Exploring the transmission advantage of Omicron in England

Epiforecasts

16 December 2021

Aims

- We aimed to assess competing explanations of the transmission advantage of Omicron, compared to the existing dominant strain, Delta, in England.
- We explored the likelihood of increased transmissibility compared to immune escape, using S-gene target failure as a proxy for infection with Omicron.
- We use a model framework where we vary only the relationship between variants while holding all other parameters constant.

Methods

- Data are all test-positive cases for England. Omicron is modelled from those cases reporting an S-gene target result (failure or positive).
- We used raw data by specimen date (figure 5).
- Models are based on data between 2021-11-21 and 2021-12-11. We used only the most recent three weeks of data and excluded the latest 1 reported data.
- We modelled at a 1 day resolution with a 7 day forecast.
- We used a weakly informative prior for a transmission advantage for the VoC vs non-VoC cases of mean 0.21 (standard deviation 0.2), based on early work from South Africa[1]
- We defined the relationship between variants as scaled and correlated.

Results

Transmission advantage is shown where 100% is equivalent to the current dominant strain, Delta (figure 1). Both models indicated a stronger transmission advantage for Omicron.

- In a fixed relationship estimated Omicron advantage is 1.32 (95% credible interval 1.3 - 1.34).
- In an correlated relationship Omicron advantage is 1.36 (95% CrI 1.25 - 1.49).
- We estimated the growth rate (figure 2), the proportion of cases attributable to Omicron (figure 3) and case counts (figure 4).

Model comparison

- Comparing the models on PSIS-LOO indicated an estimated difference in expected log pointwise predictive density of -5.66 (with a standard error of 1.06) for the correlated model compared to the scaled model.
- We also compared each model using model scoring.

[1] 2021-12-03, Carl Pearson and others, "Omicron spread in South Africa", Epidemics8

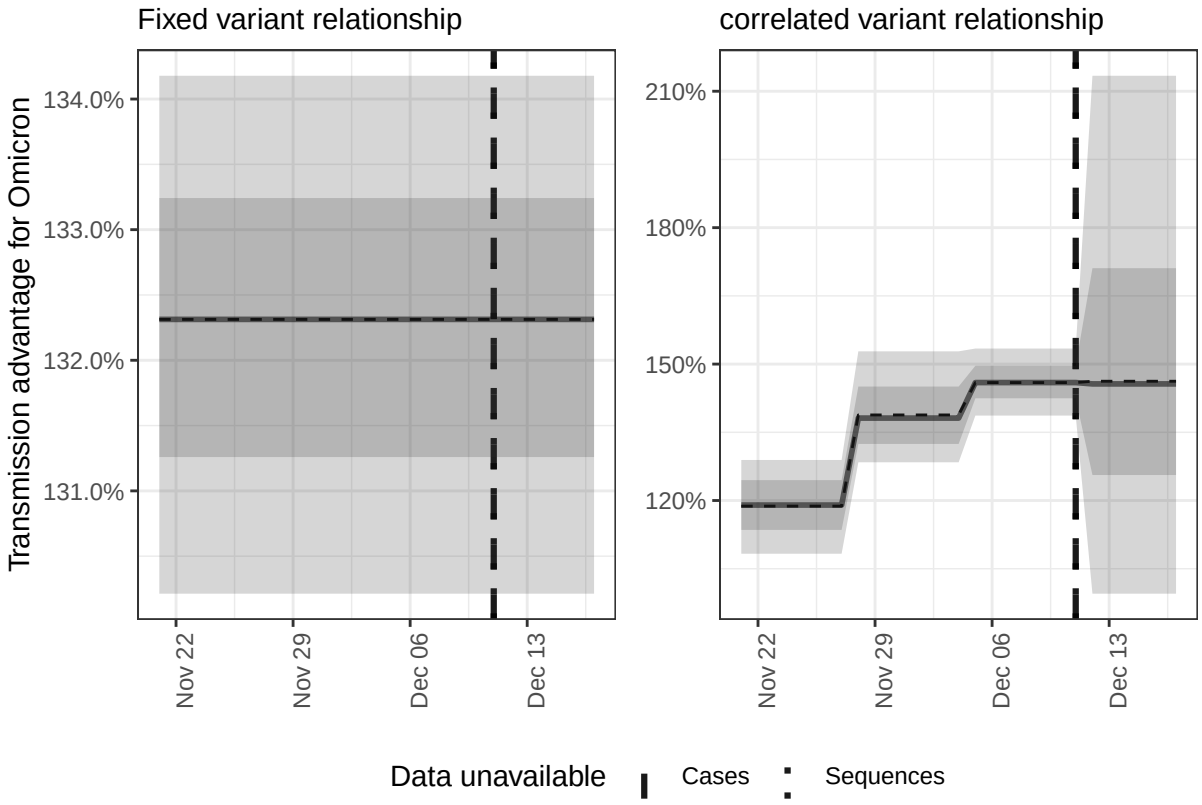

Figure 1: The transmission advantage of Omicron, modelled in a fixed relationship to Delta (left) and a time-varying relationship (right).

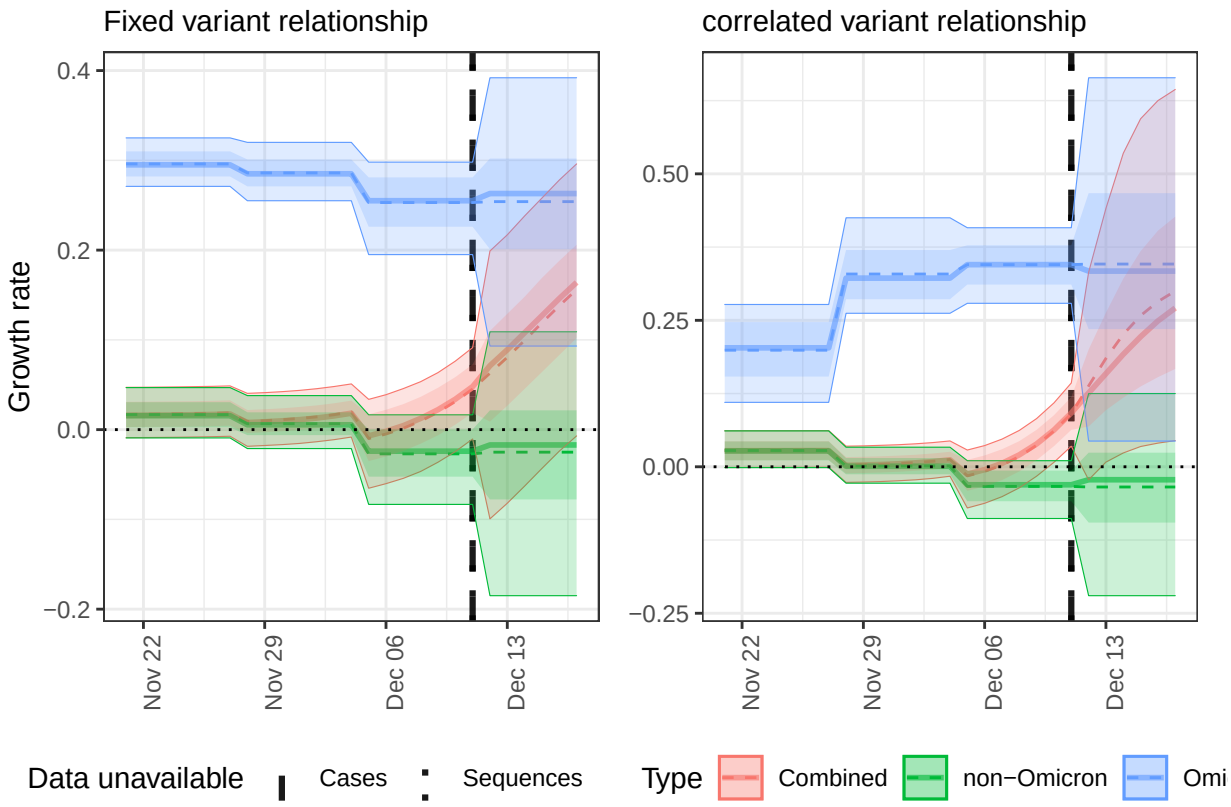

Figure 2: The growth rate and reproduction number of Omicron, modelled in a fixed relationship to Delta (left) and a time-varying relationship (right).

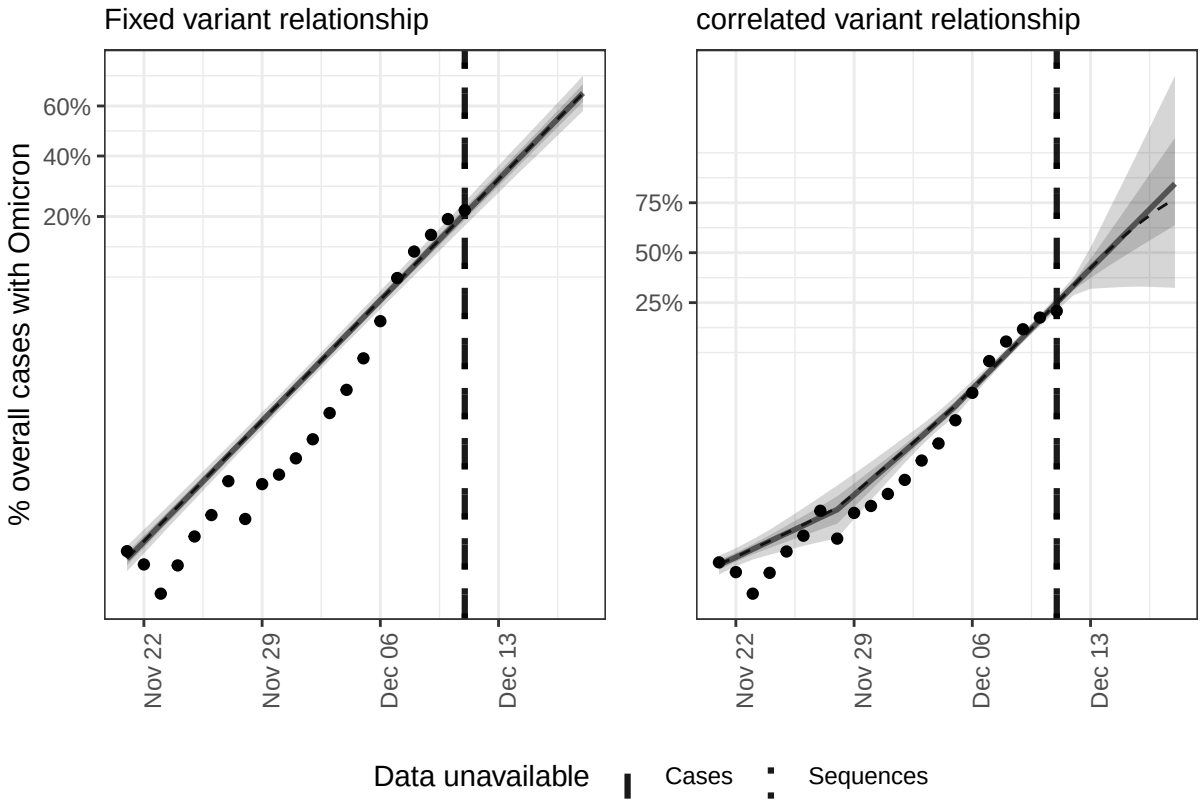

Figure 3: Fraction of cases attributable to Omicron, modelled in a fixed relationship to Delta (left) and a time-varying relationship (right).

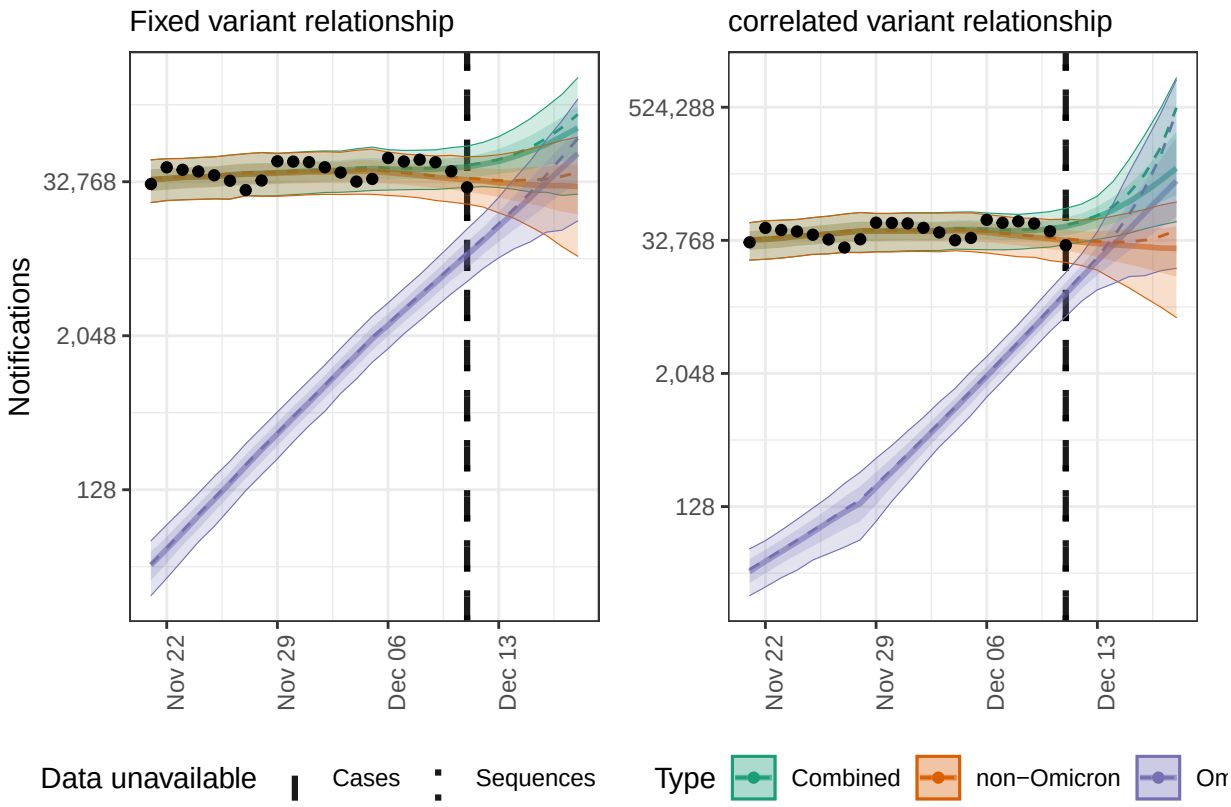

Figure 4: Weekly cases shown on a log scale, modelled in a fixed relationship to Delta (left) and a time-varying relationship (right).

Variant relationship	interval_score	sharpness	underprediction	overprediction	coverage_deviation	bias
scaled	2510	2180	92	237	0.06	-0.22
correlated	2630	2250	103	273	0.08	0.02

Raw data

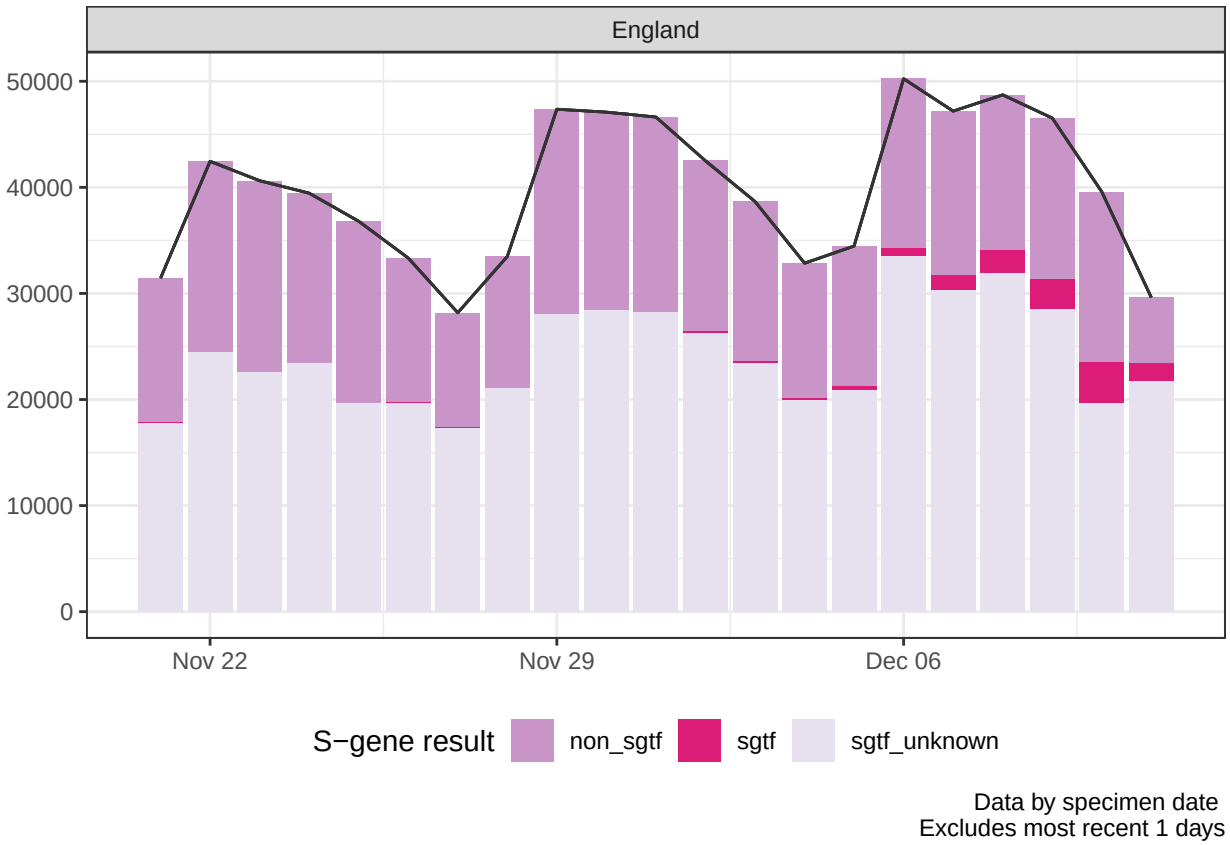

Figure 5: Raw data