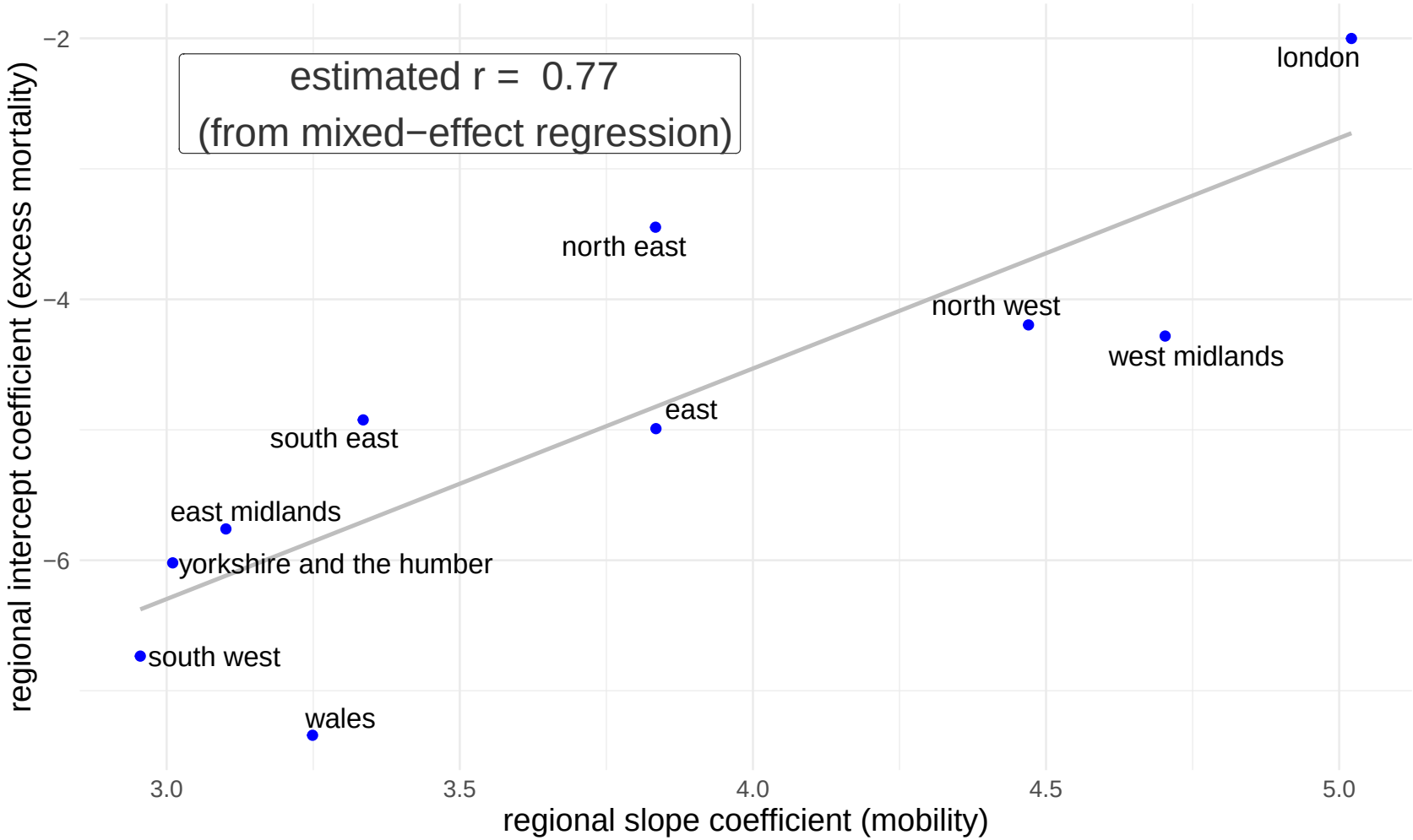
Excess mortality & mobility (Google mobility index)



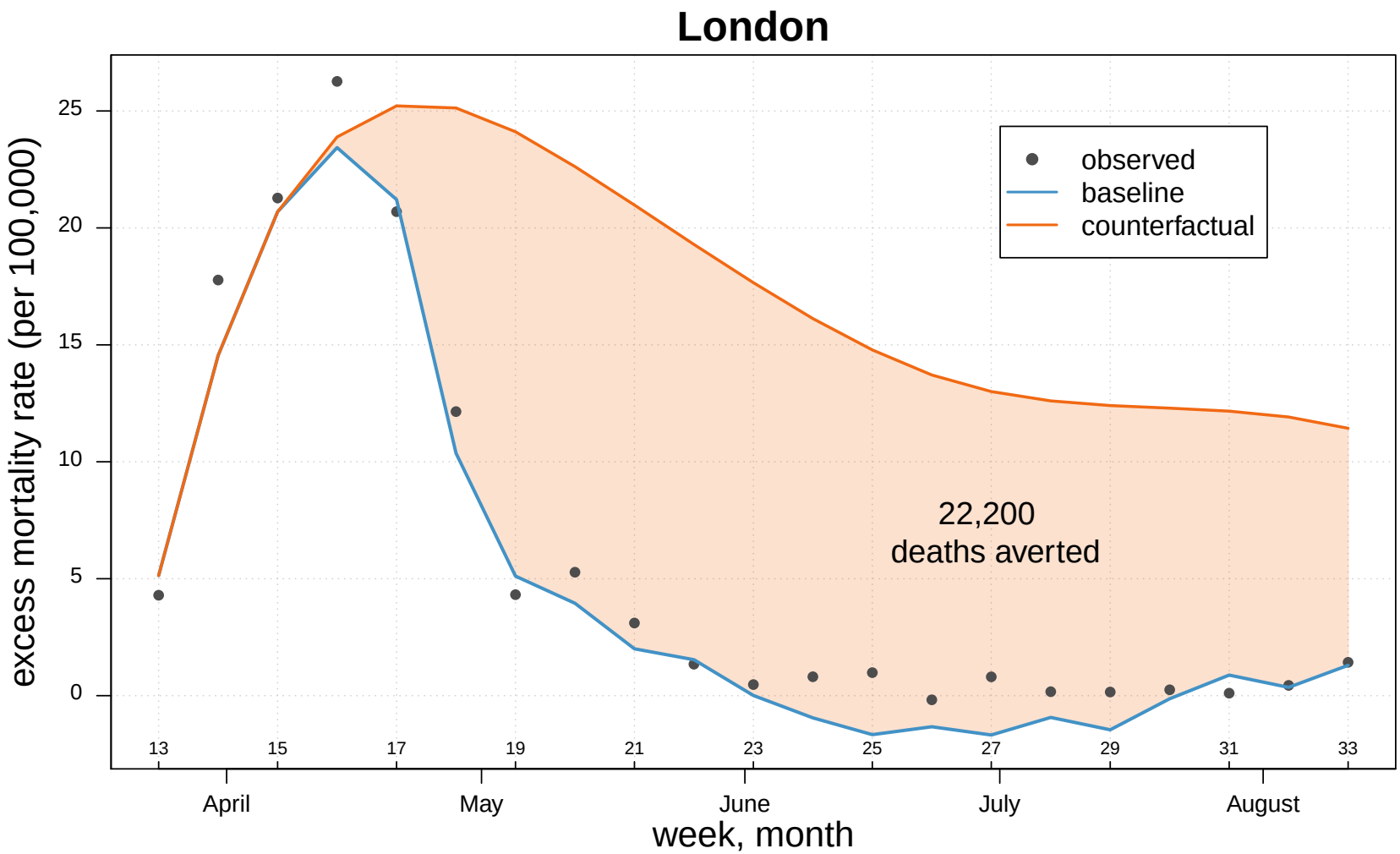
Excess mortality & lagged mobility (Google mobility index)



Model results



Counterfactual analysis



Conclusions

1. Association between mobility reduction and excess mortality
2. Lag of five or more weeks
3. Results confirmed in regression setting accounting for pandemic time trend and regional differences
4. Estimated 93,700 (85,400-102,500) excess deaths
5. Doubled without mobility reductions

Limitations

Groups discussion after break. . .

Break

Discussion

Group discussion: research design

The papers links mobility restrictions to excess mortality:

1. What are some **strenghts** of the research design?
2. What are some **weaknesses** of the research design?

Analysis of research design

Strenghts

1. Excess mortality as outcome (alternative definitions)
2. Account for infection-death lag

Weaknesses

1. Ecological study
2. Mortality reporting (accuracy, lags)

Group discussion: digital trace data

The papers users Google mobility data as an explanatory variable:

1. What are some **strenghts** of the use of digital trace data?
2. What are some **weaknesses** of the use of digital trace data?

Use of digital trace data

Strengths

1. Real-time mobility data
2. Uses different measures of mobility

Weaknesses

1. Internet penetration rates
2. Algorithmic black-box of Google data