

Appendix

Appendix Tables

Appendix Table legends:

Appendix Table A1: Component contribution in percentages from model estimates and from the true parameter estimates across different simulated scenarios.

Appendix Table A2: Summary of the absolute difference and the squared absolute difference of the component contribution in percentage between the estimates from the fitted model with simulated data and from the true.

Appendix Table A3: Summary of the point estimates across converged models fitted with simulated datasets. The information in the true column are retrieved from Table 3 in the main manuscript.

Appendix Table A4: Number of converged models and that the summary of the 95% CIs of the parameter estimates contain the true point estimates

Appendix Figures

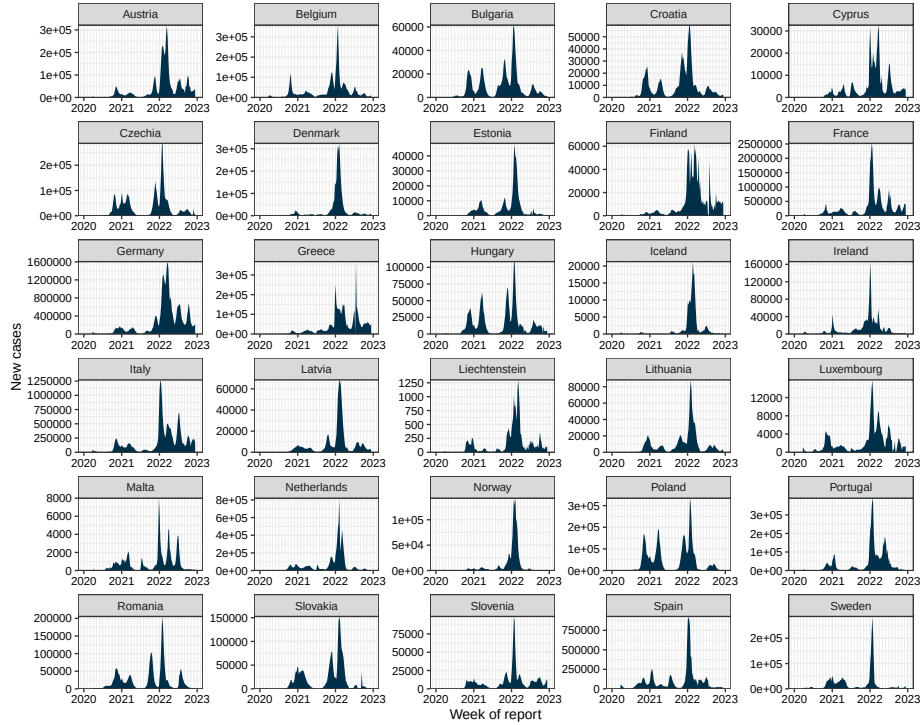


Figure A1: Number of COVID-19 reported cases by country from Week 13-2020 to Week 50-2022.

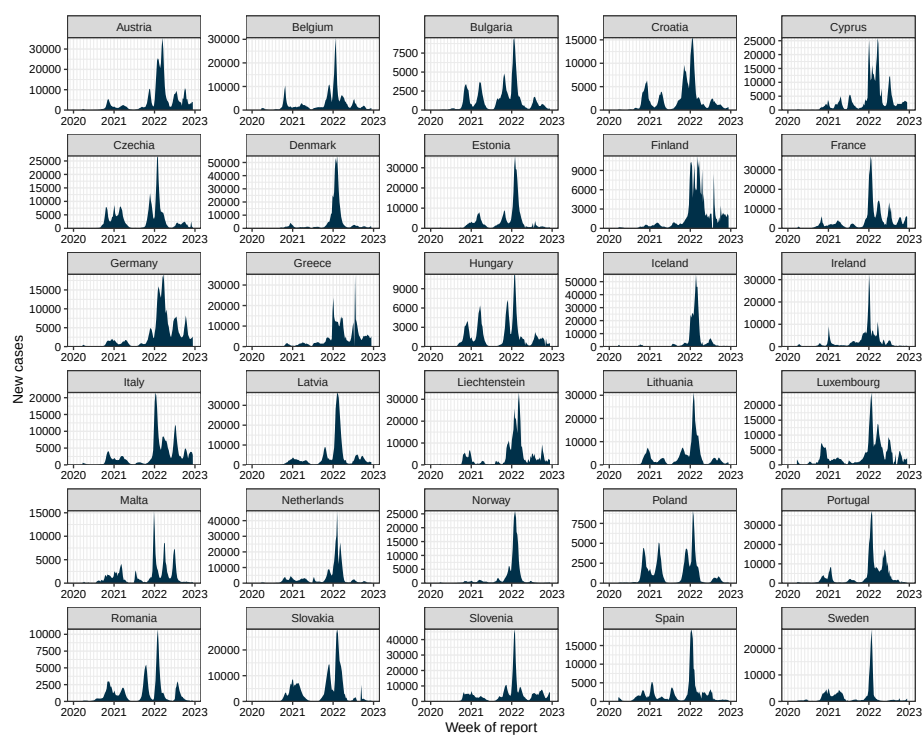


Figure A2: Number of COVID-19 reported cases per one million population by country from Week 13-2020 to Week 50-2022.

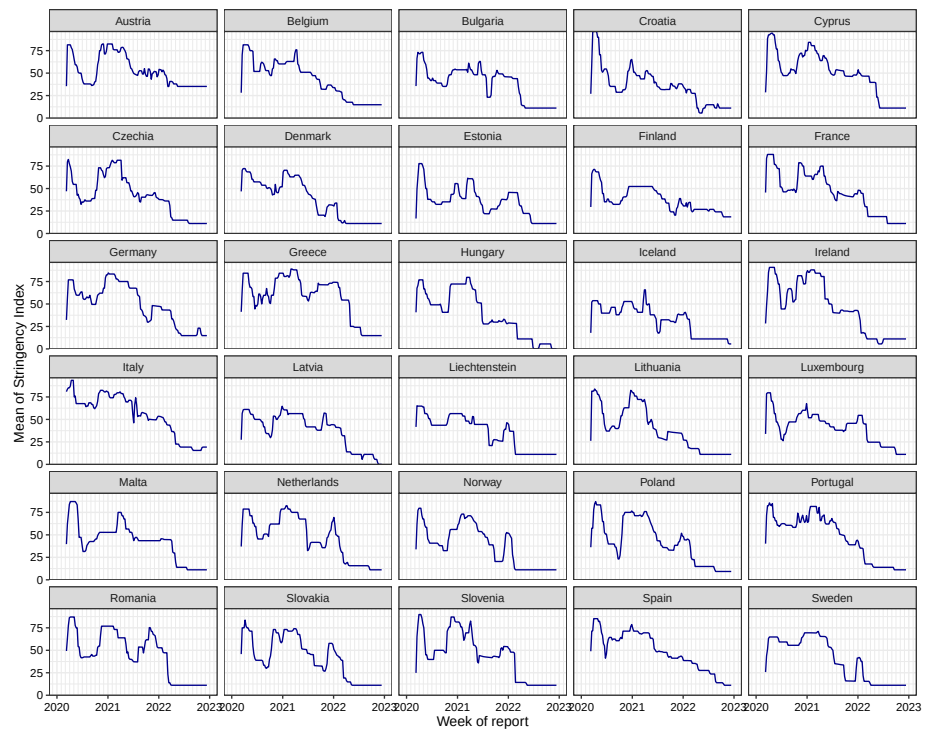


Figure A3: The Stringency Index by country from Week 11-2020 to Week 50-2022.

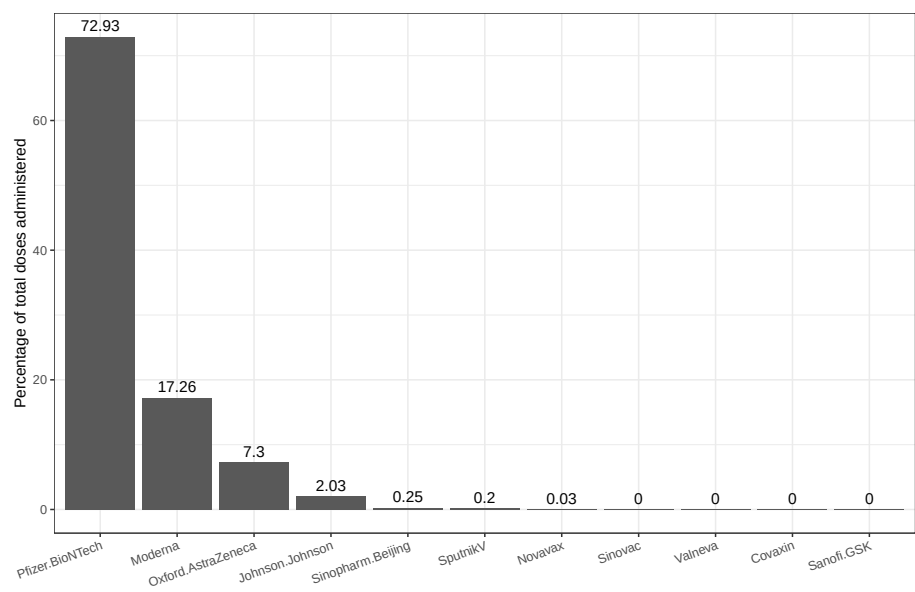


Figure A4: Vaccine products, sourced from Our World in Data website [27].

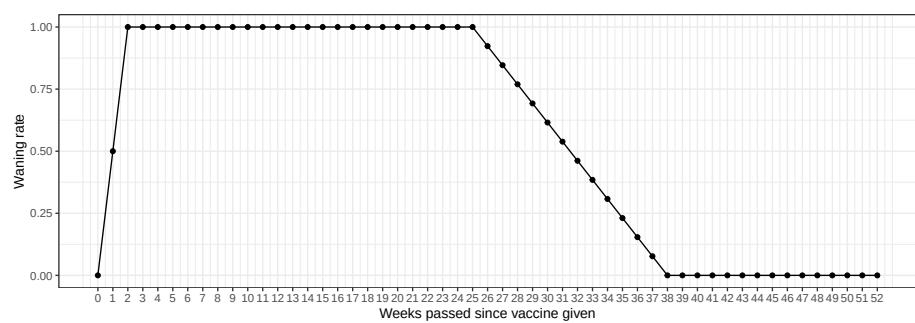


Figure A5: Waning function, adapted from [19].

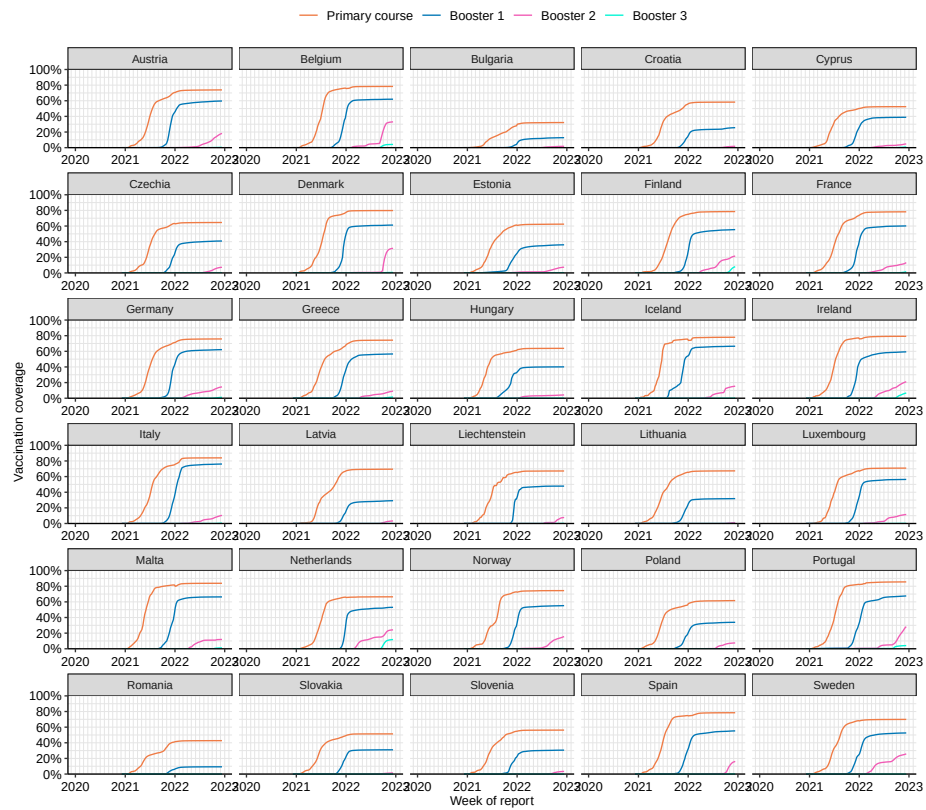


Figure A6: Raw vaccination coverage by country from Week 50-2020 to Week 50-2022.

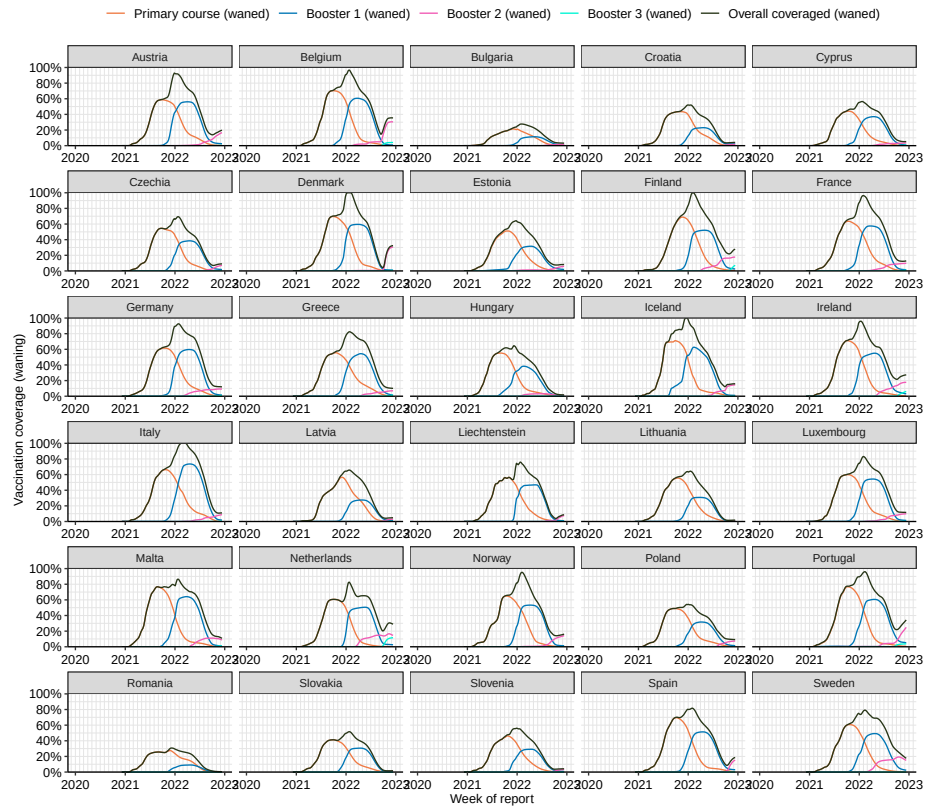


Figure A7: Vaccination coverage (with waning immunity) by country from Week 50-2020 to Week 50-2022.

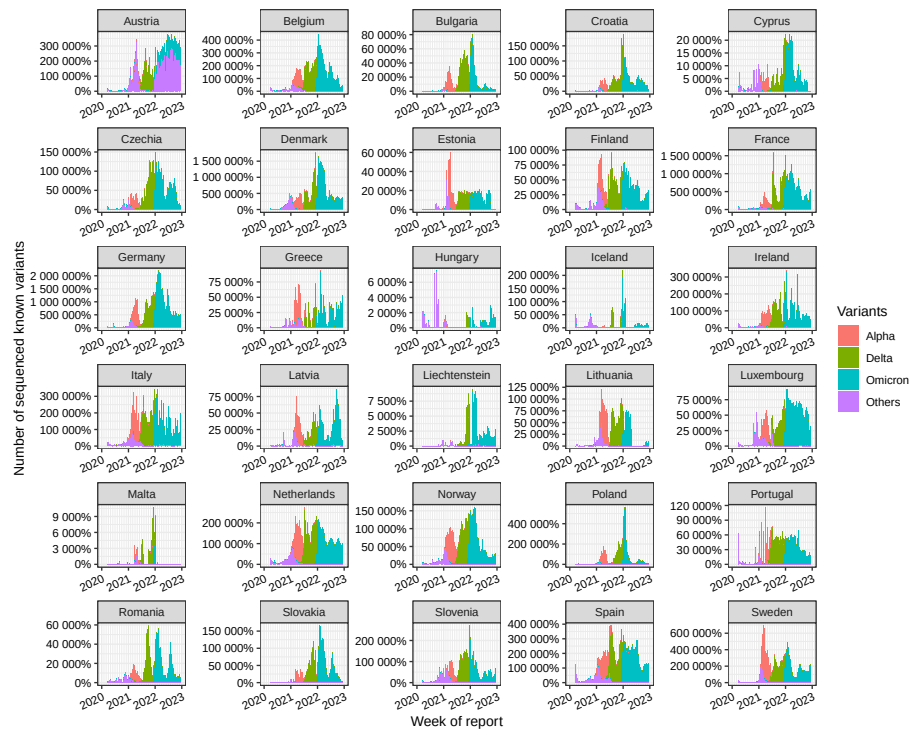


Figure A8: Number of sequenced with known variants by country from Week 13-2020 to Week 50-2022.

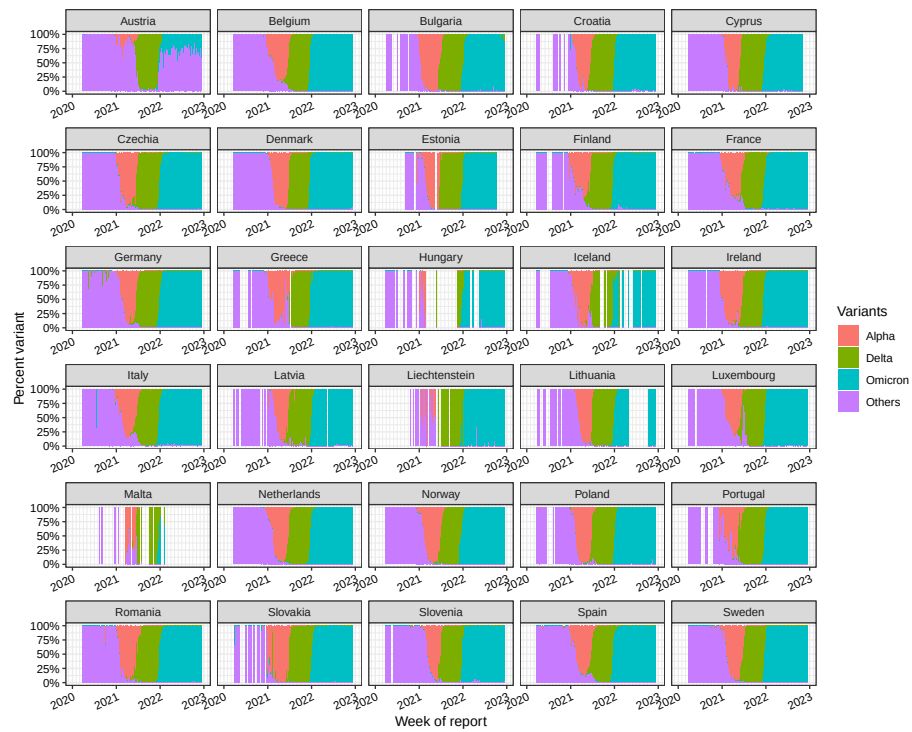


Figure A9: Percentages of samples sequenced with known variants by country from Week 13-2020 to Week 50-2022.

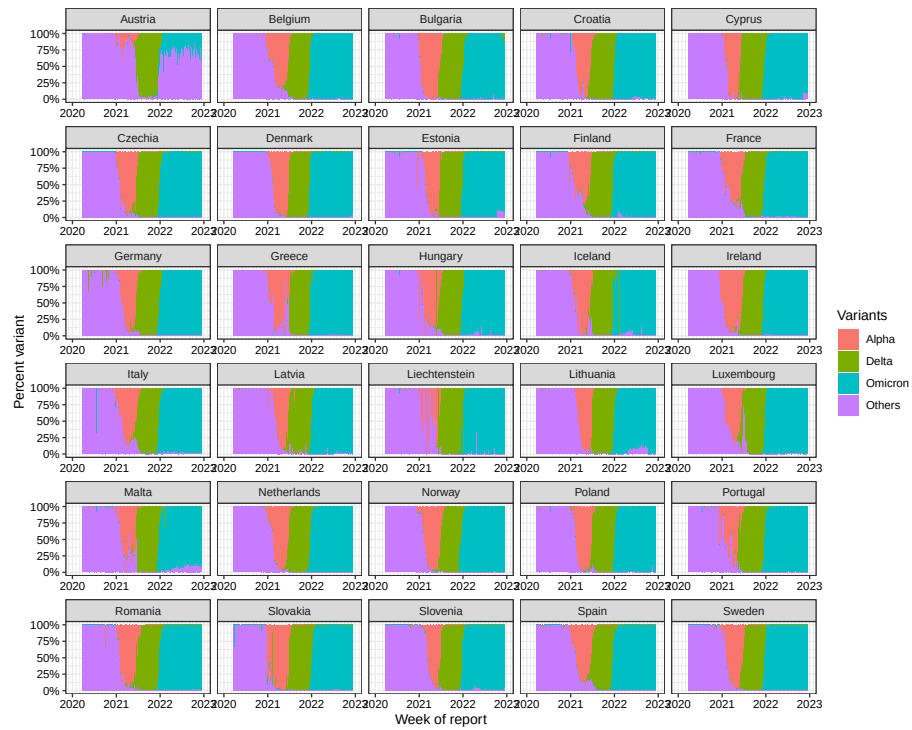


Figure A10: Percentages of samples sequenced with known variants by country (adjusted) from Week 13-2020 to Week 50-2022.

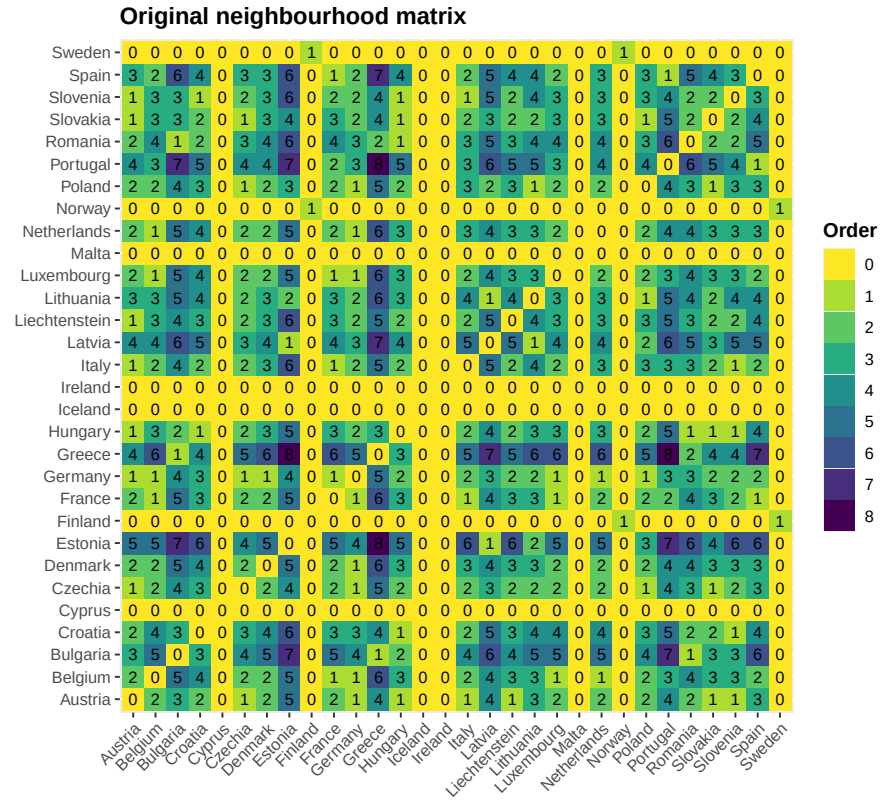


Figure A11: The original neighbourhood matrix.

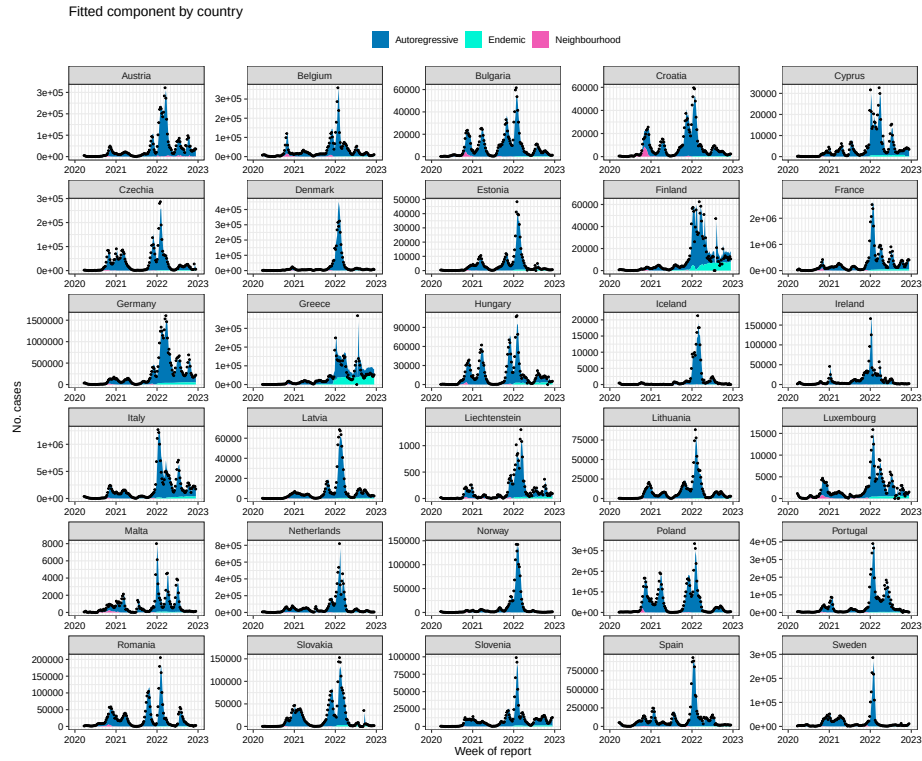


Figure A12: Fitted components of the random effects model by each EU/EEA country between Week 13-2020 and Week 50-2022. The dots indicate the observed number of weekly infections. The autoregressive, the spatiotemporal, and the endemic components are illustrated by blue, orange, and cyan areas, respectively.



Figure A13: Contribution in percentage of the fitted components of the random effects model by each EU/EEA country between Week 13-2020 and Week 50-2022. The autoregressive, the spatiotemporal, and the endemic components are illustrated by blue, orange, and cyan lines, respectively.

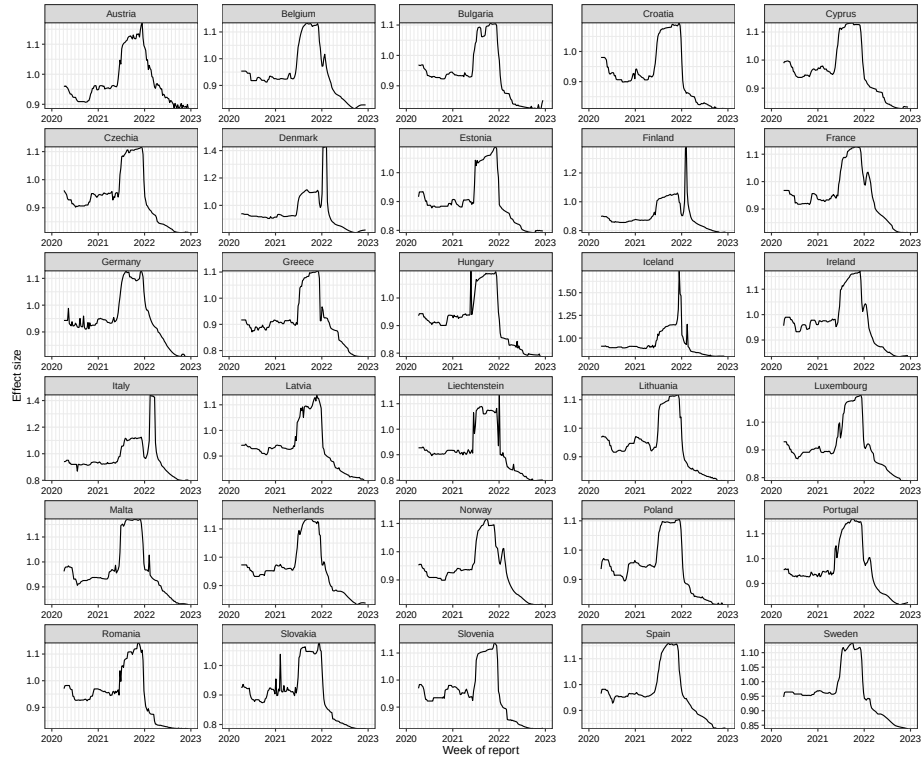


Figure A14: The estimated predictors of the autoregressive component (i.e., λ_{it}) in each country.

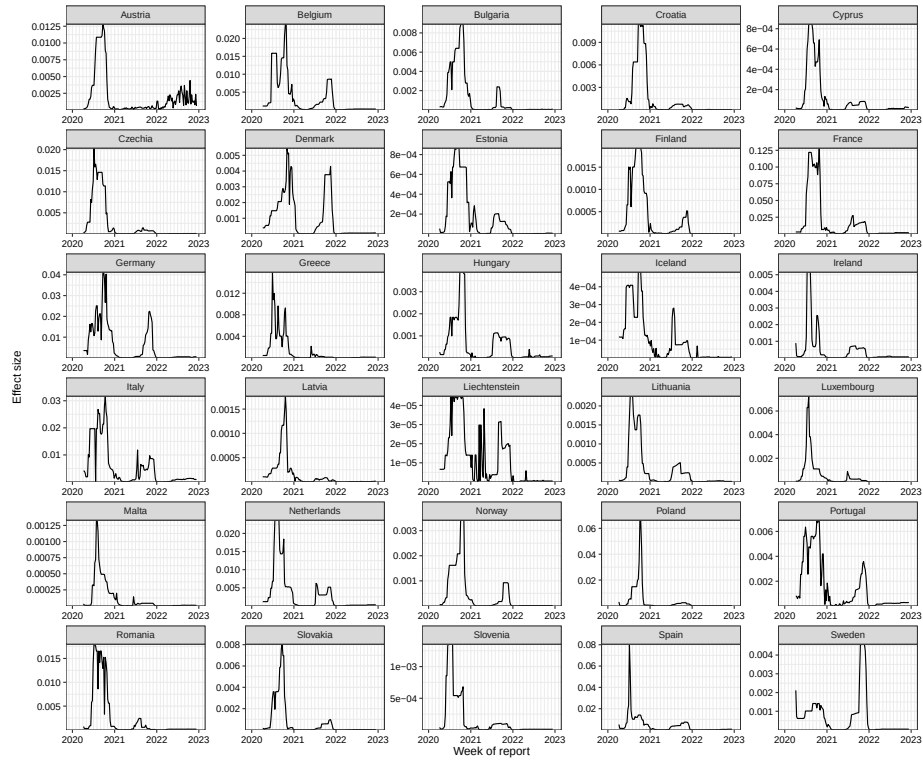


Figure A15: The estimated predictors of the neighbourhood component (i.e., ϕ_{it}) in each country.

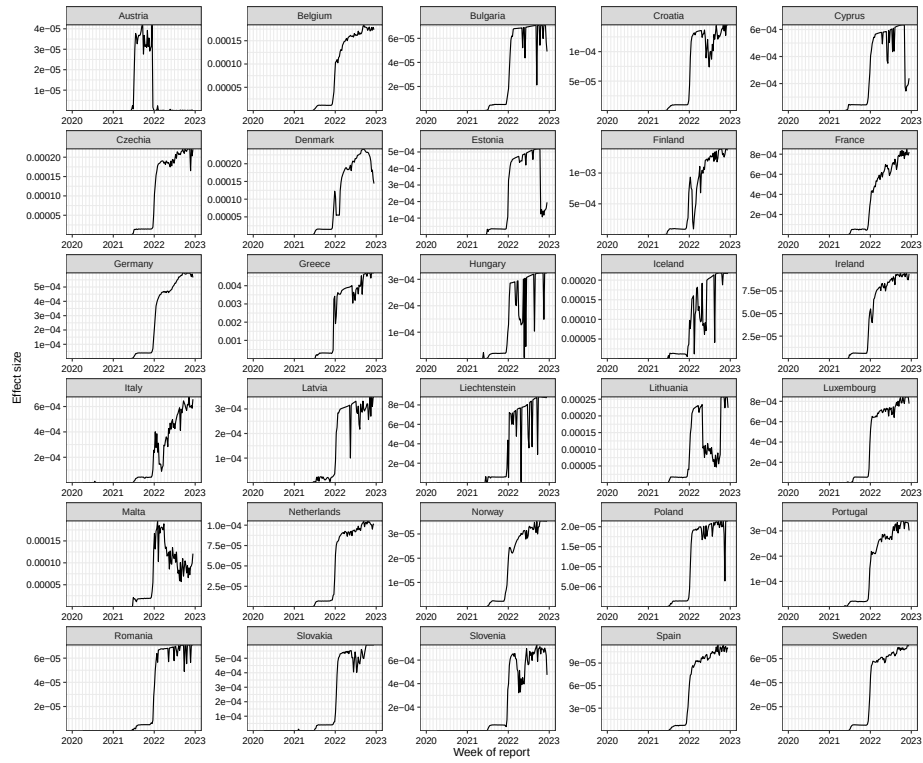


Figure A16: The estimated predictors of the endemic component (i.e., ν_{it}) in each country.

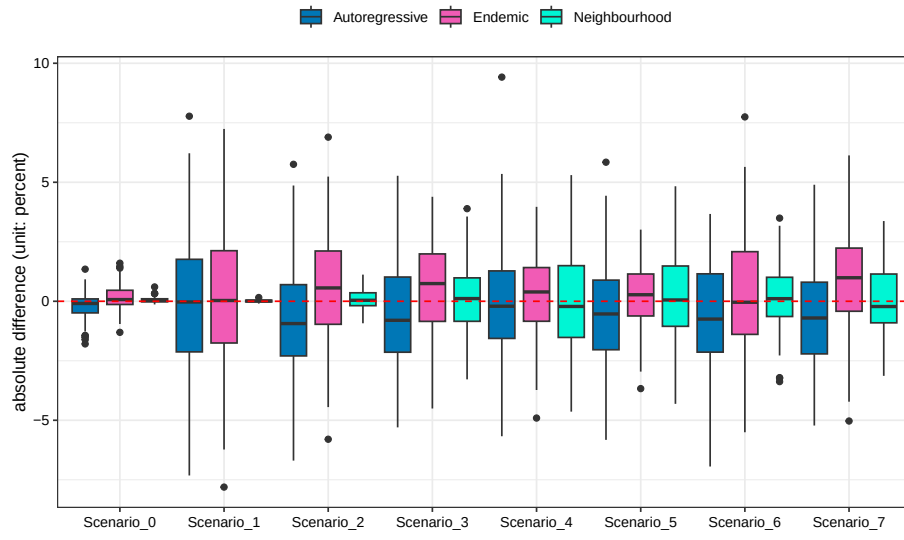


Figure A17: The absolute difference of the overall contribution in percentage of each of the three components between the estimates from fitted models with simulated data and the estimates when the true parameter estimates from Table 3 are plugged into the simulated datasets. The summary of the contribution is available in the Appendix Table A2. The autoregressive, the spatiotemporal, and the endemic components are illustrated by blue, pink, and cyan, respectively.

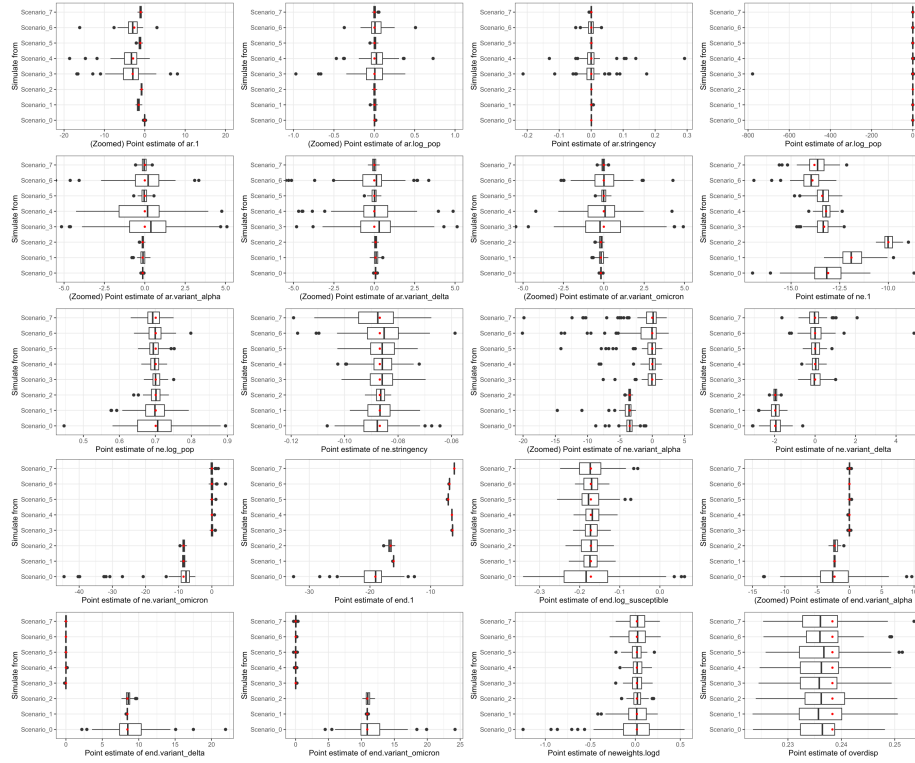


Figure A18: Boxplots of the point parameter estimates obtained from converged model fitted with simulated datasets across different simulated scenarios (detailed results are shown in Appendix Table A3) and the comparison with the "true" point estimates (red dots) in Table 3 in the main manuscript. Figures are shown either in zoomed or no zoomed versions for visualization perspectives.

Figure A19: Time lag weight

