

Cambridge Judge Business School
Cambridge Centre for Health Leadership & Enterprise

COVID-19 TRACKER: INDIA

6 February 2022



Centre for
**Health Leadership
& Enterprise**



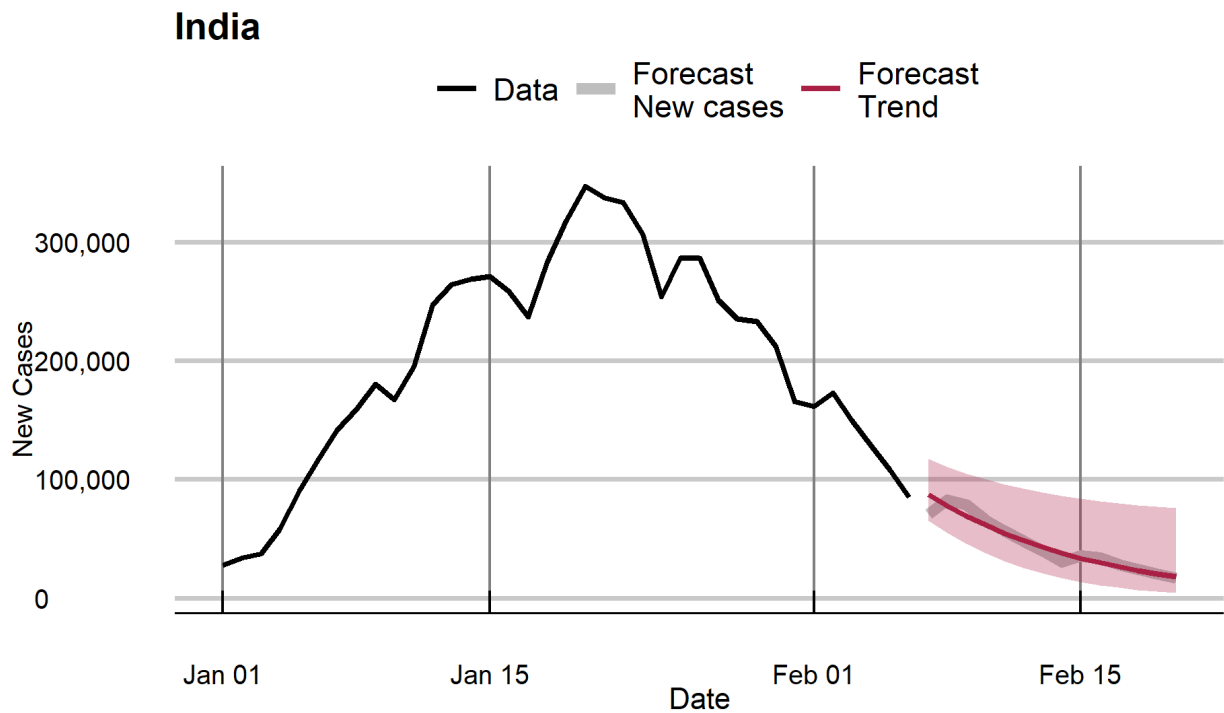
Reported daily COVID case numbers continue to decline swiftly in India, with the national reproduction number at 0.71 on 6th February, down from 0.82 on 29th January. The filtered daily growth rate of cases has declined to -11.4%. The trend value of reported daily cases can be expected to drop to about 18,000 nationally, by 20th February.

Reproduction numbers have dropped below 1, and the filtered daily growth rates have turned negative, in all states and union territories other than Mizoram, where the reproduction number stood at 1.04 on 6th February. The state is likely to see the peak in reported daily cases mid-February.

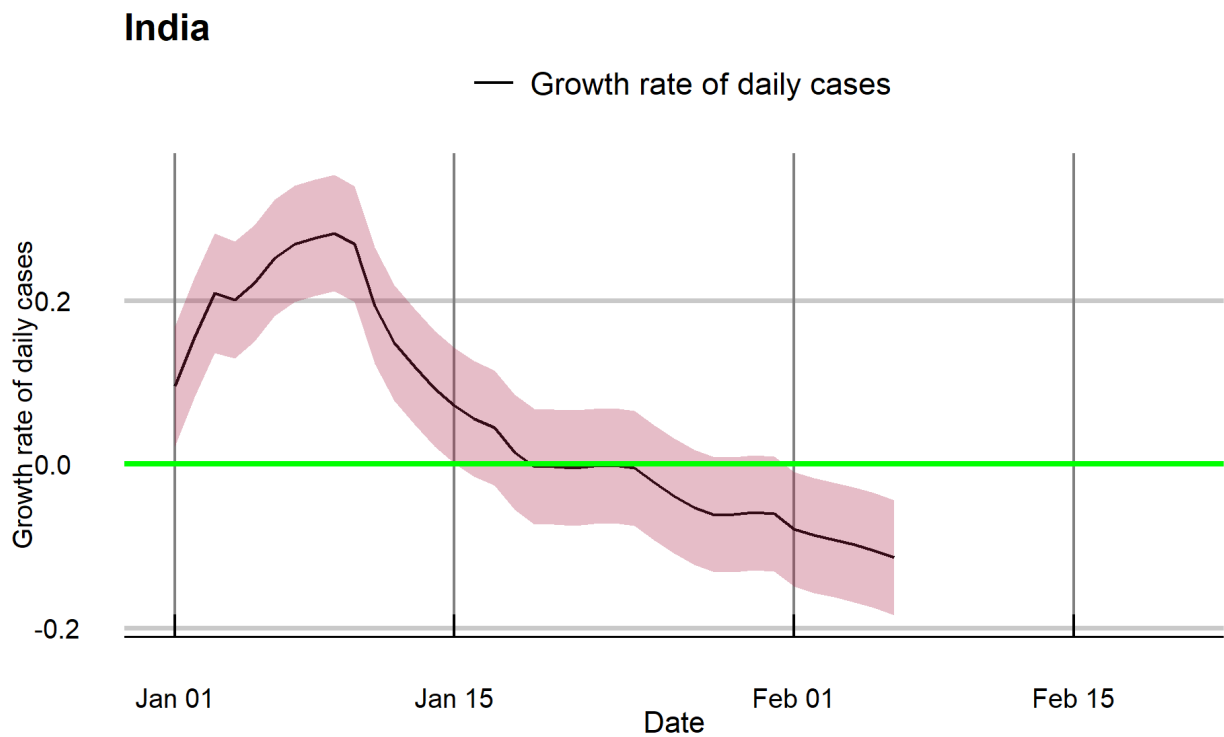
In the only other state of concern last week, Kerala, daily reported cases peaked on 2nd February, and is likely to plunge to about 8,500 per day in terms of underlying trend by 20th February.

Looking ahead as the current wave subsides, close watch is warranted over the spread of the Omicron lineage's BA.2 sub-variant, which has been found to be significantly more infectious and also capable of a greater extent of immune evasion than the original Omicron variant (BA.1) first reported from South Africa. On a positive note, the evidence, admittedly limited so far, suggests that the risk of hospitalisation remains low and comparable between BA.2 and BA.1 variants; and further, that BA.1 infection might impart protection against BA.2. Alert global surveillance and quick reportage of any emerging novel variant of the virus remains crucially important.

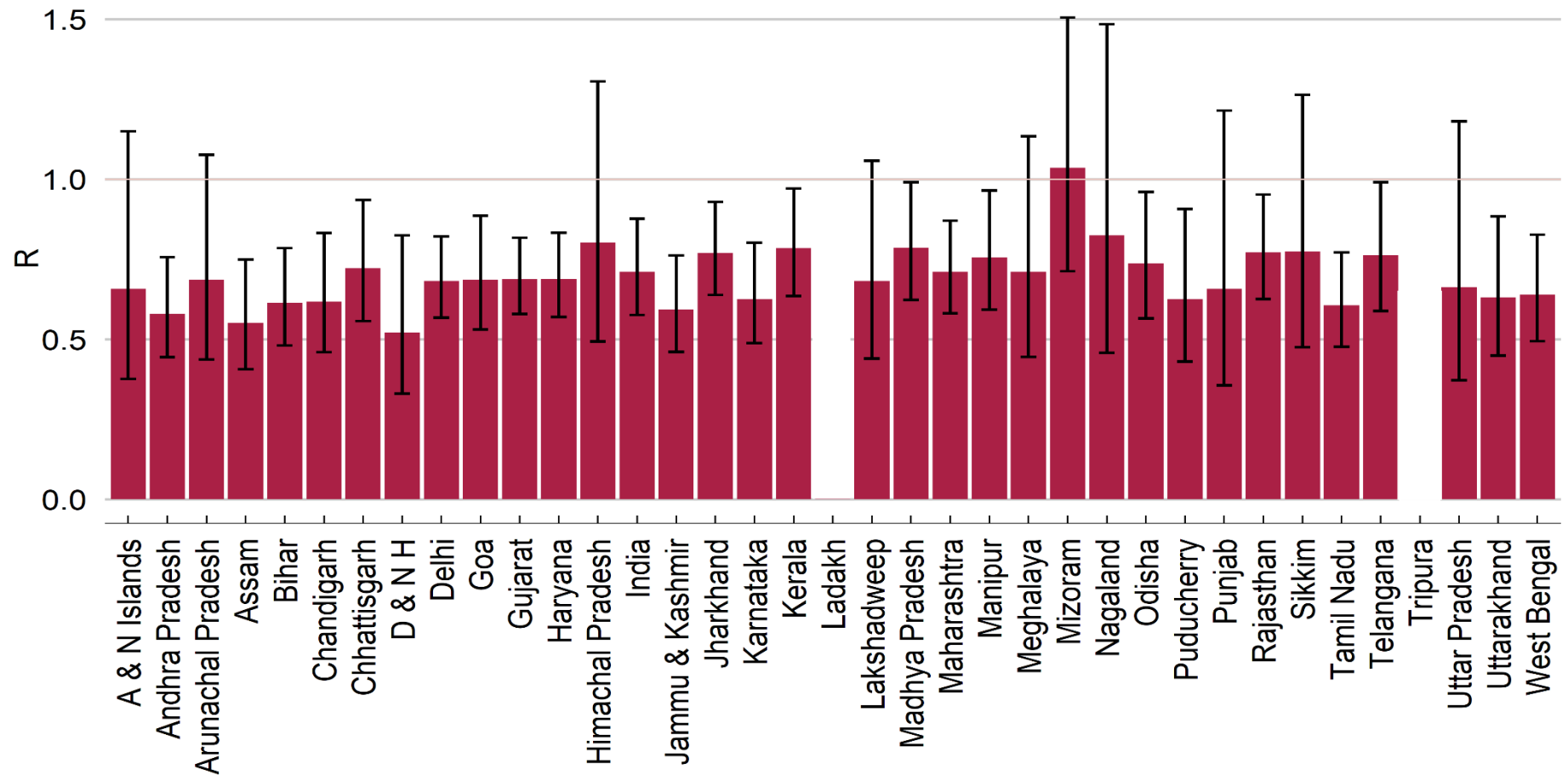
Forecasts of daily cases: 7th February to 20th February 2022



Filtered daily growth rates of new cases: days leading up to 6 February 2022



Reproduction numbers on 6th February 2022



Bar chart shows point estimates of R and confidence intervals with 95% coverage

Note: Small numbers in Andaman and Nicobar Islands, Dadra and Nagar Haveli, Ladakh, Lakshadweep and Tripura make their estimates less reliable. Ladakh and Tripura data are not available for 6 February. As of 5 February the reproduction number estimates for Ladakh was 0.86 and for Tripura, 0.46.

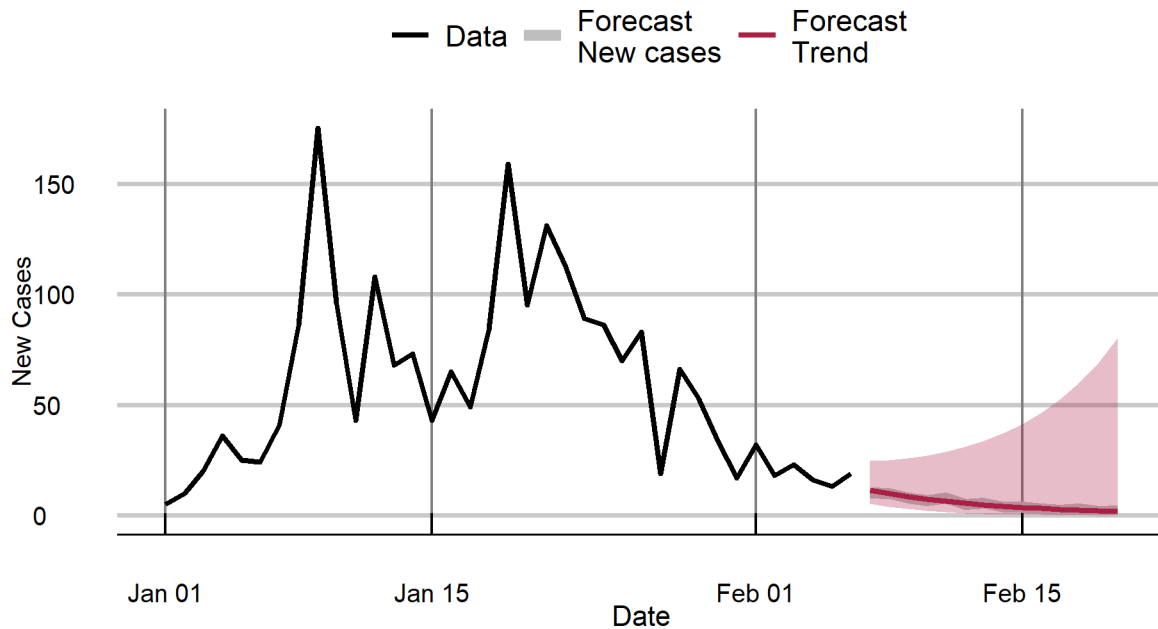
Reproduction numbers and Filtered daily growth rates: 6th February 2022

| | Reproduction number | Filtered growth rate |
|-------------------|---------------------|----------------------|
| India | 0.71 | -11.4% |
| | | |
| A & N Islands | 0.66 | -14.0% |
| Andhra Pradesh | 0.58 | -18.2% |
| Arunachal Pradesh | 0.69 | -12.6% |
| Assam | 0.55 | -19.8% |
| Bihar | 0.61 | -16.3% |
| Chandigarh | 0.62 | -16.1% |
| Chhattisgarh | 0.72 | -10.9% |
| D & N H | 0.59 | -17.4% |
| Delhi | 0.68 | -12.7% |
| Goa | 0.69 | -12.6% |
| Gujarat | 0.69 | -12.5% |
| Haryana | 0.69 | -12.5% |
| Himachal Pradesh | 0.80 | -7.4% |
| Jammu & Kashmir | 0.59 | -17.5% |
| Jharkhand | 0.77 | -8.7% |
| Karnataka | 0.63 | -15.7% |
| Kerala | 0.79 | -8.1% |
| Ladakh | 0.87 | -5.2% |
| Lakshadweep | 0.68 | -12.8% |
| Madhya Pradesh | 0.79 | -8.1% |
| Maharashtra | 0.71 | -11.4% |
| Manipur | 0.76 | -9.3% |
| Meghalaya | 0.71 | -11.4% |
| Mizoram | 1.04 | 1.2% |
| Nagaland | 0.82 | -6.5% |
| Odisha | 0.74 | -10.2% |
| Puducherry | 0.62 | -15.7% |
| Punjab | 0.66 | -14.0% |
| Rajasthan | 0.77 | -8.7% |
| Sikkim | 0.77 | -8.5% |
| Tamil Nadu | 0.61 | -16.7% |
| Telangana | 0.76 | -9.0% |
| Tripura | 0.46 | -26.1% |
| Uttar Pradesh | 0.66 | -13.8% |
| Uttarakhand | 0.63 | -15.4% |
| West Bengal | 0.64 | -14.9% |

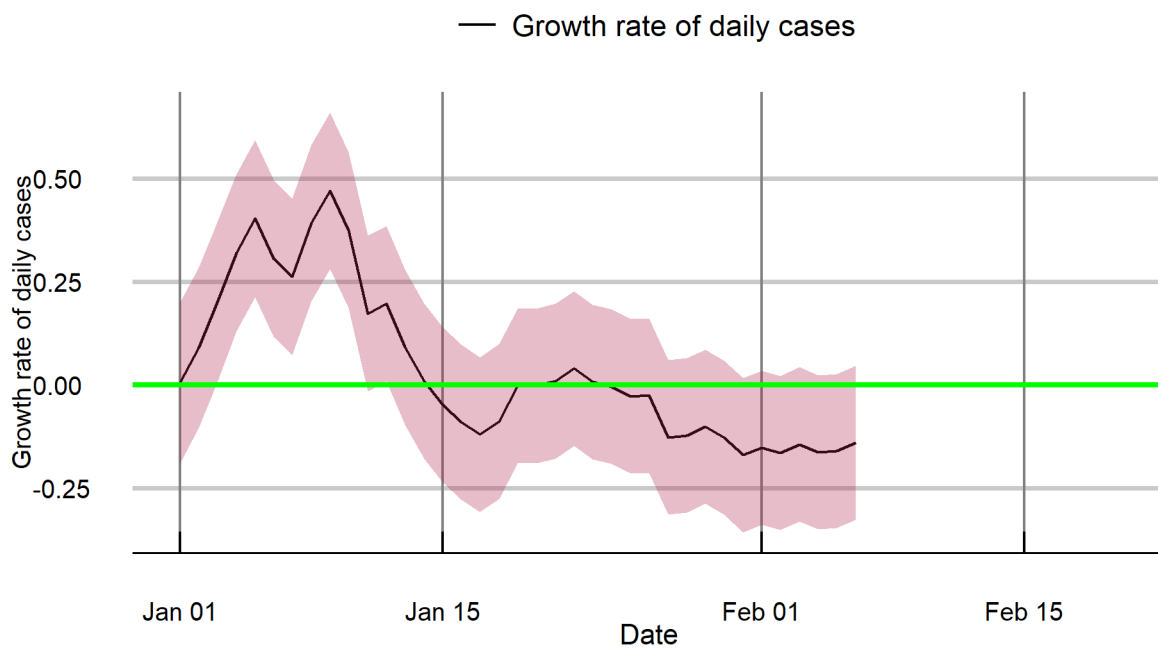
Note: Estimates for Dadra and Nagar Haveli, Ladakh and Tripura relate to 5th February 2022.

Forecasts of daily cases and filtered daily growth rates of cases for states and union territories : 7th February to 20th February 2022

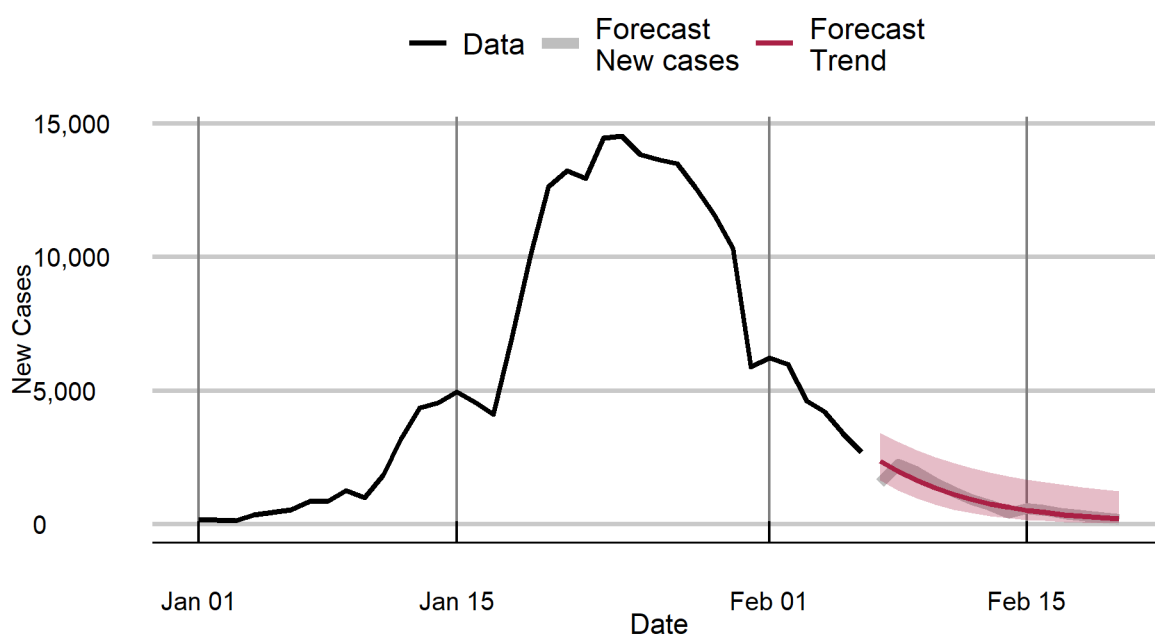
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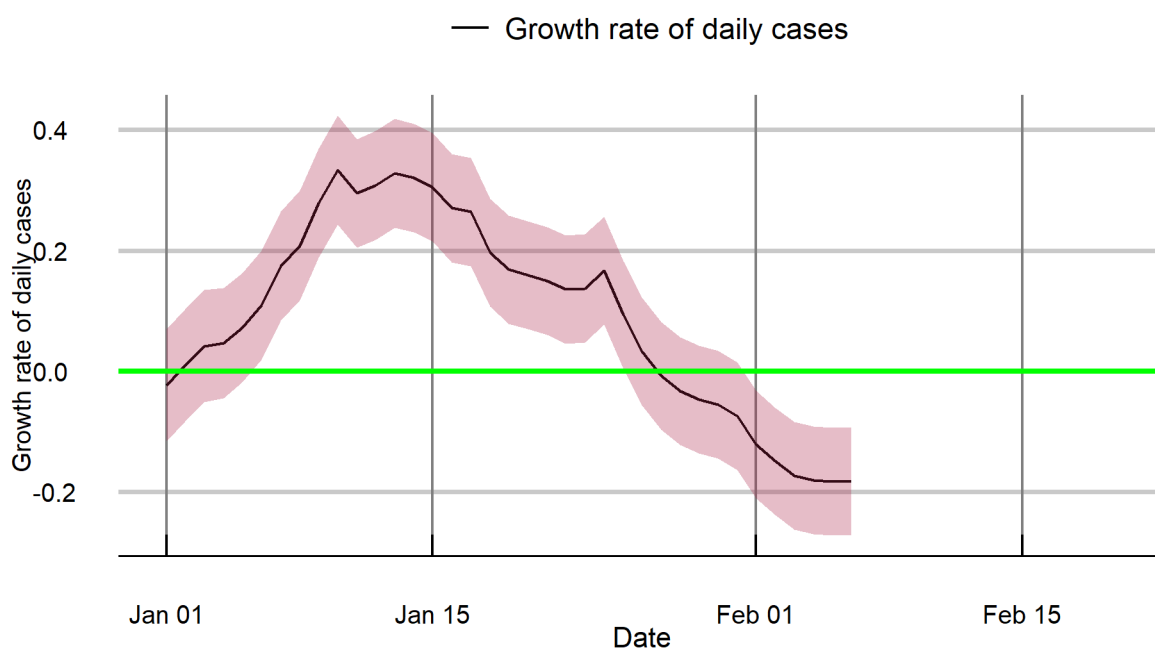
A & N Islands



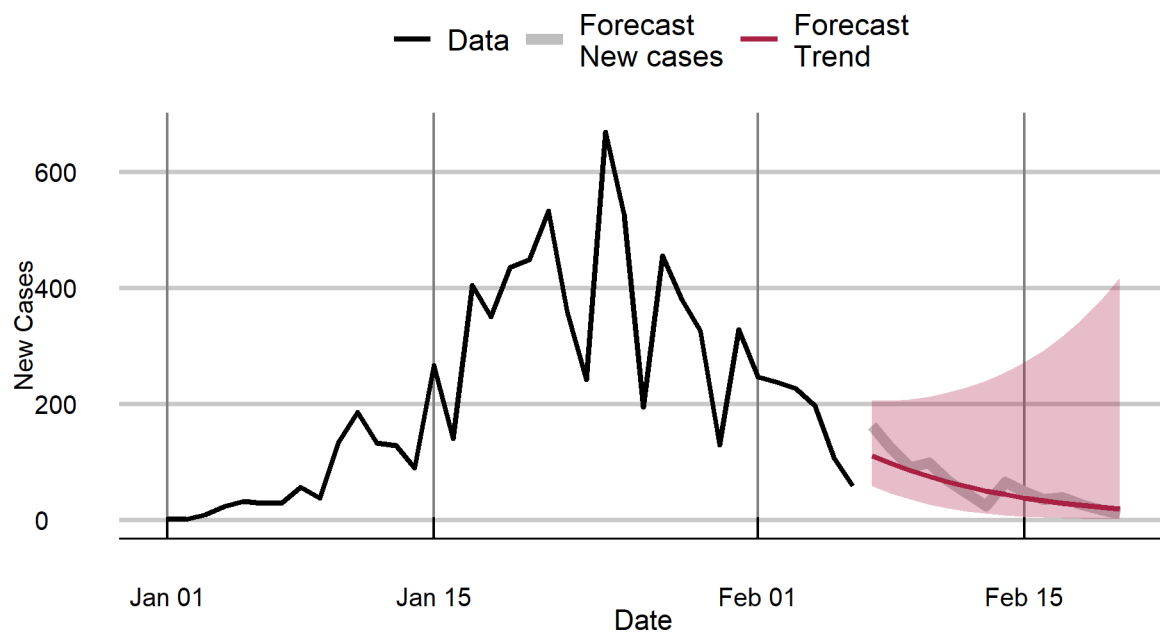
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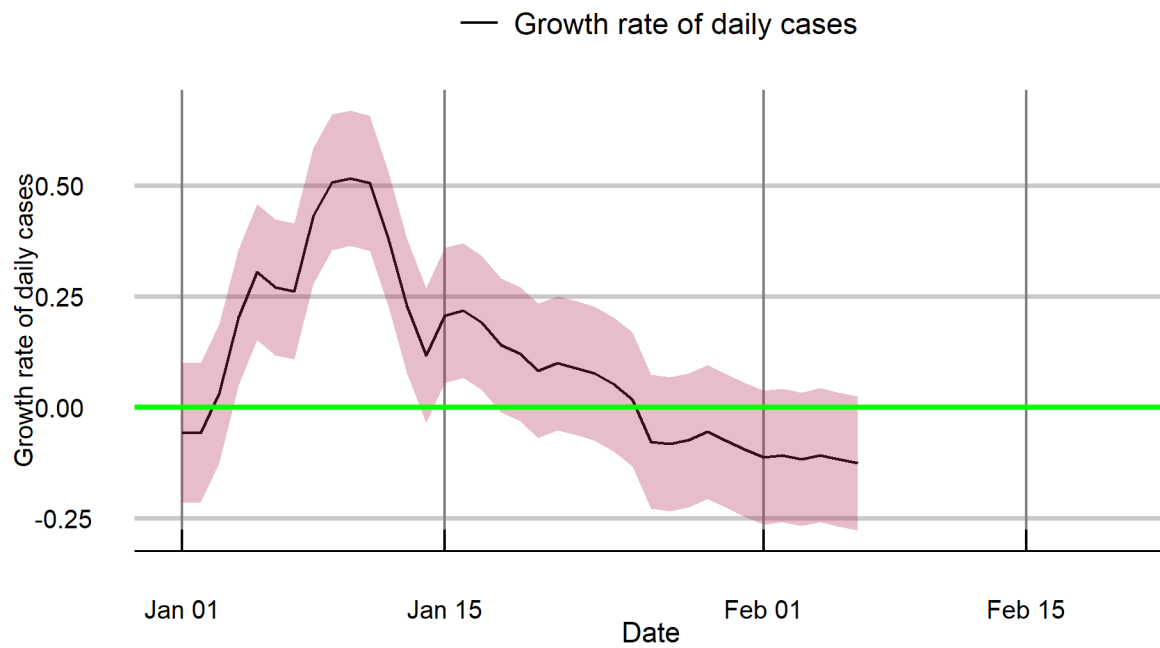
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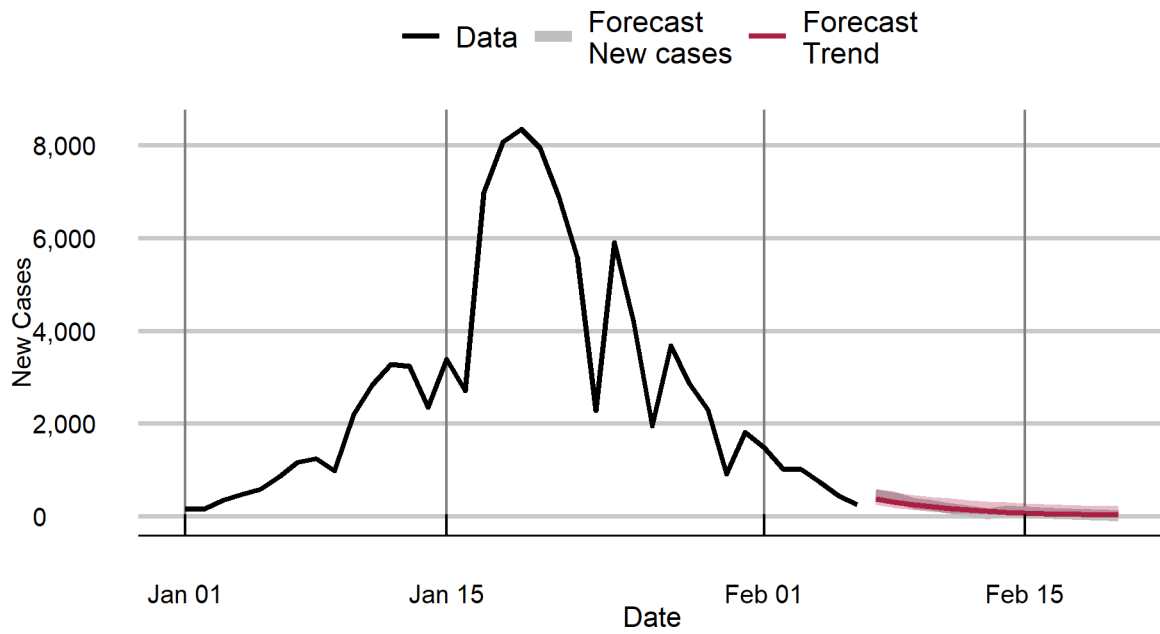
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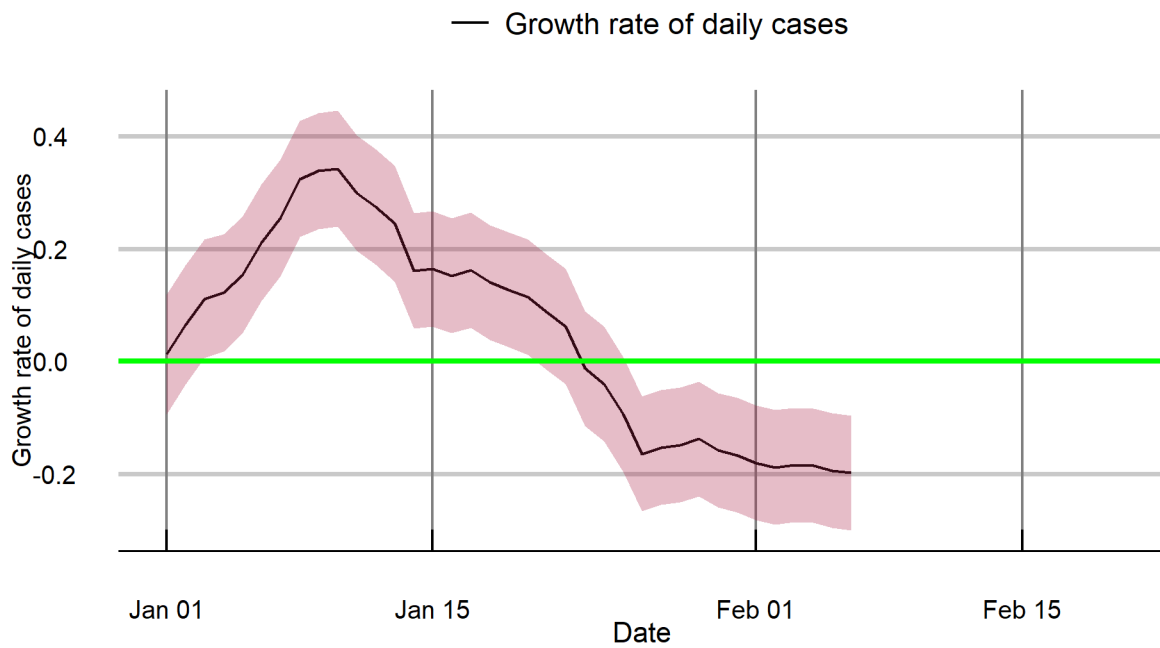
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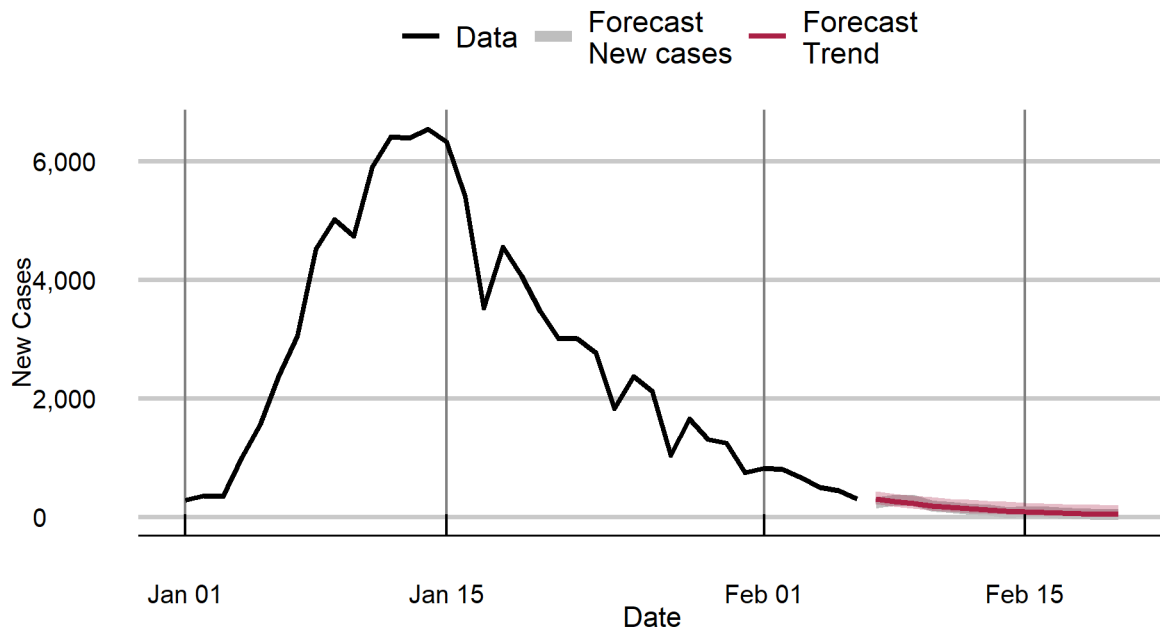
Assam



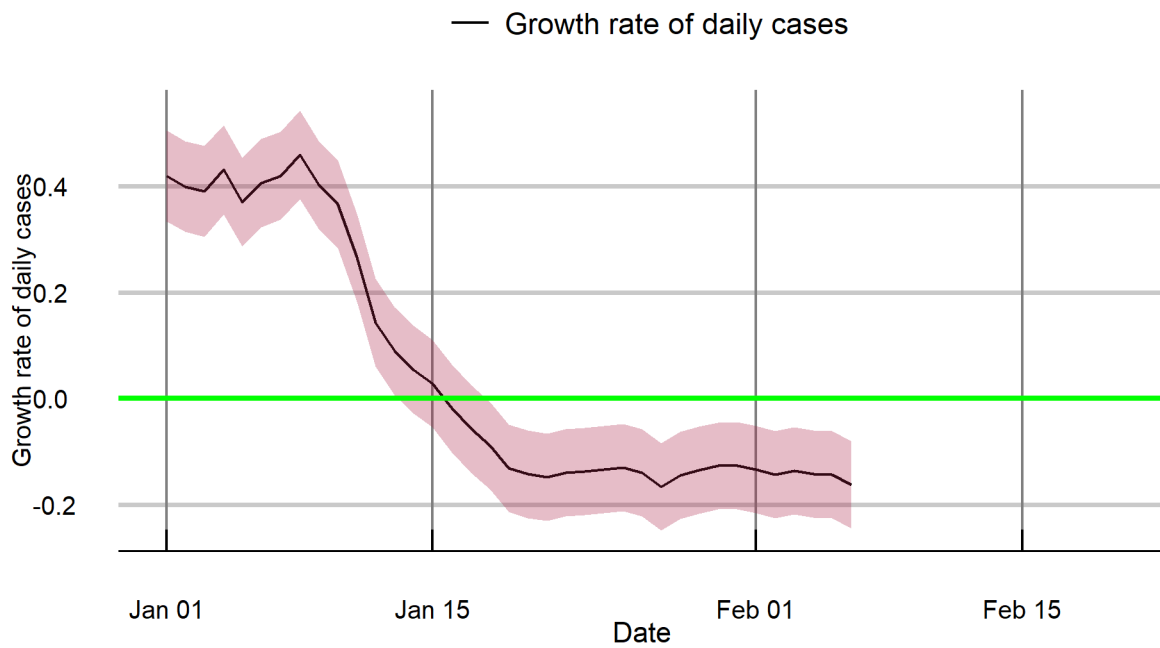
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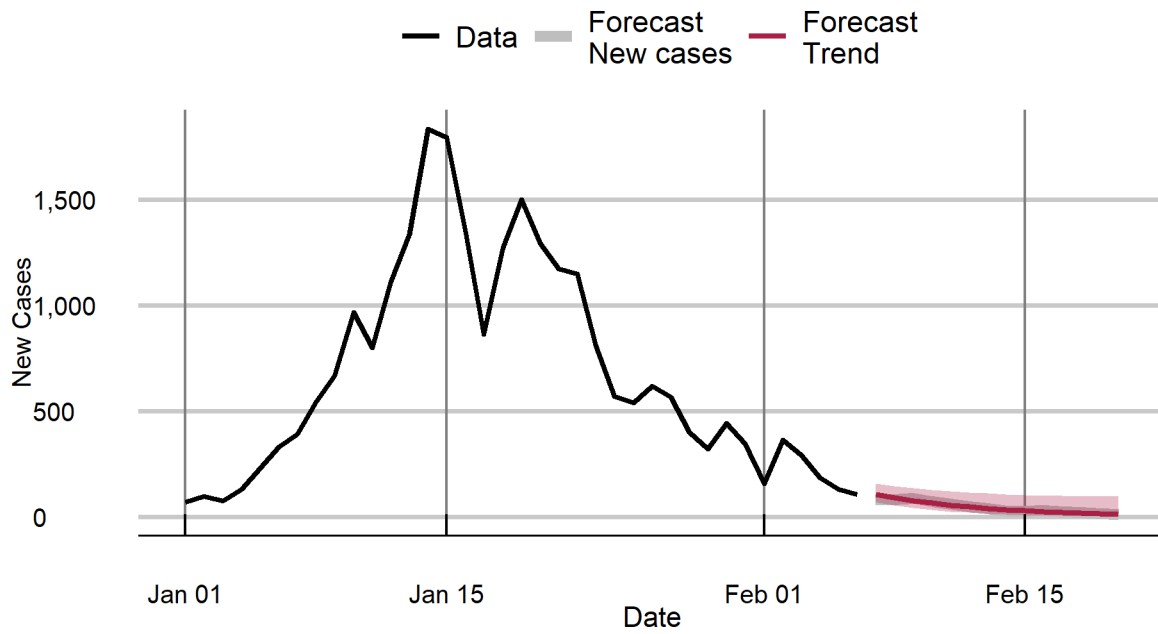
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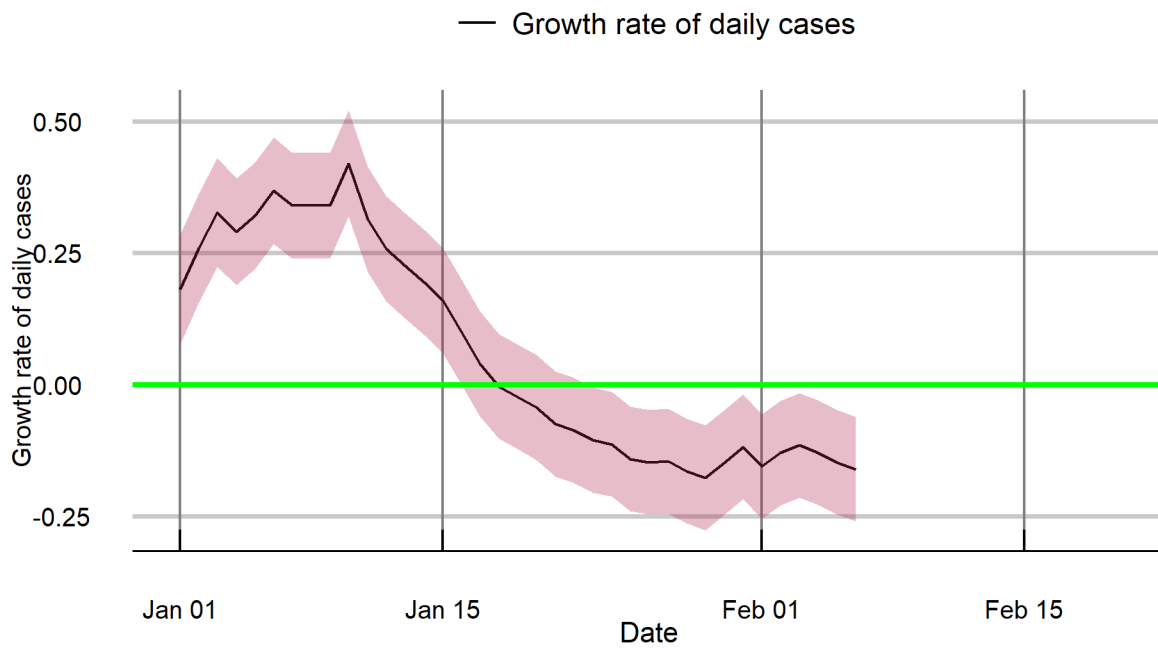
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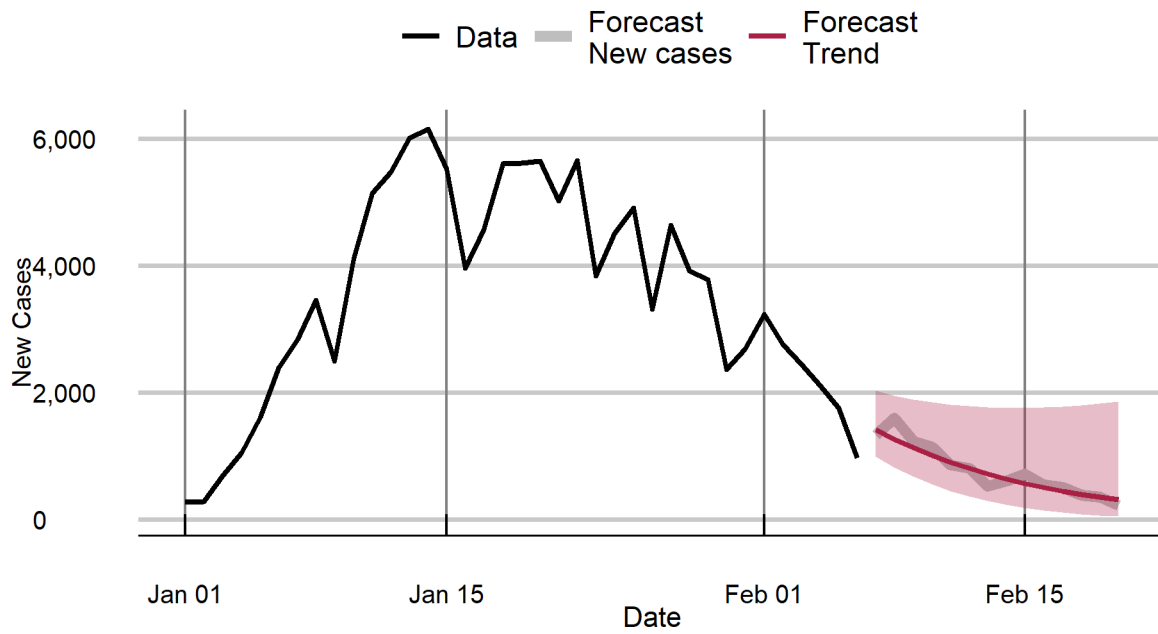
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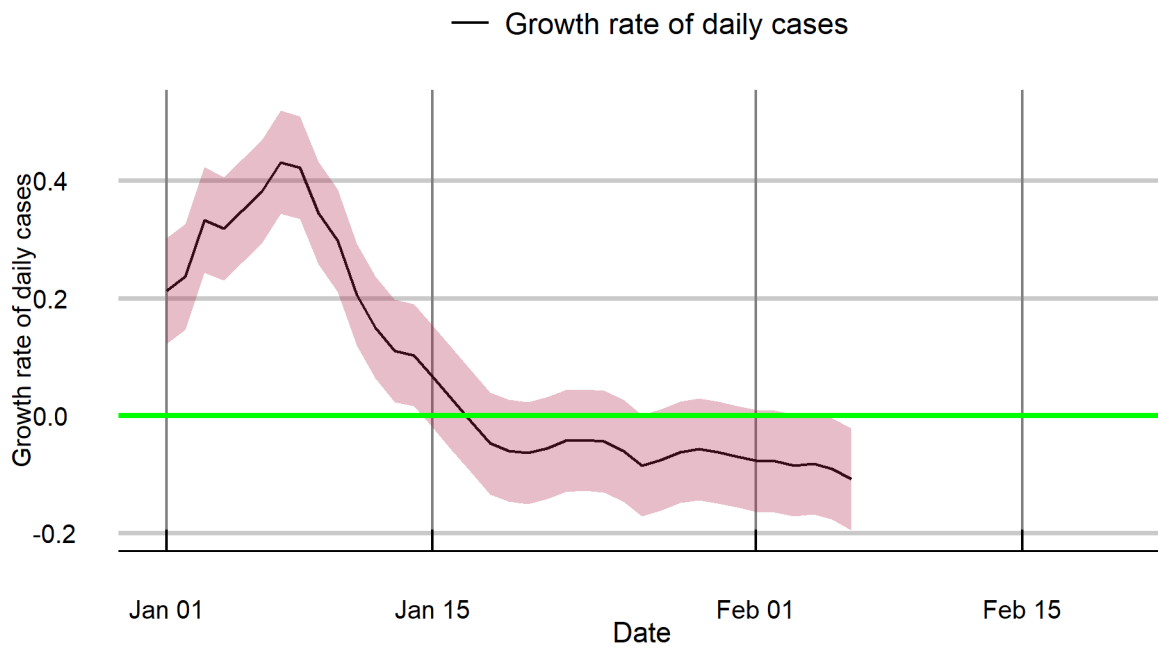
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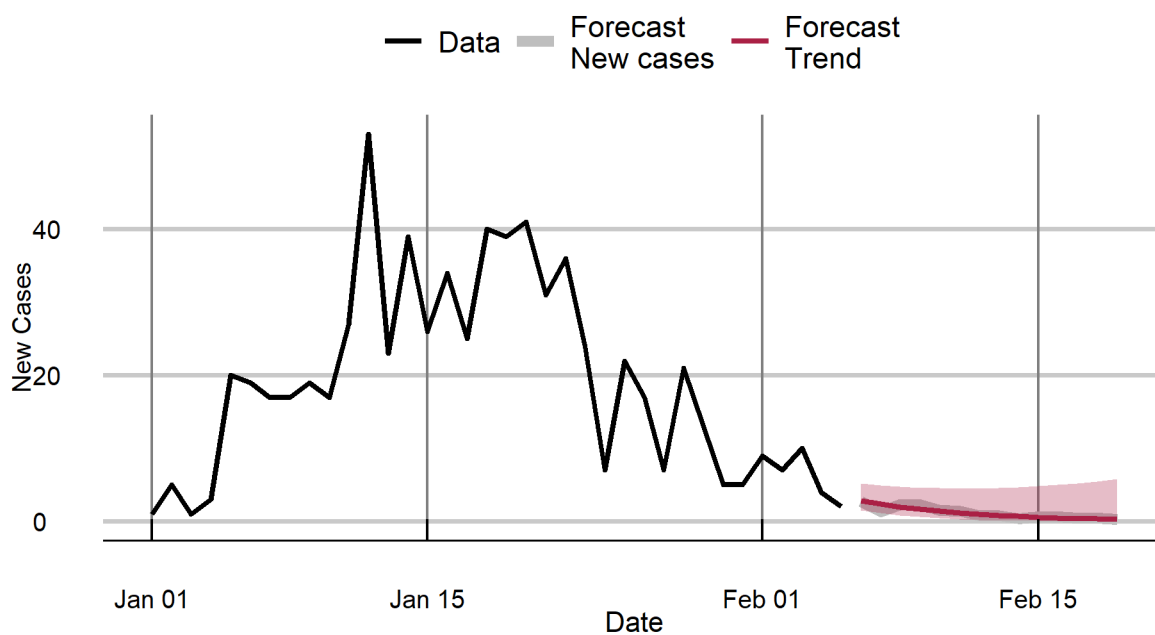
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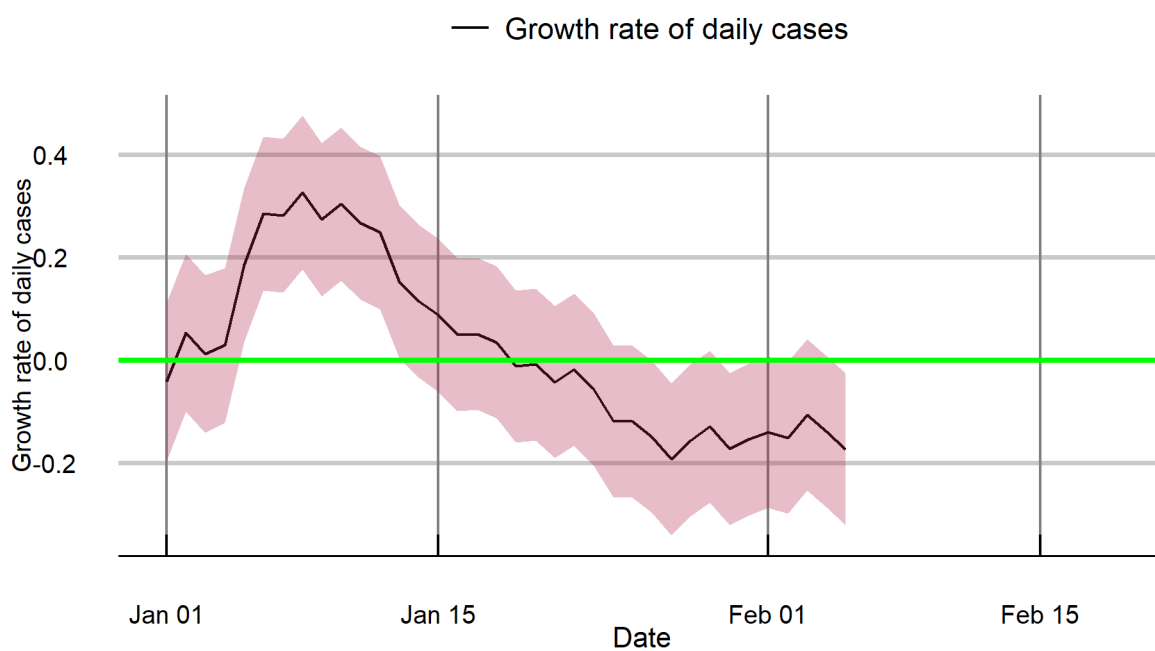
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D & N H

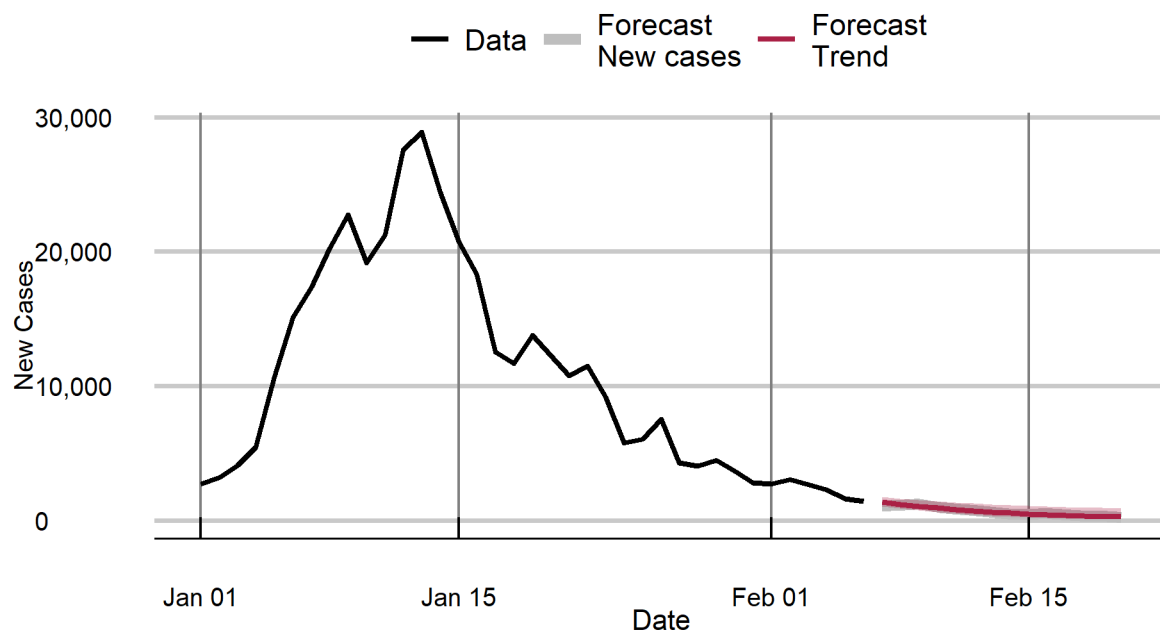


D & N H

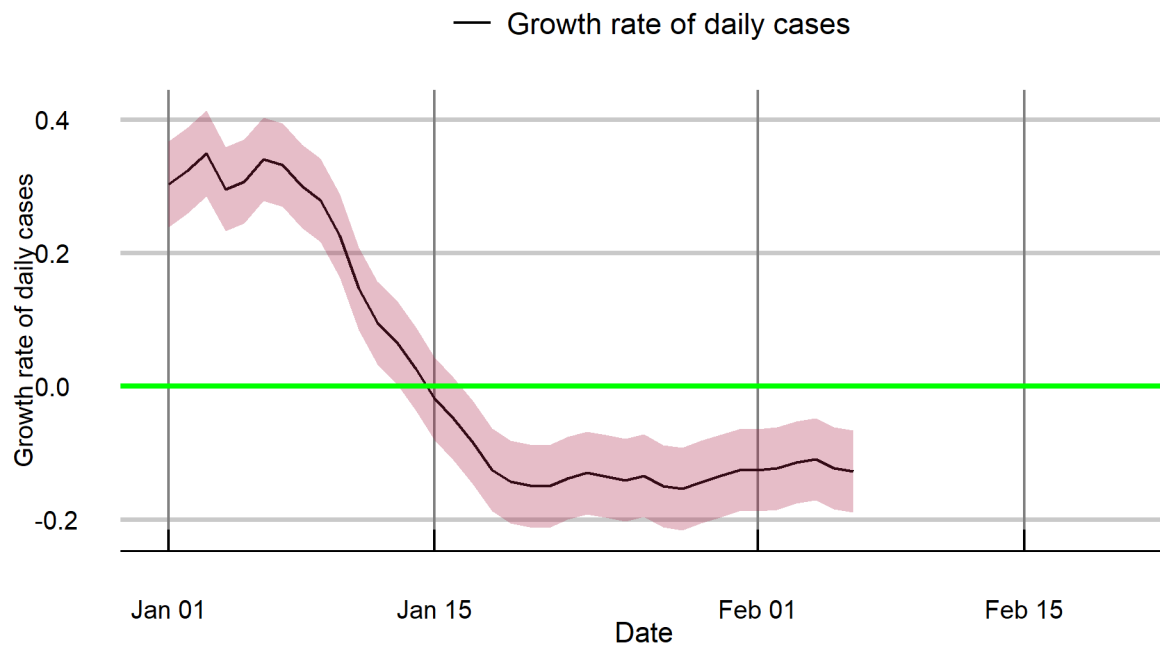


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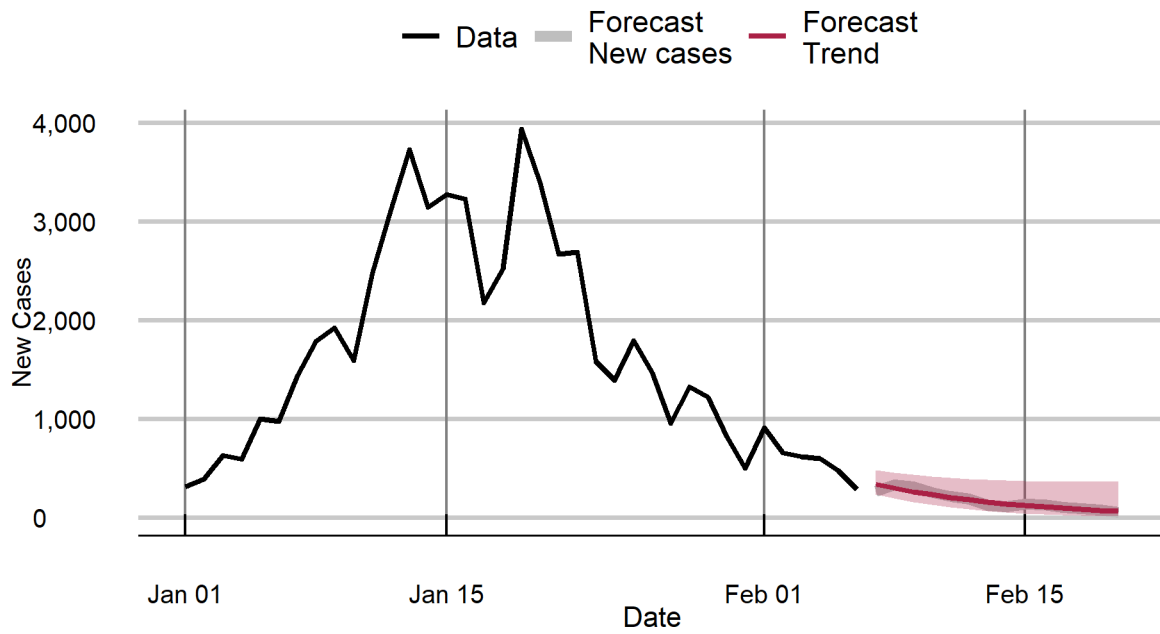
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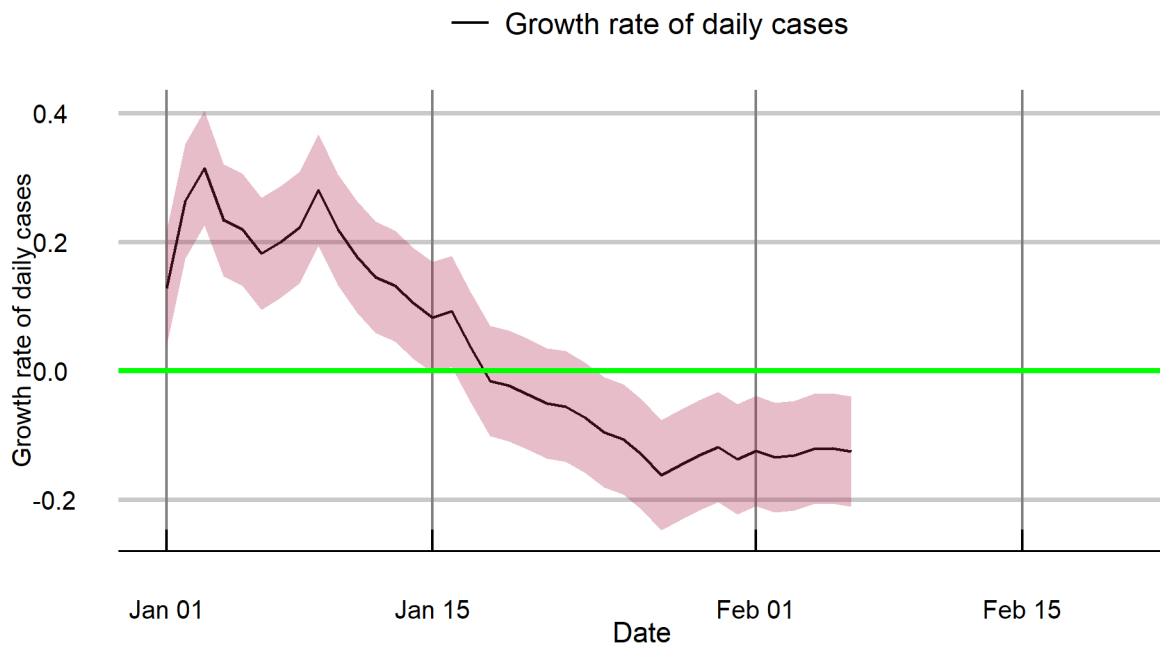
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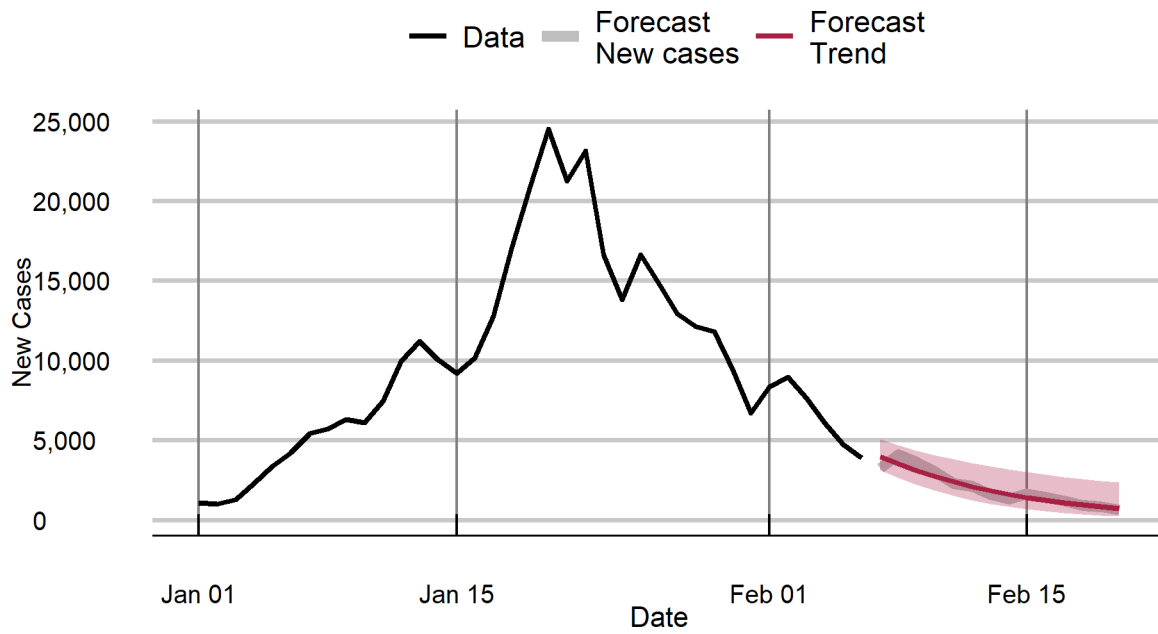
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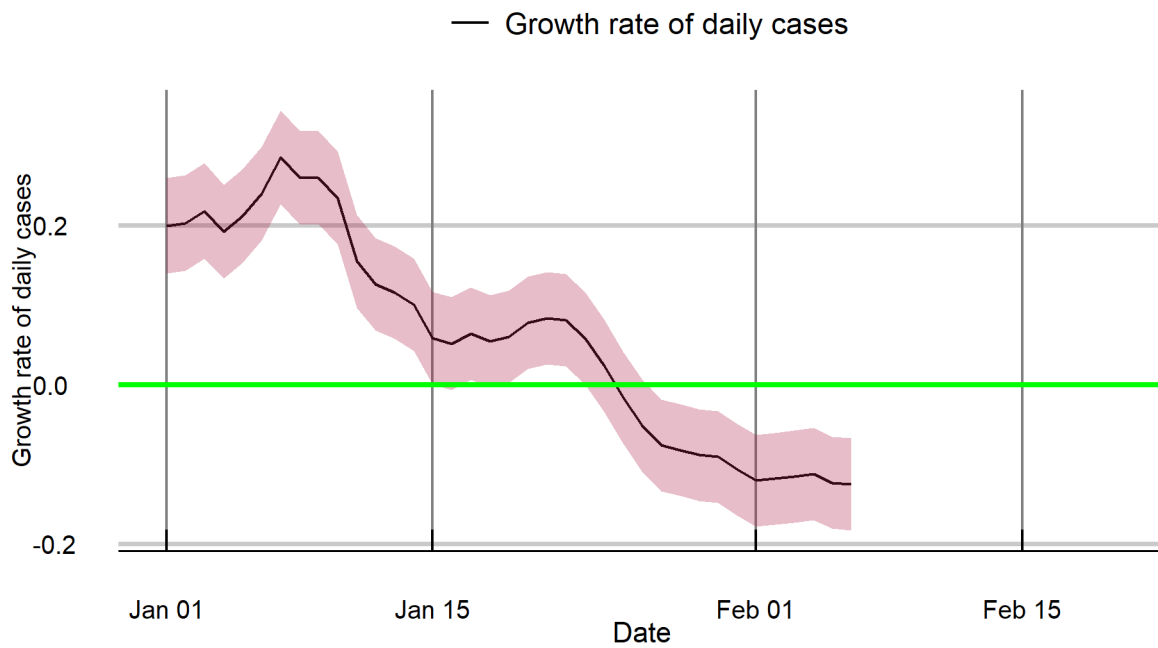
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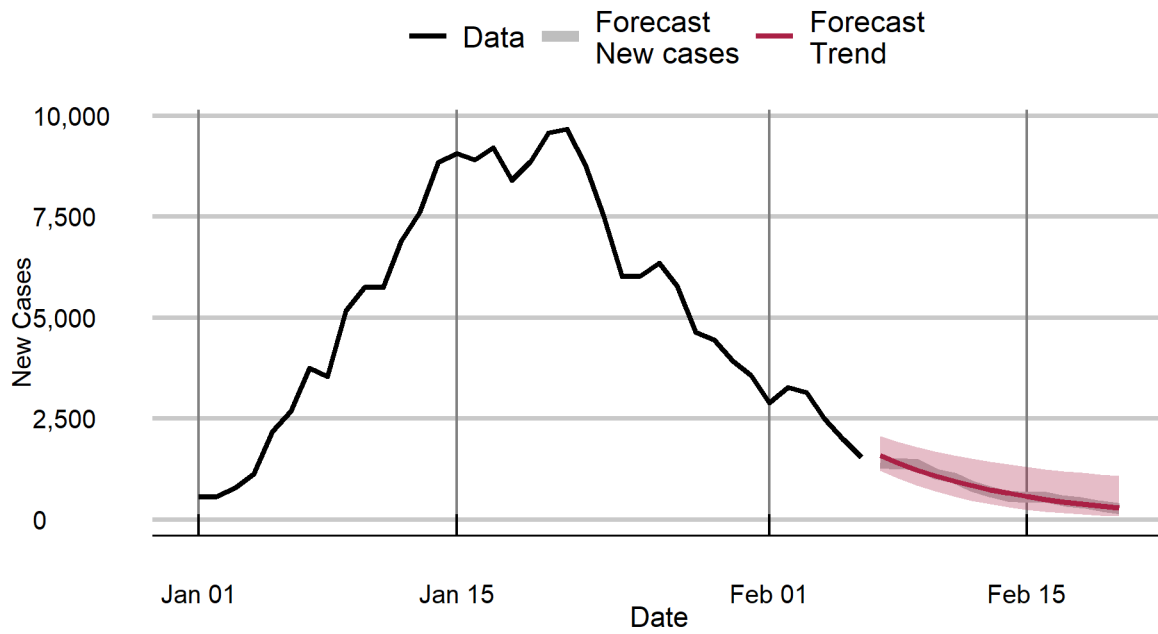
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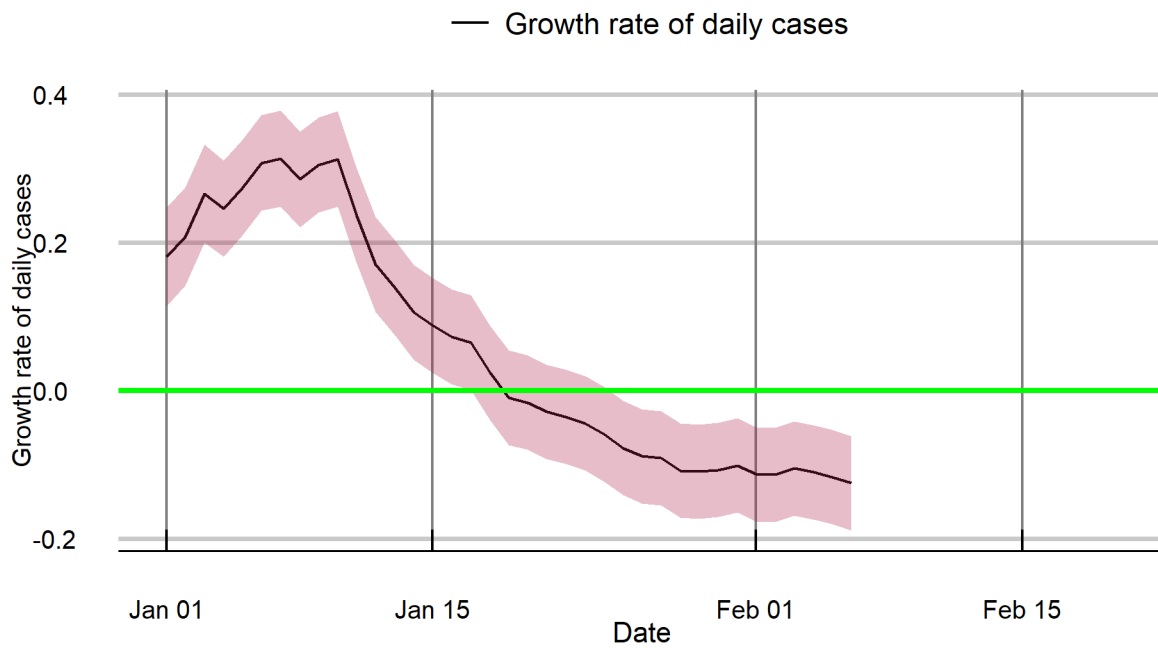
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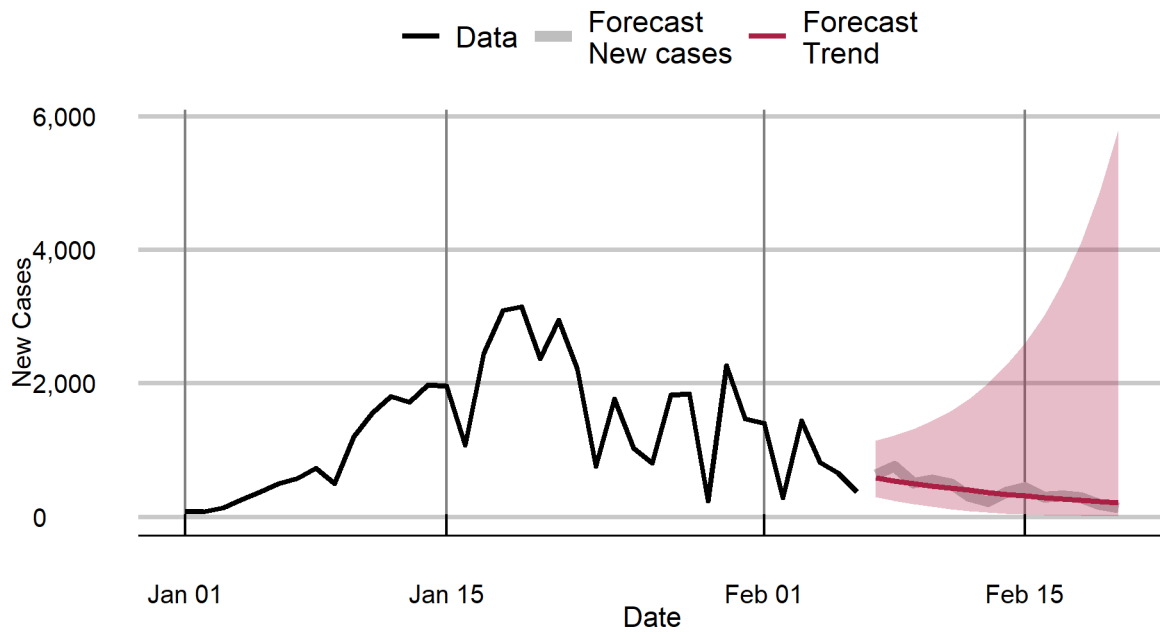
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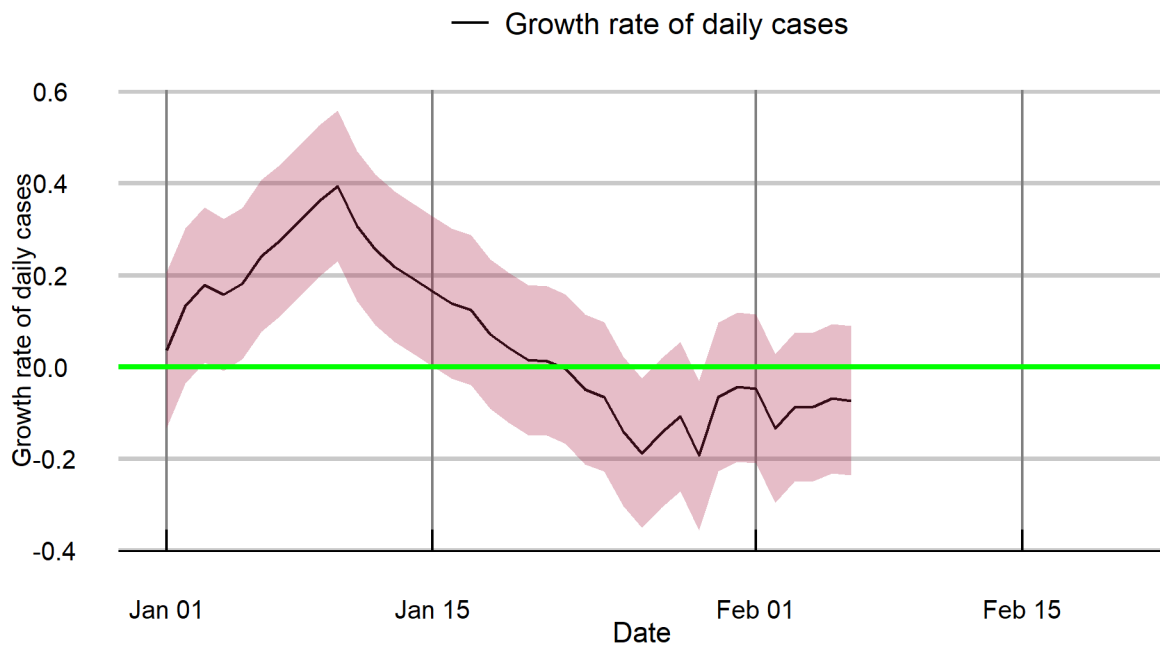
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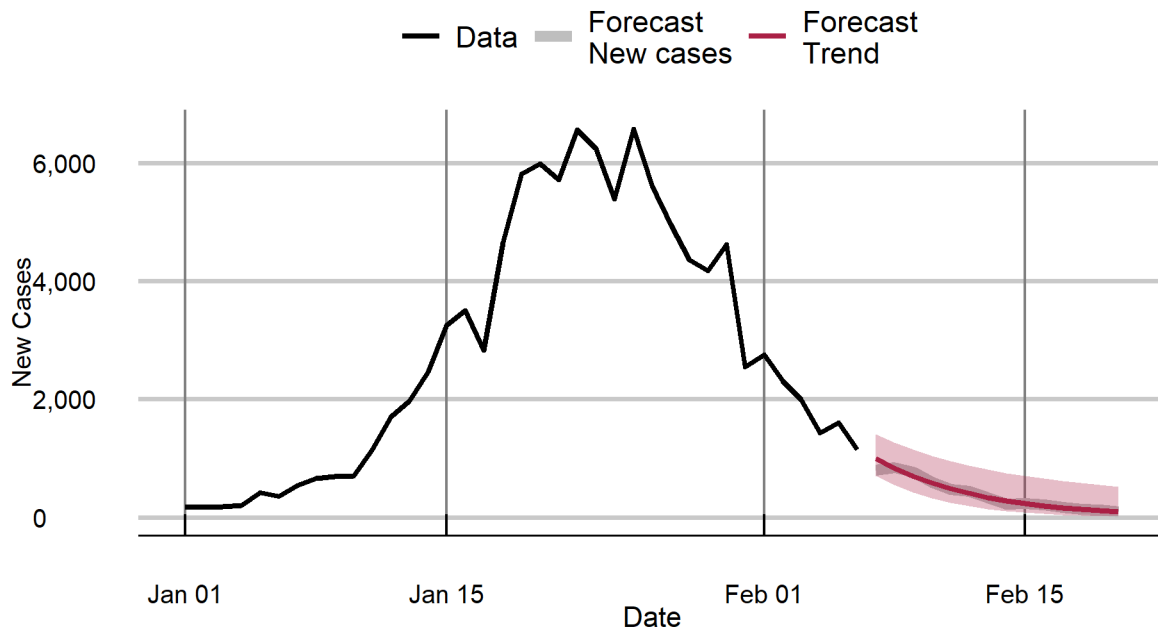
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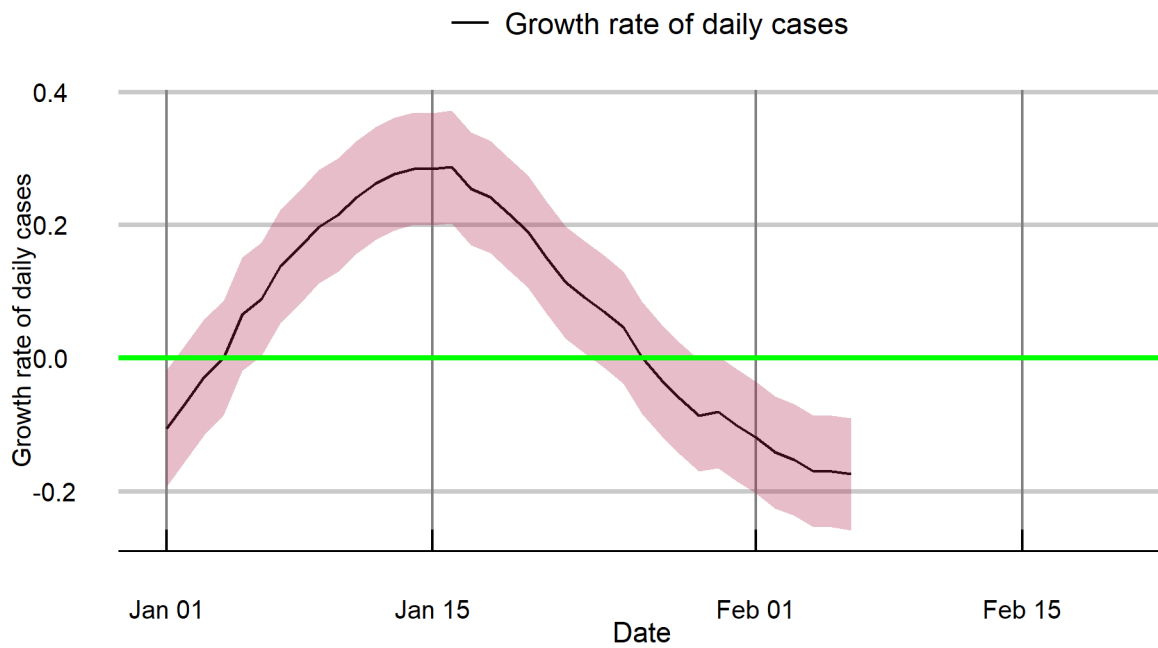
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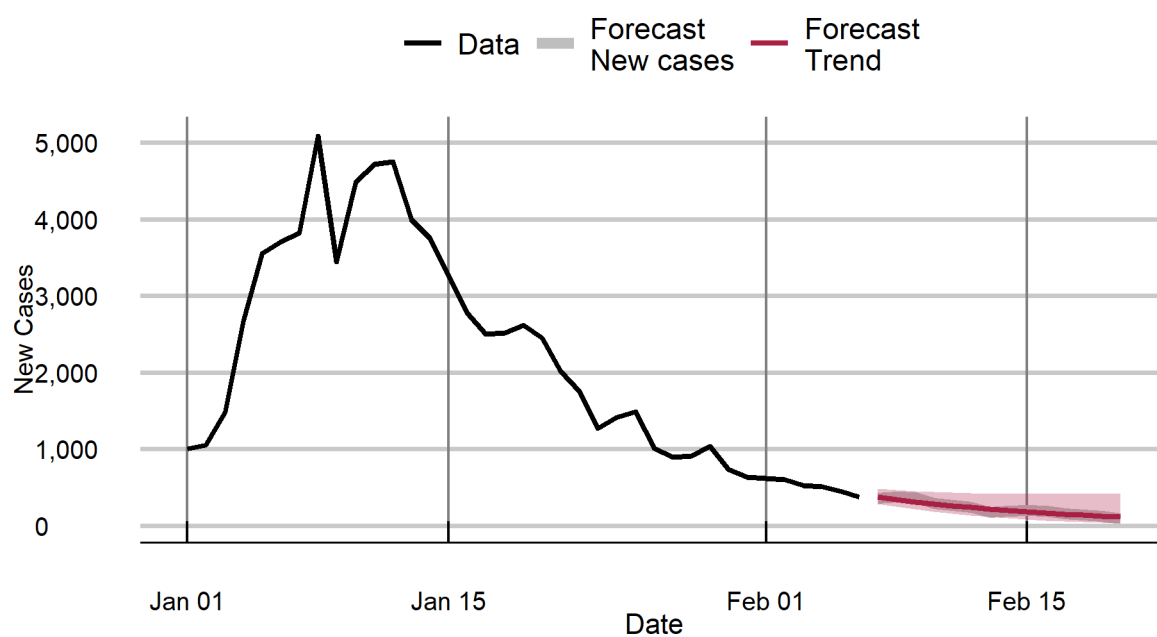
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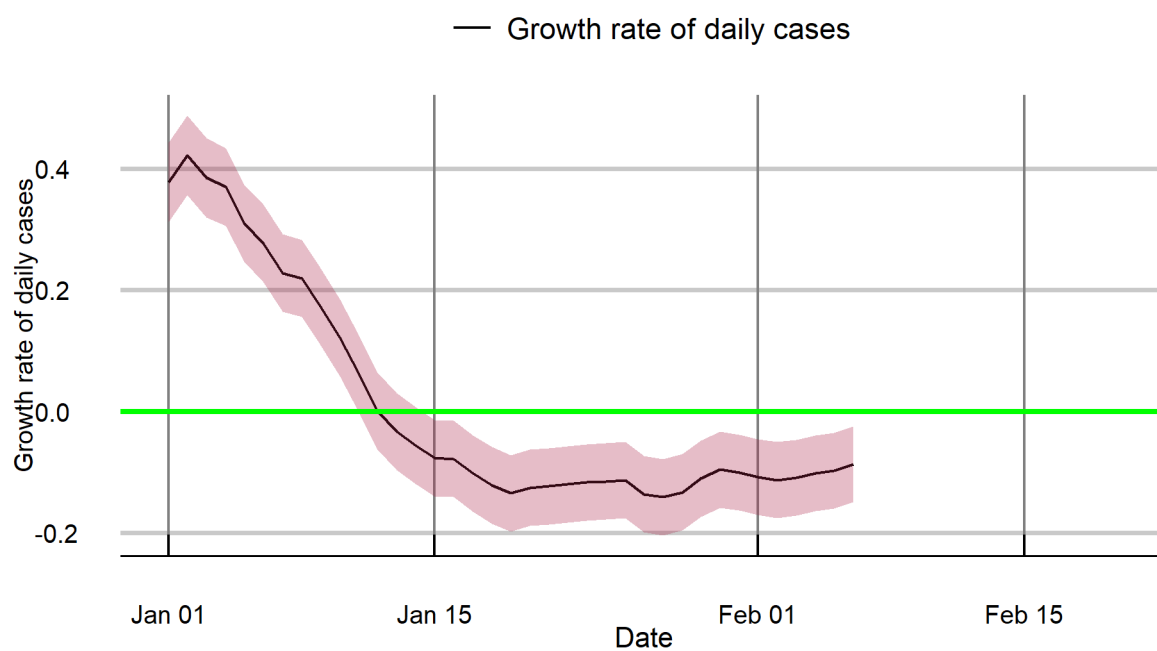
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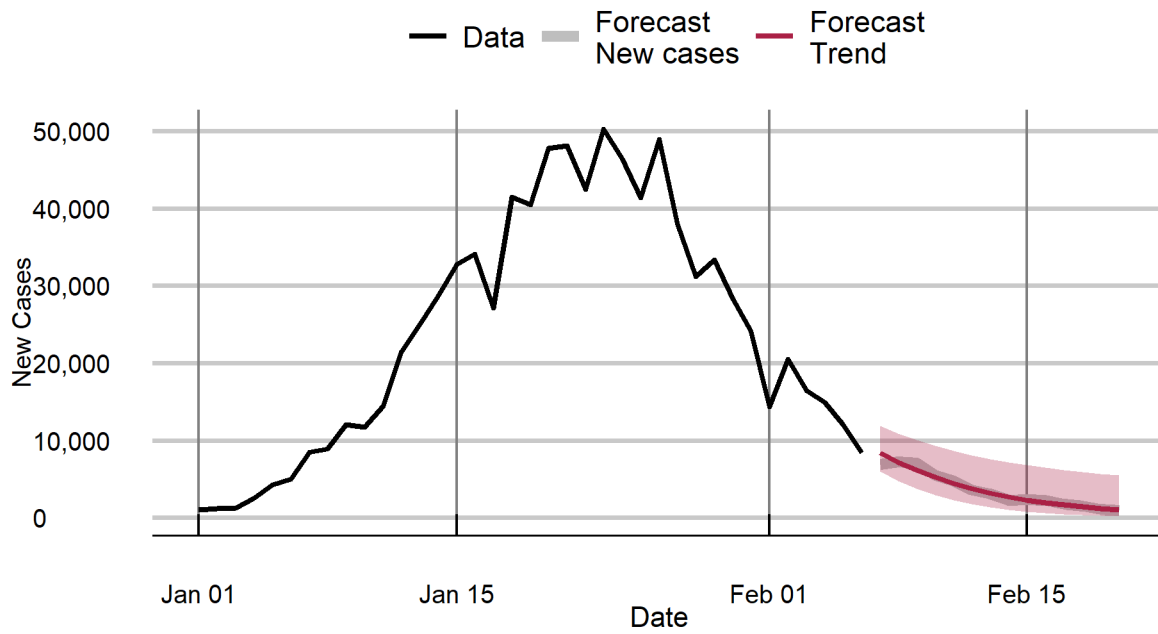
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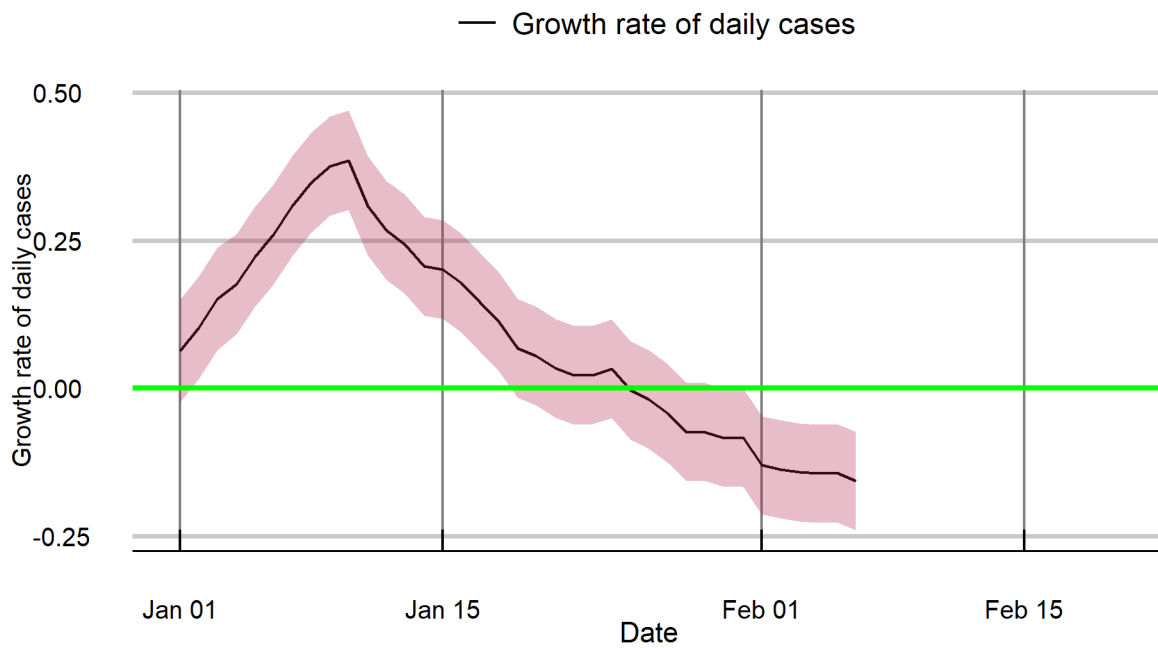
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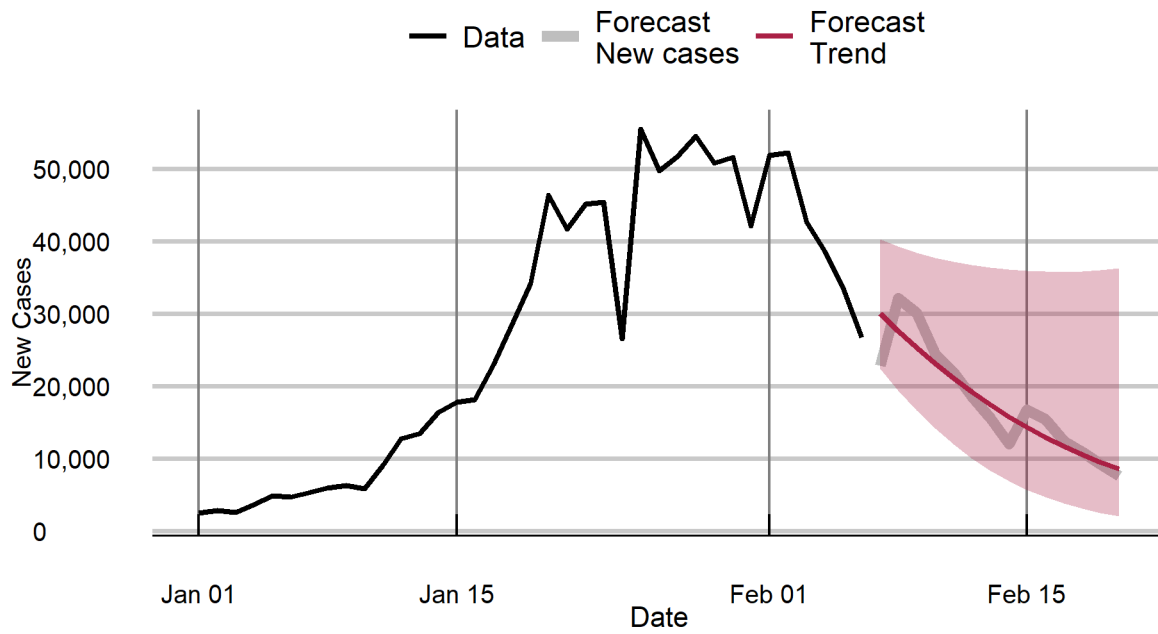
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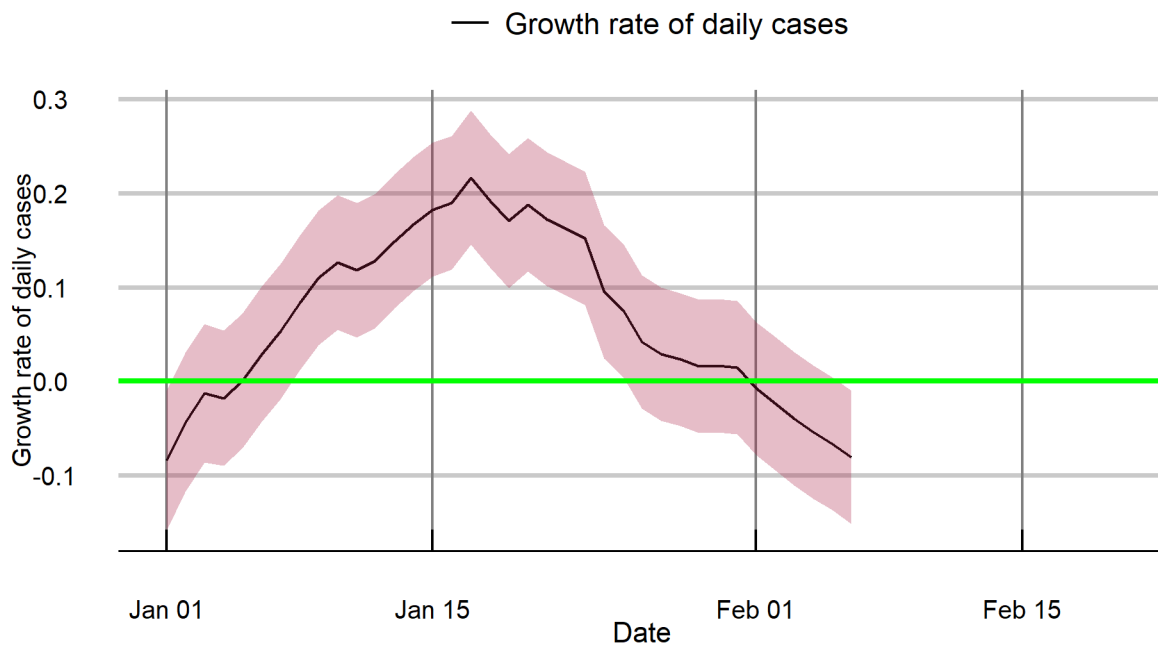
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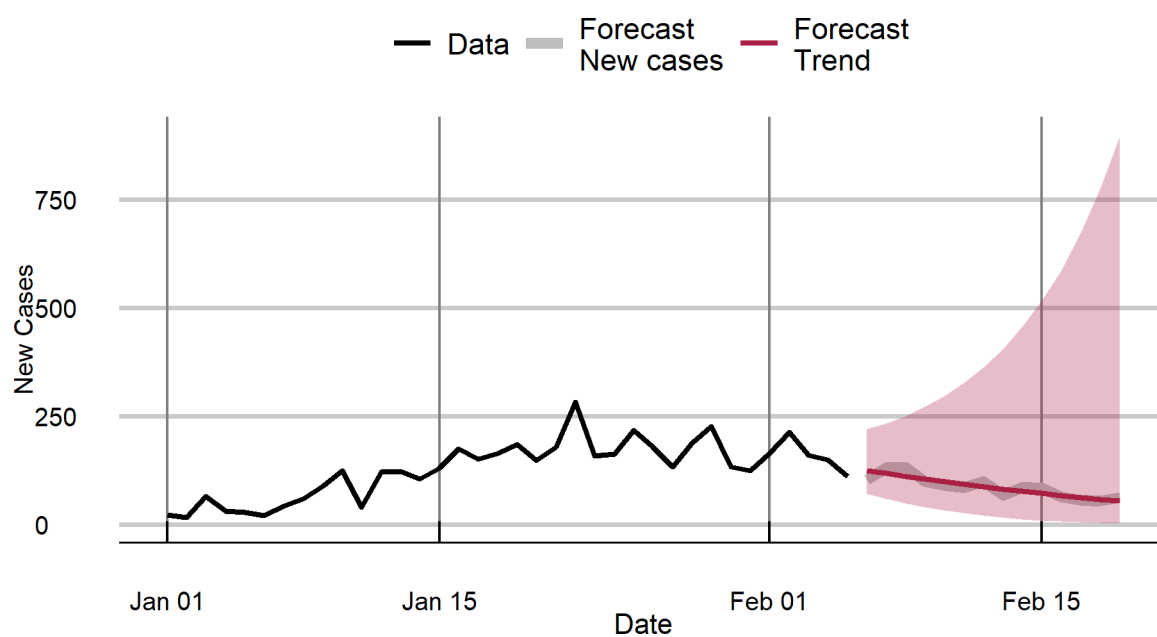
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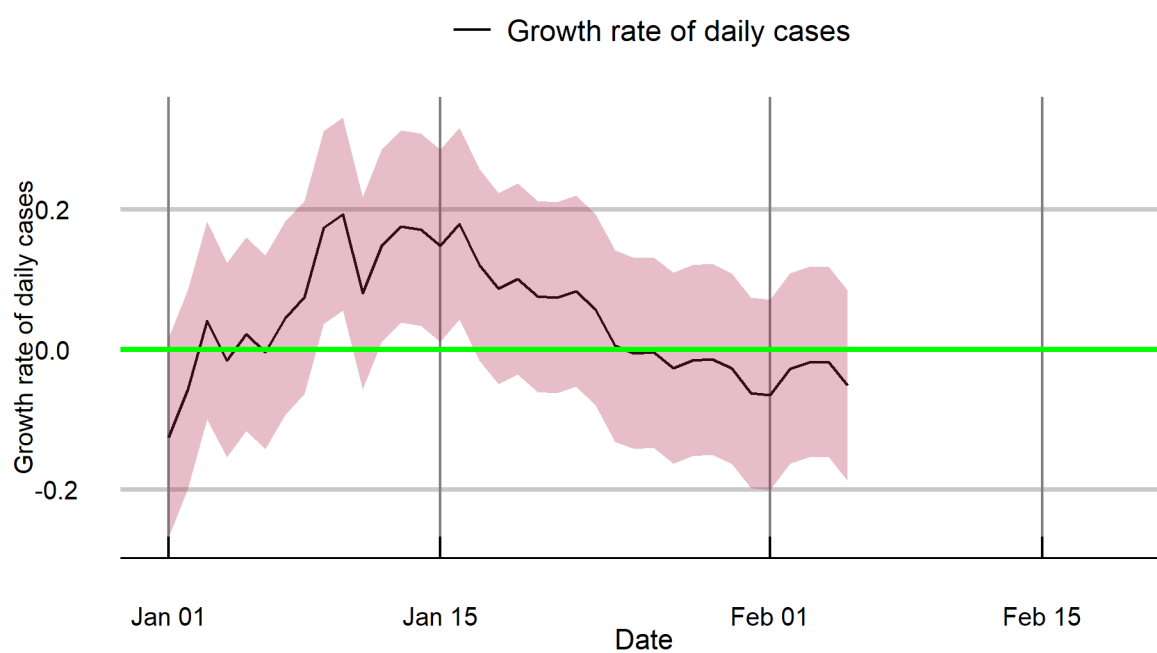
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Ladakh

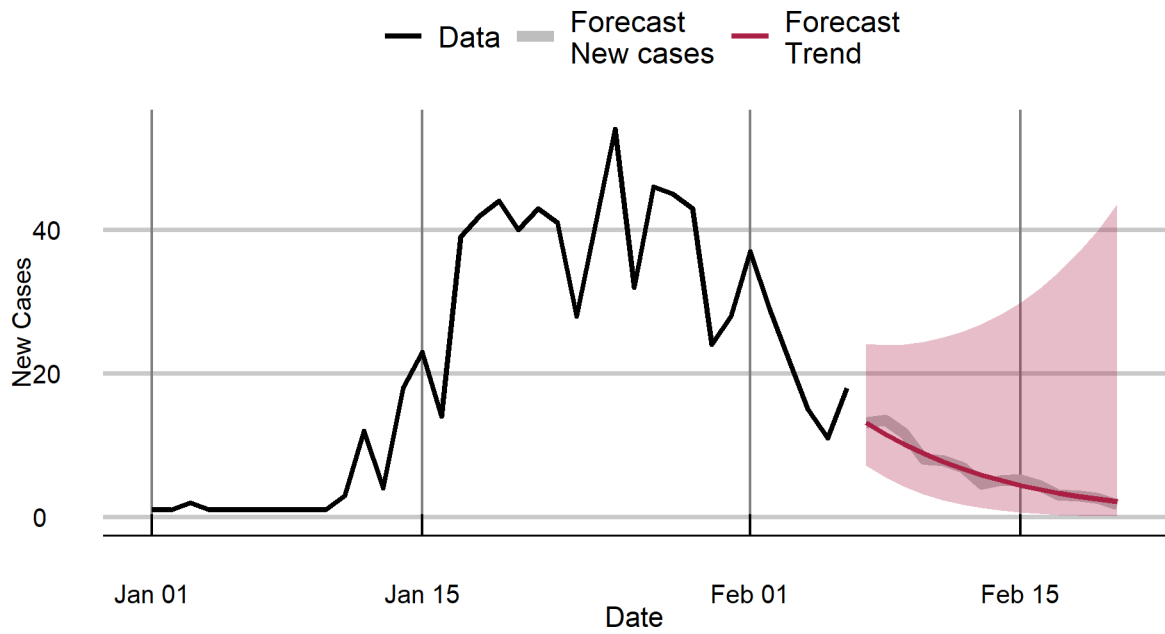


Ladakh

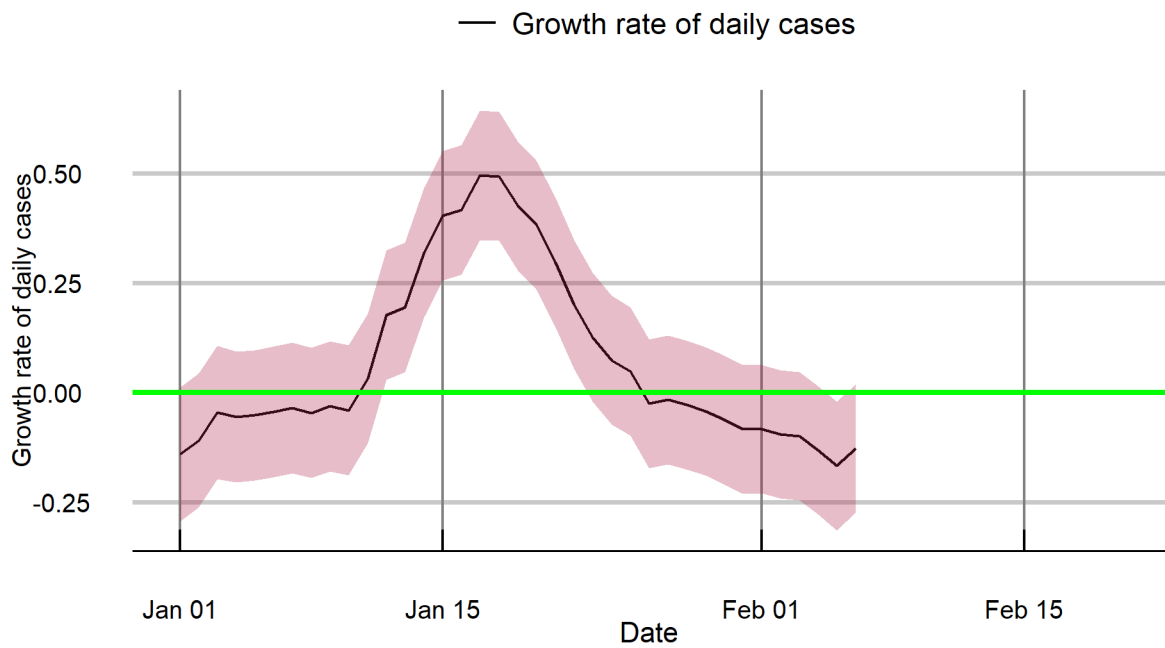


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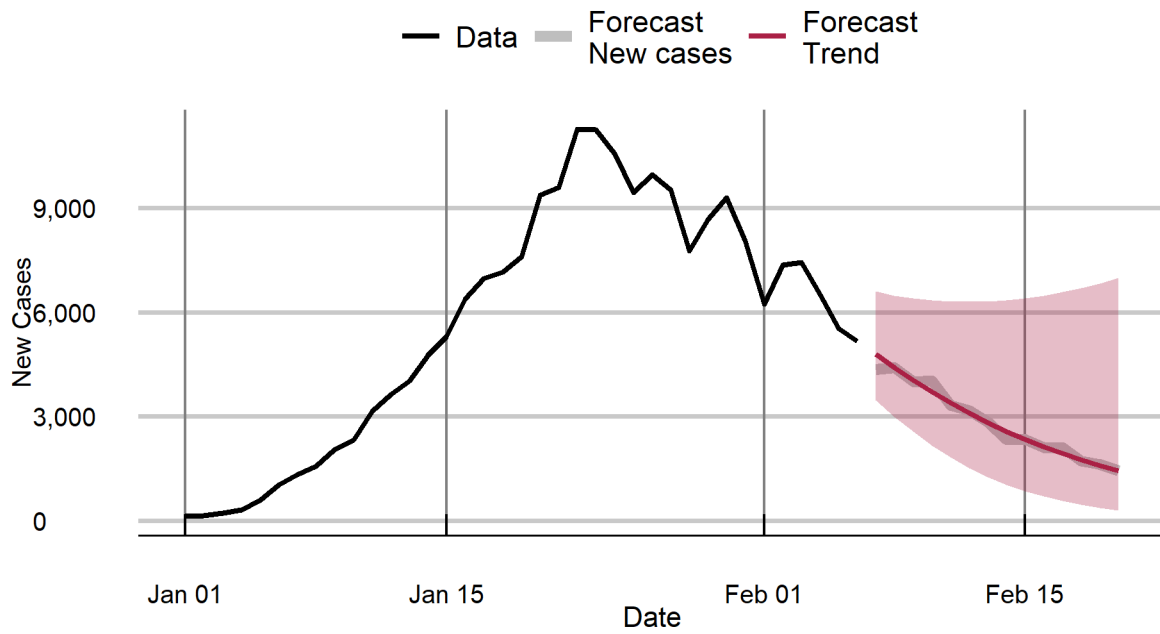
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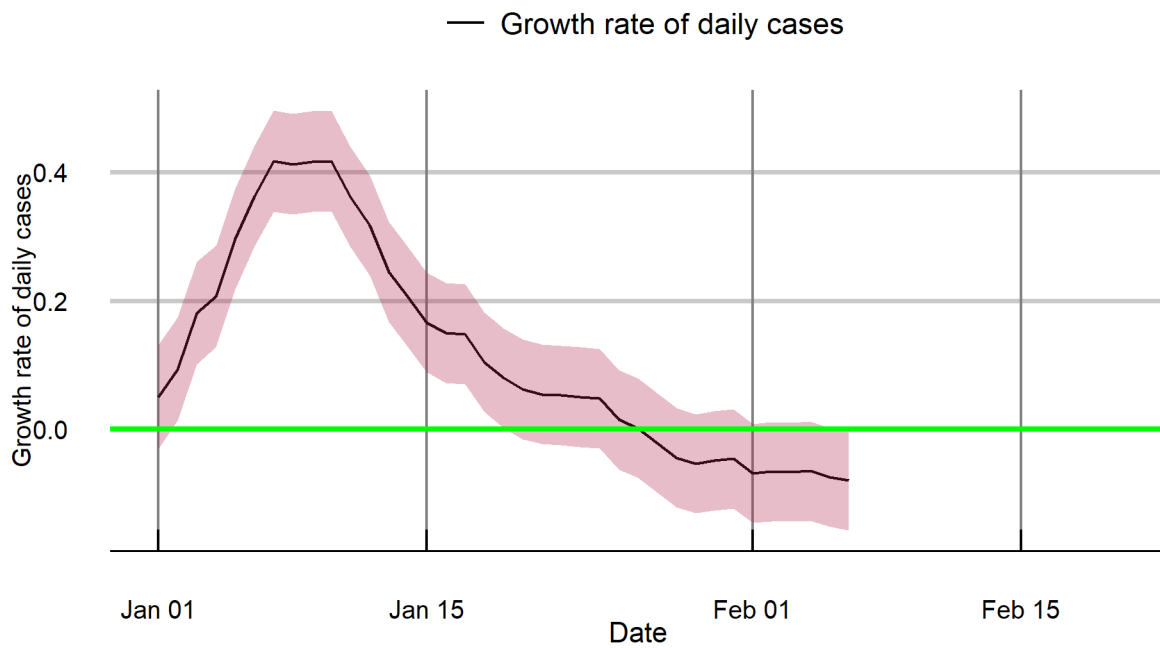
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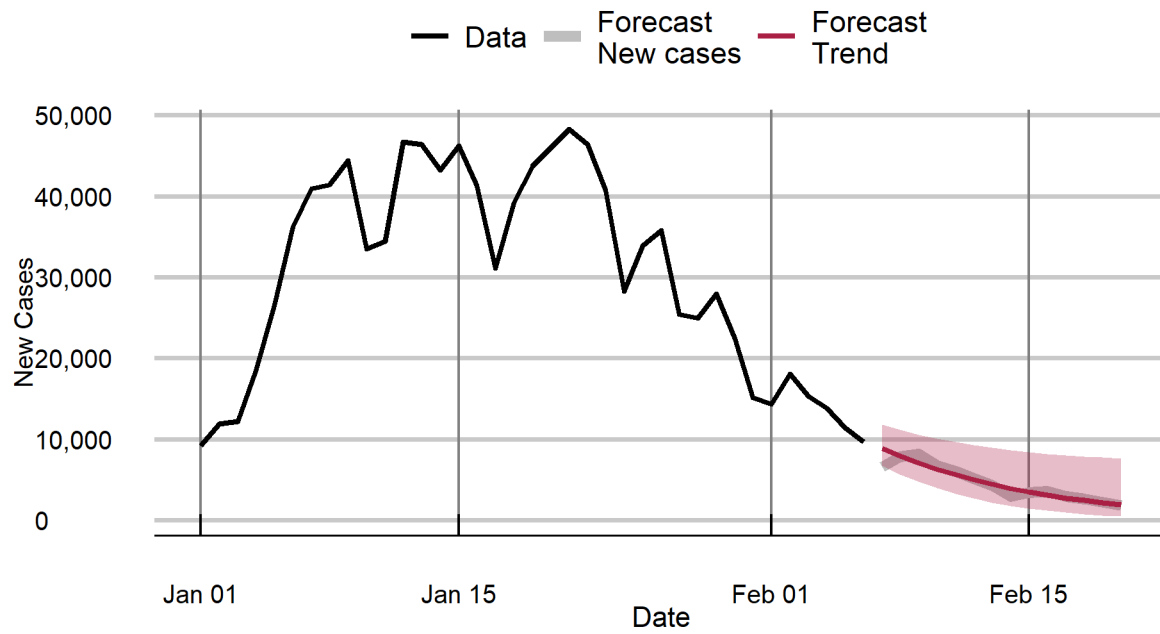
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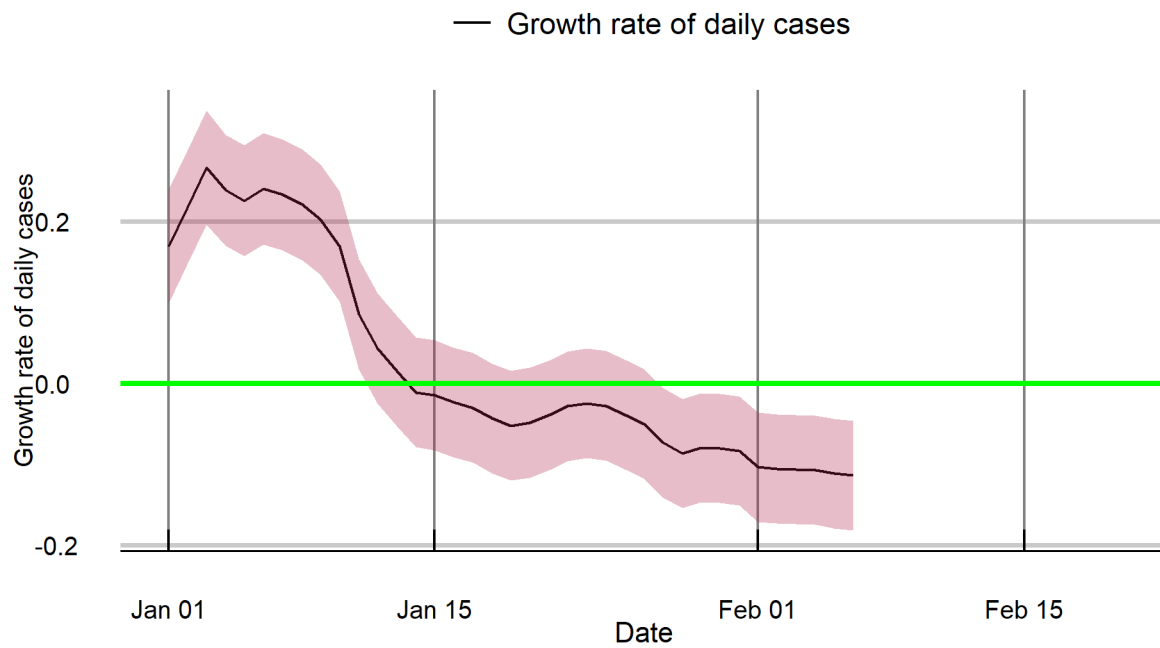
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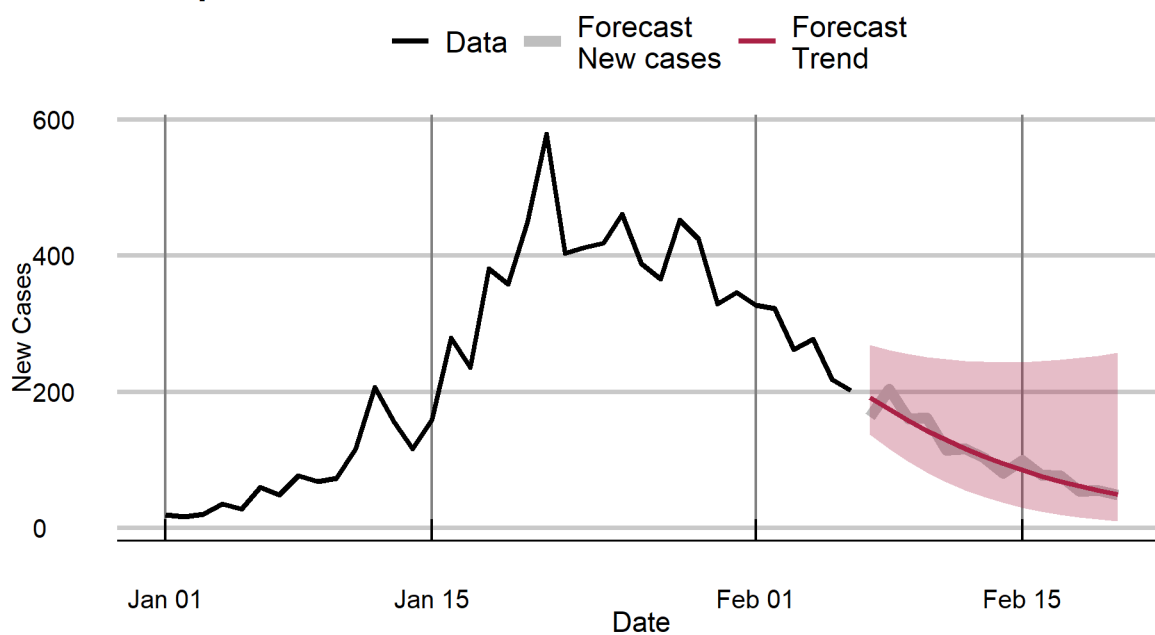
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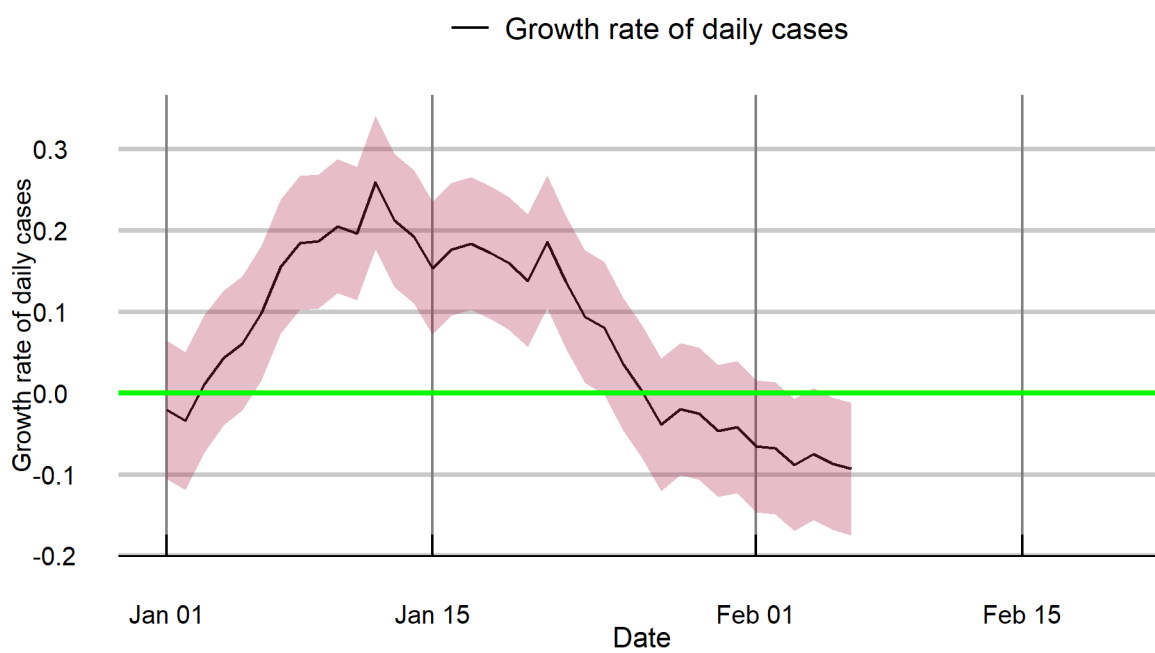
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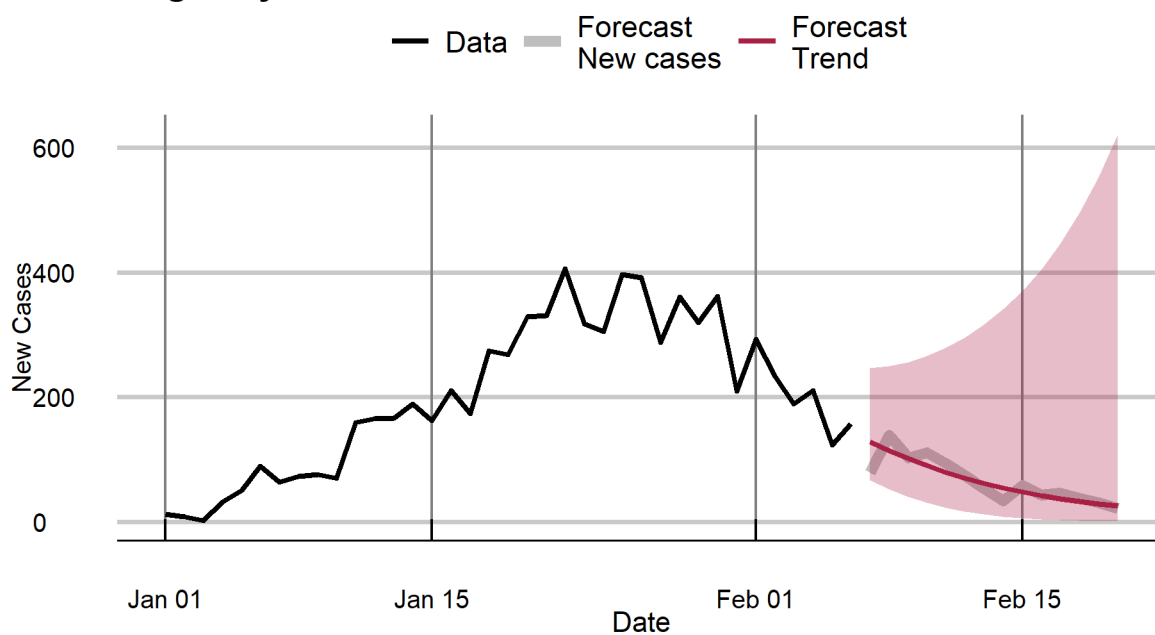
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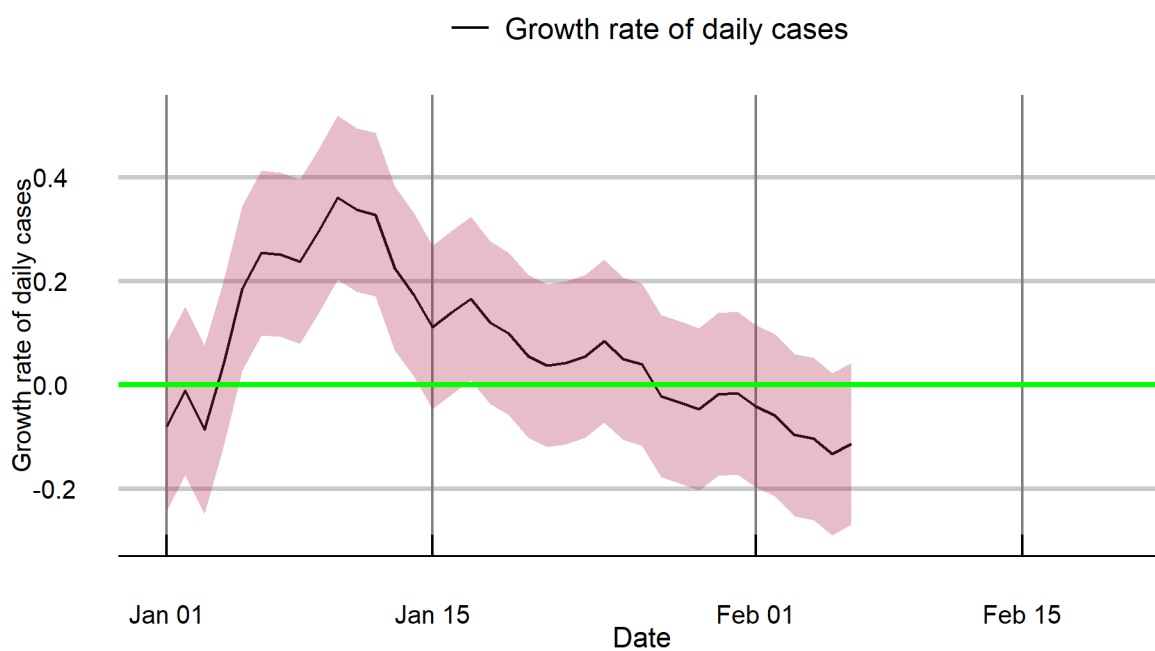
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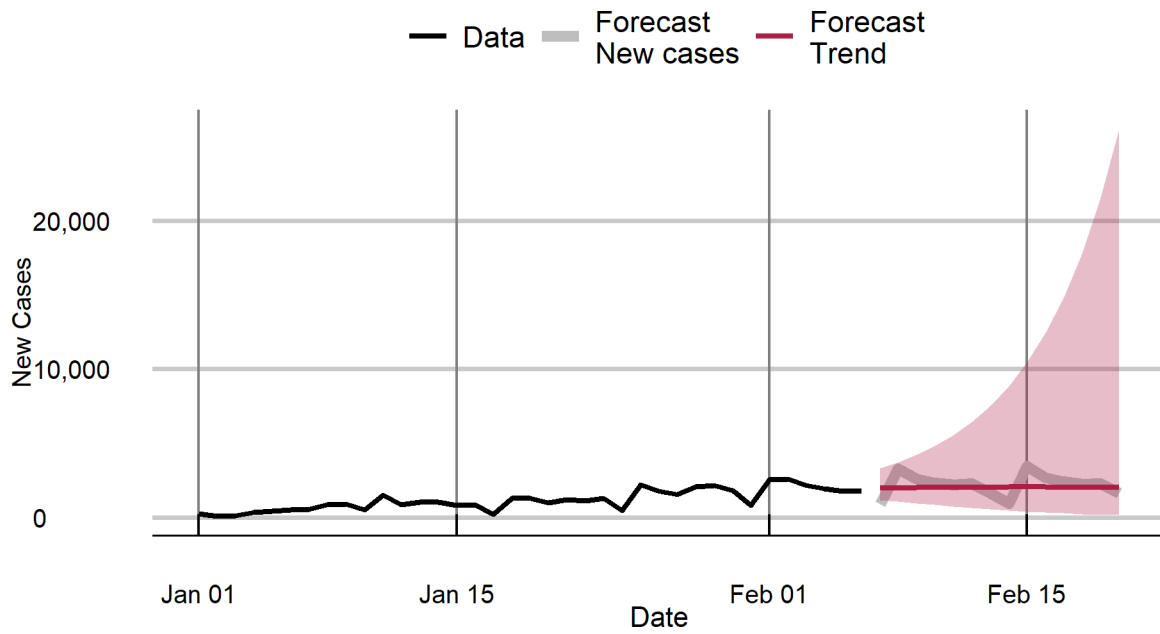
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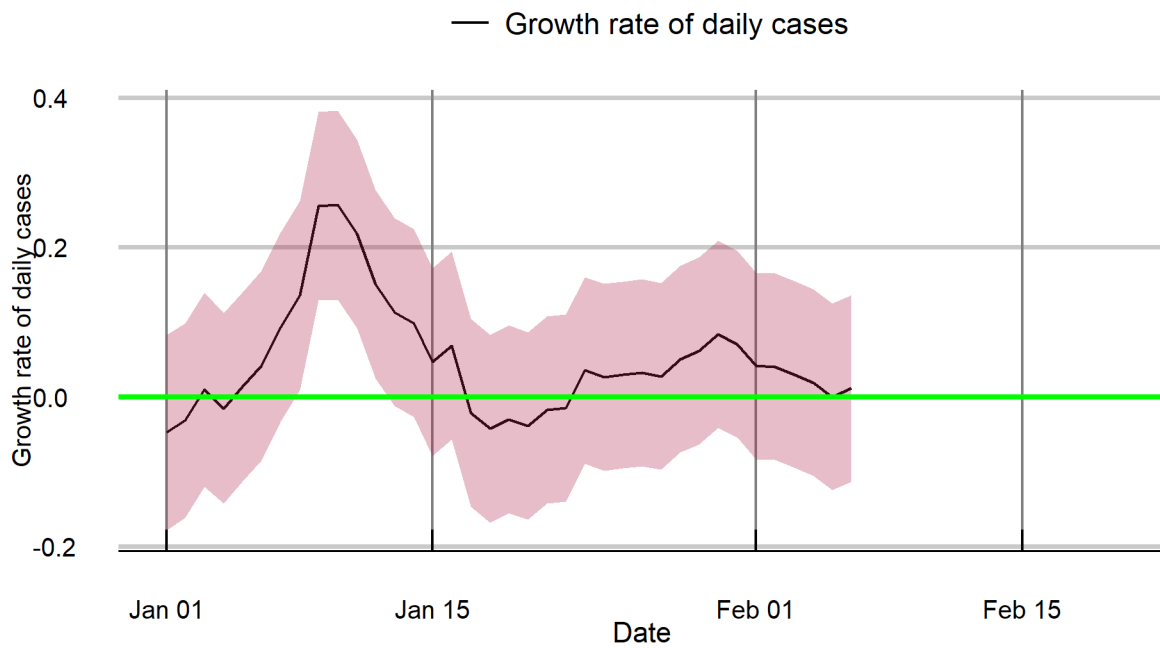
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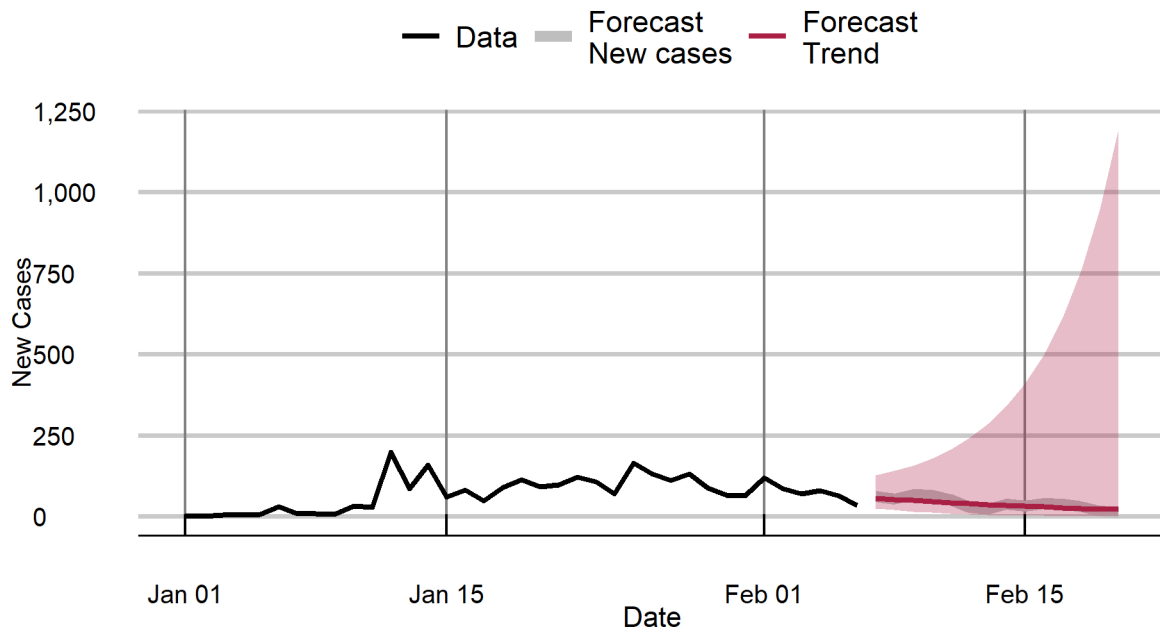
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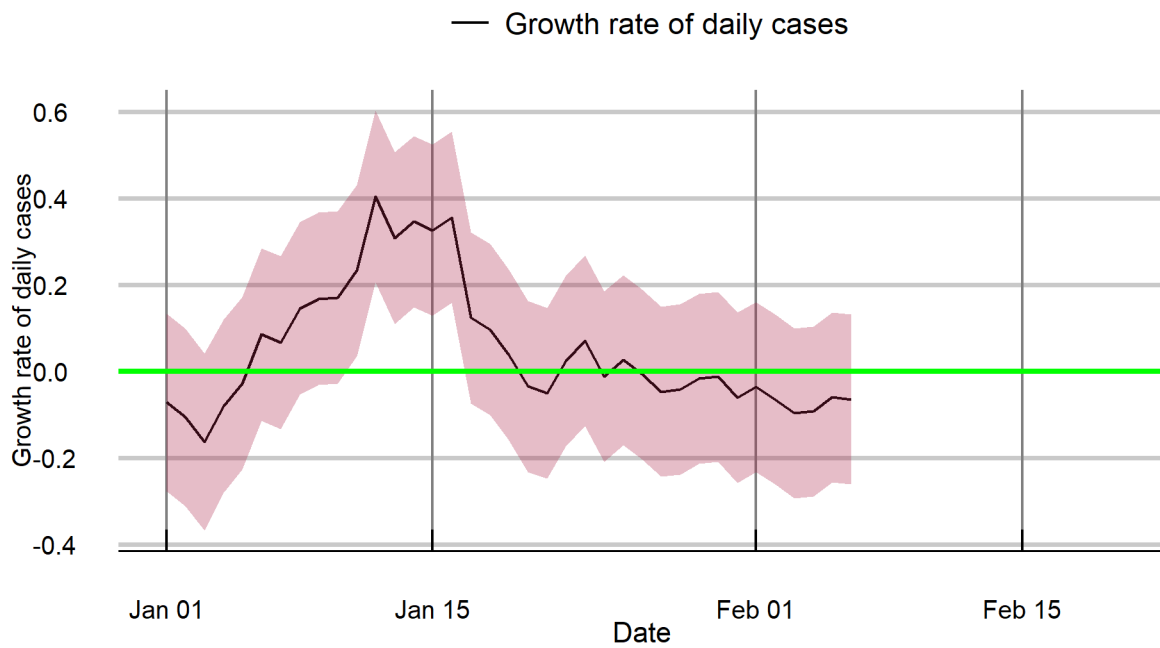
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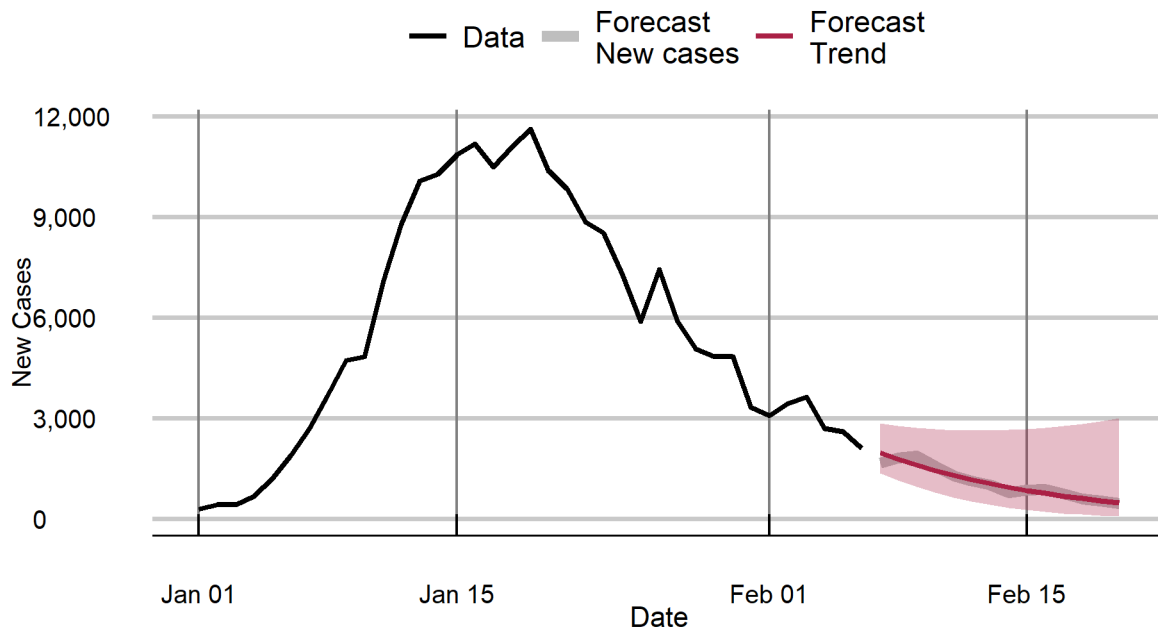
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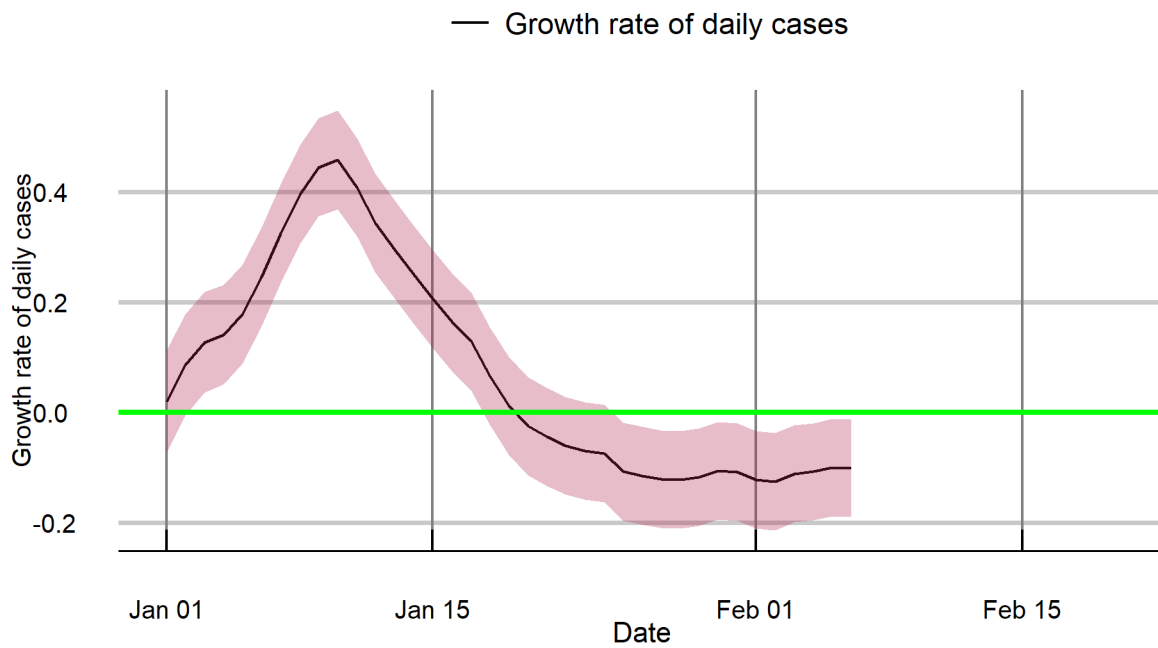
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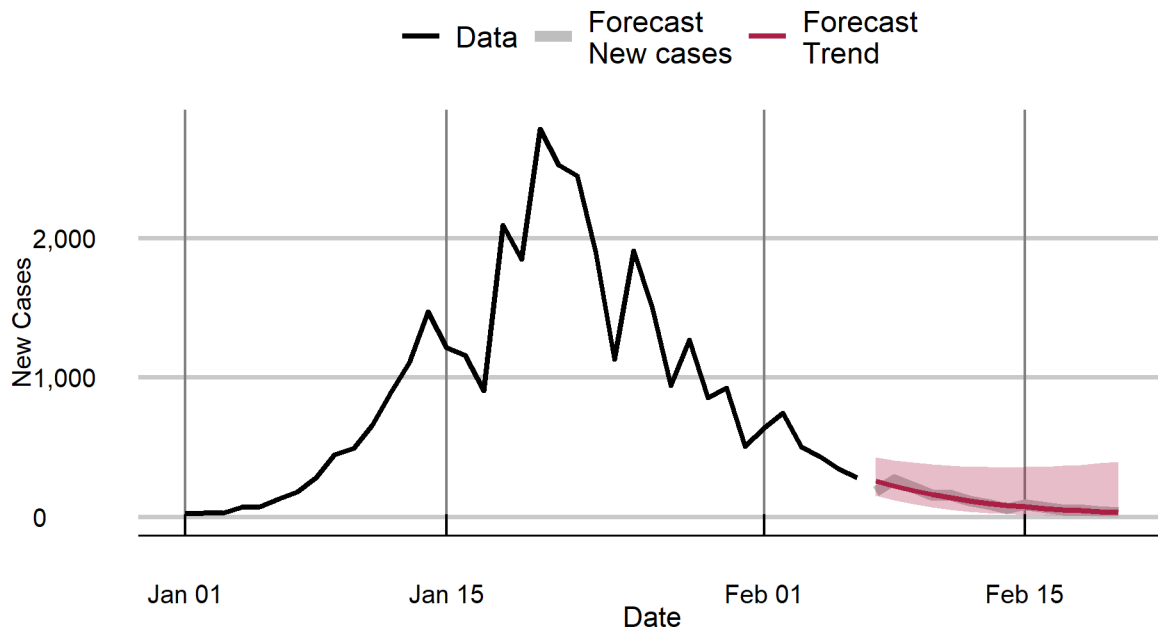
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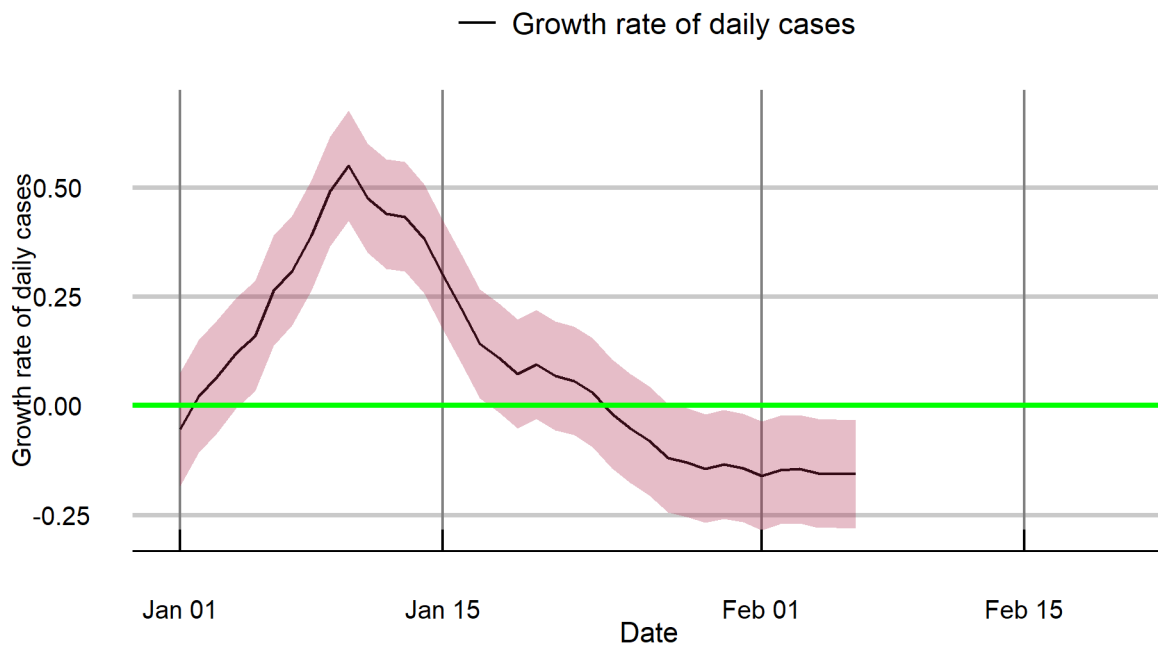
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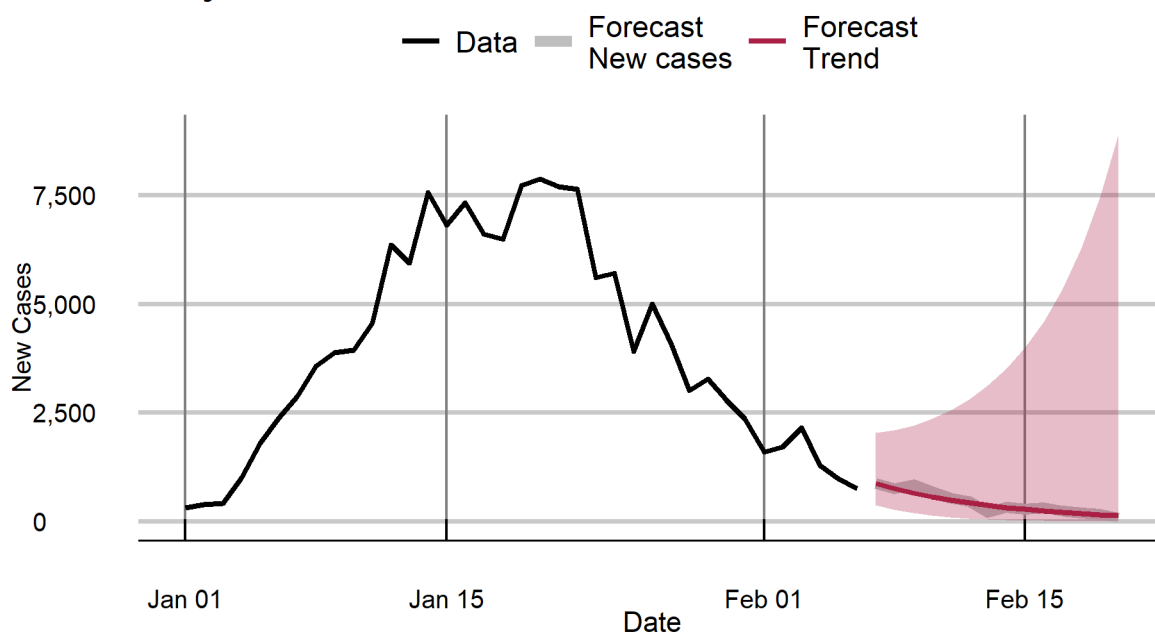
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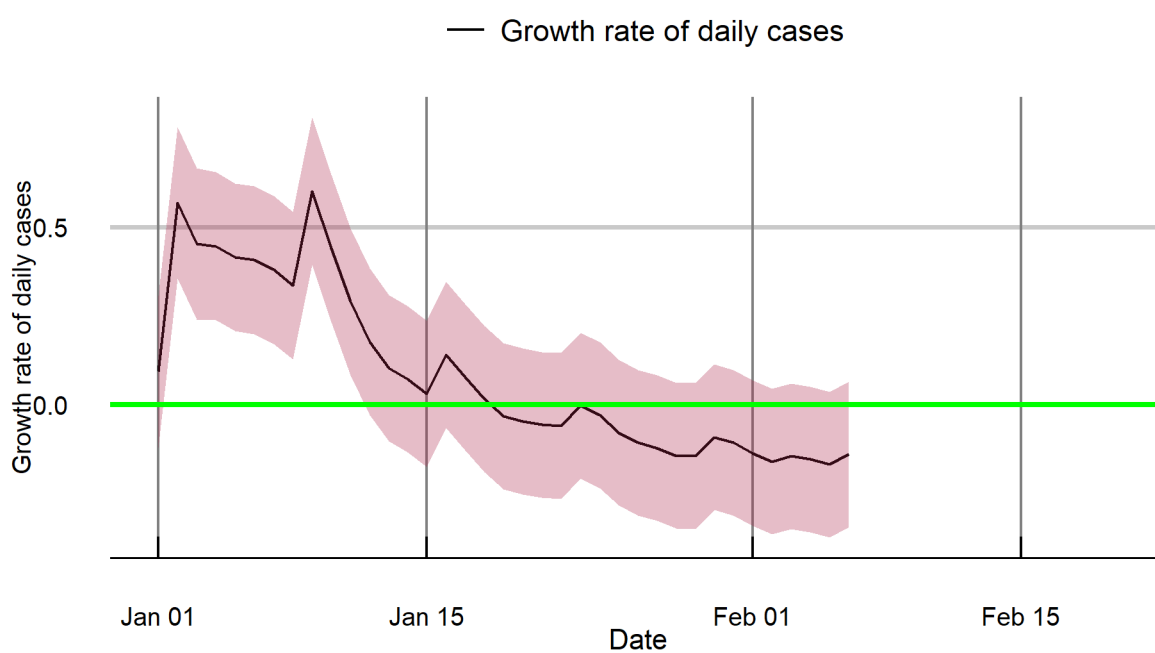
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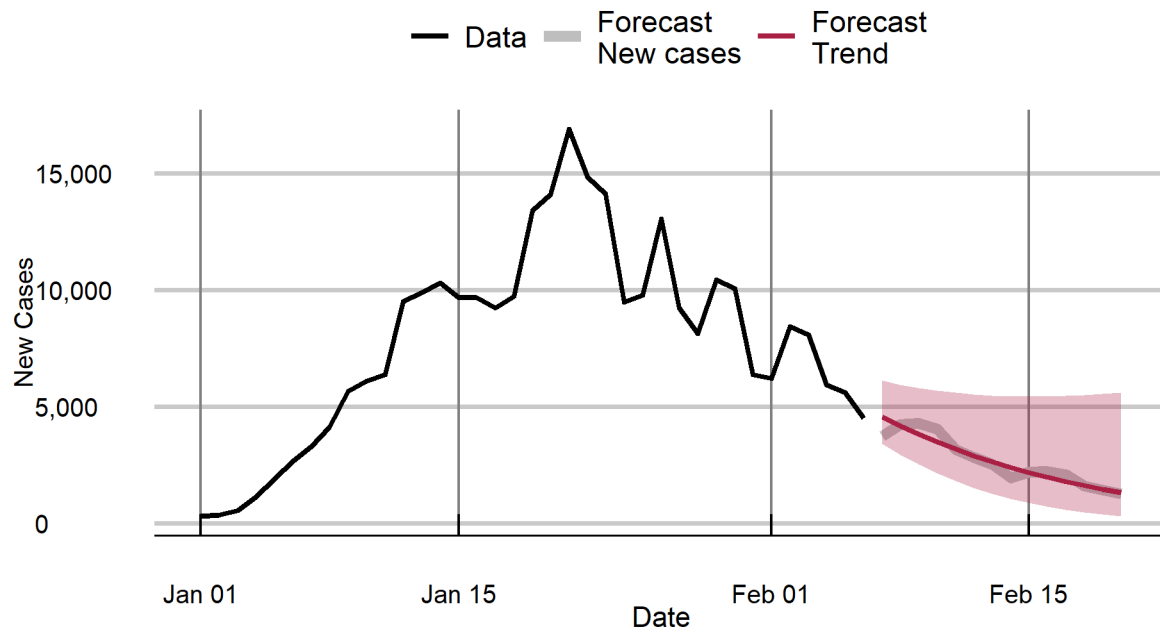
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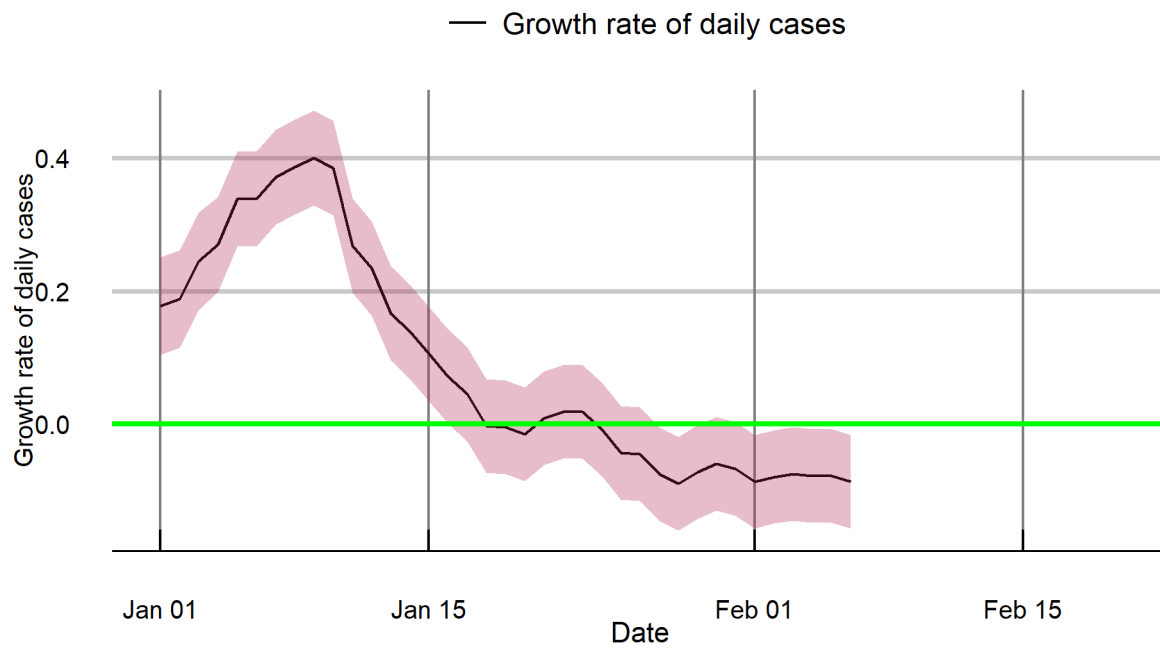
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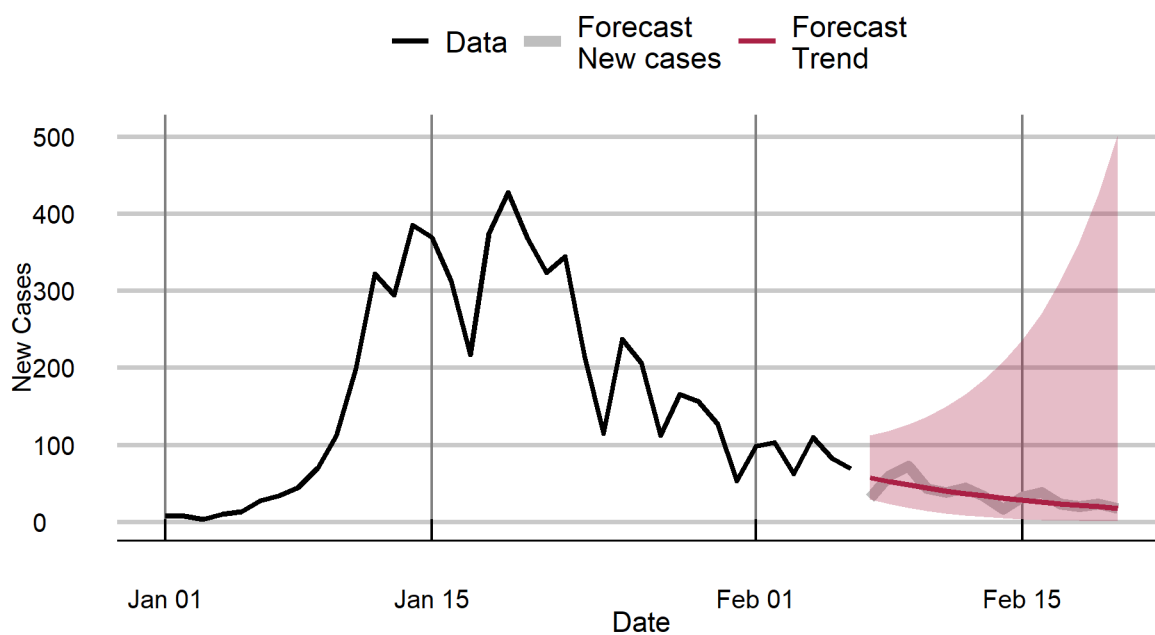
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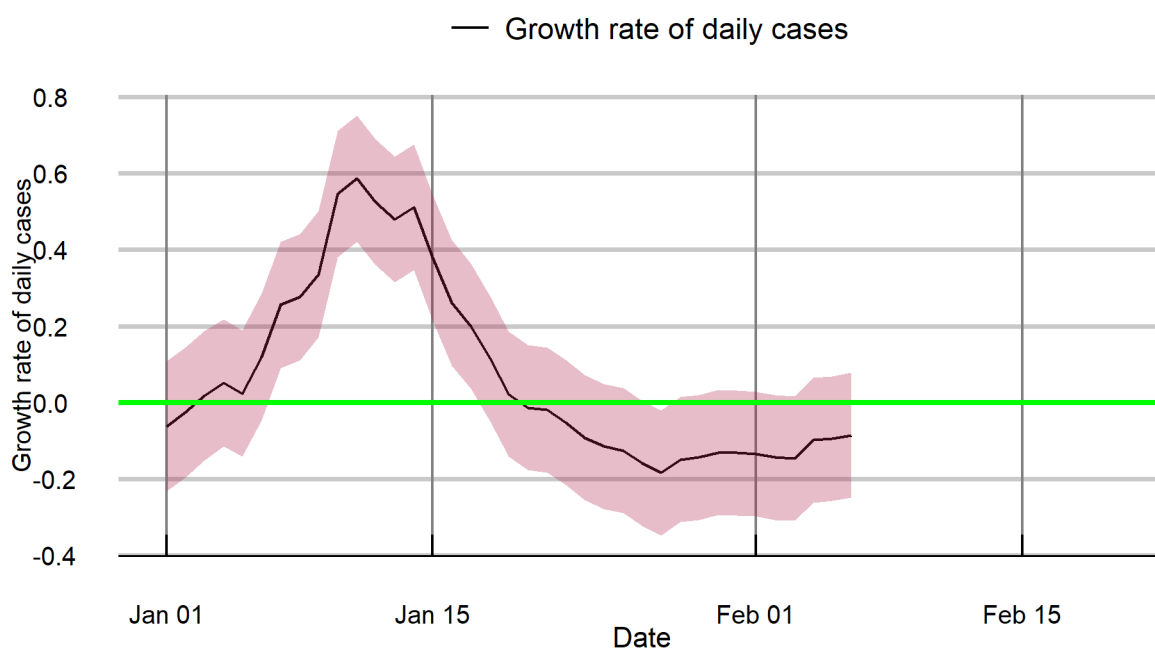
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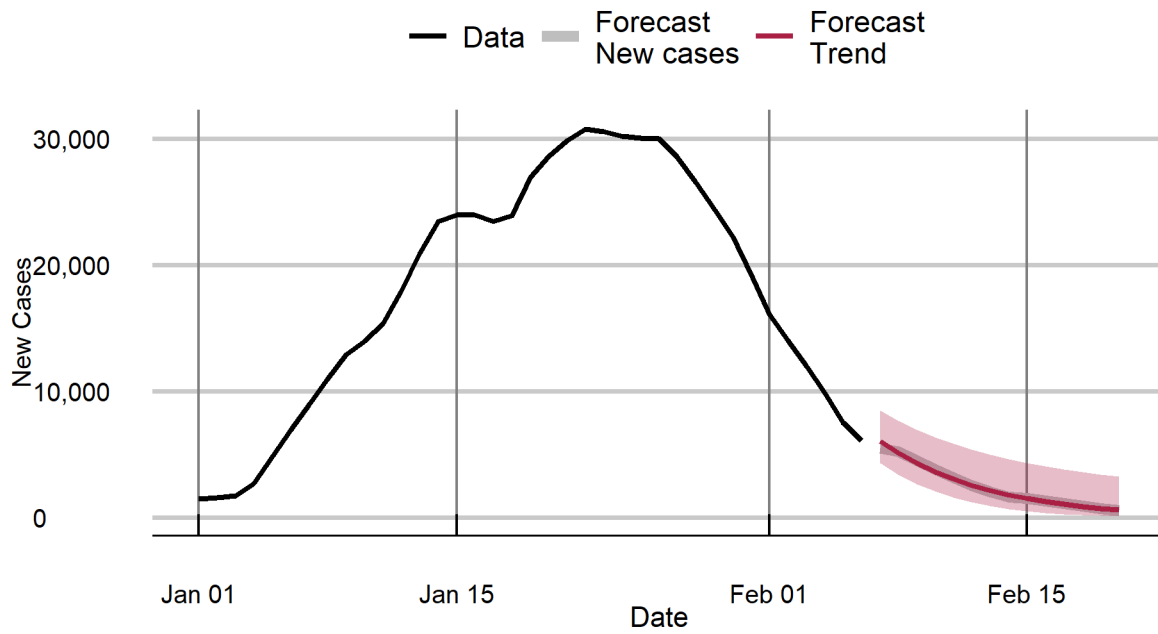
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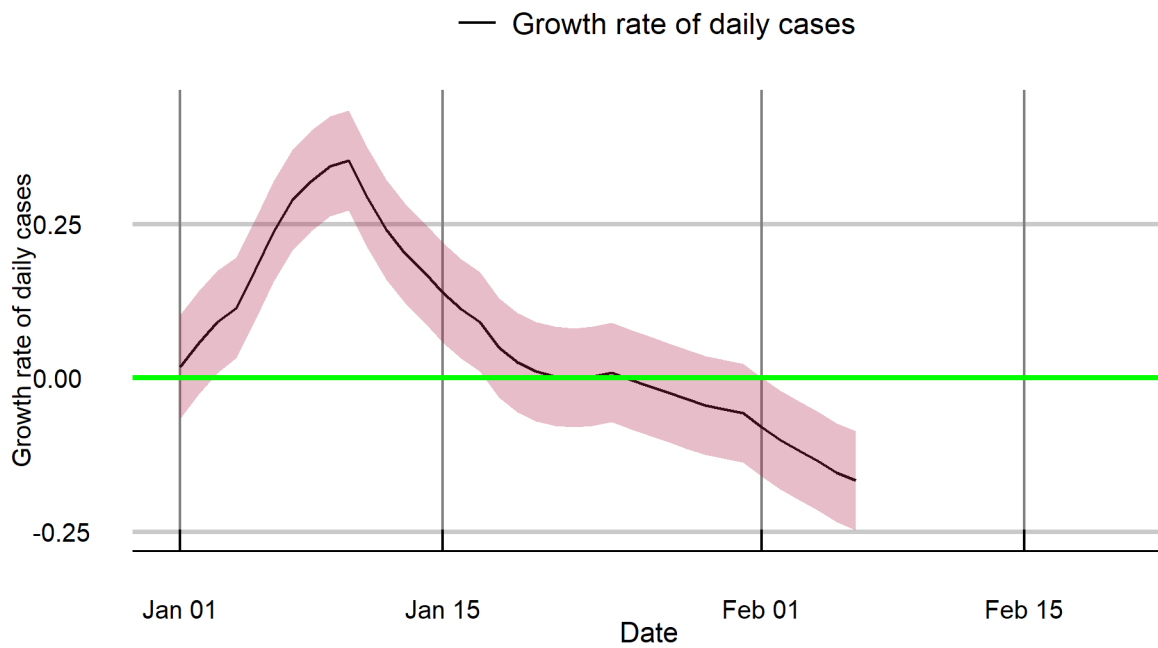
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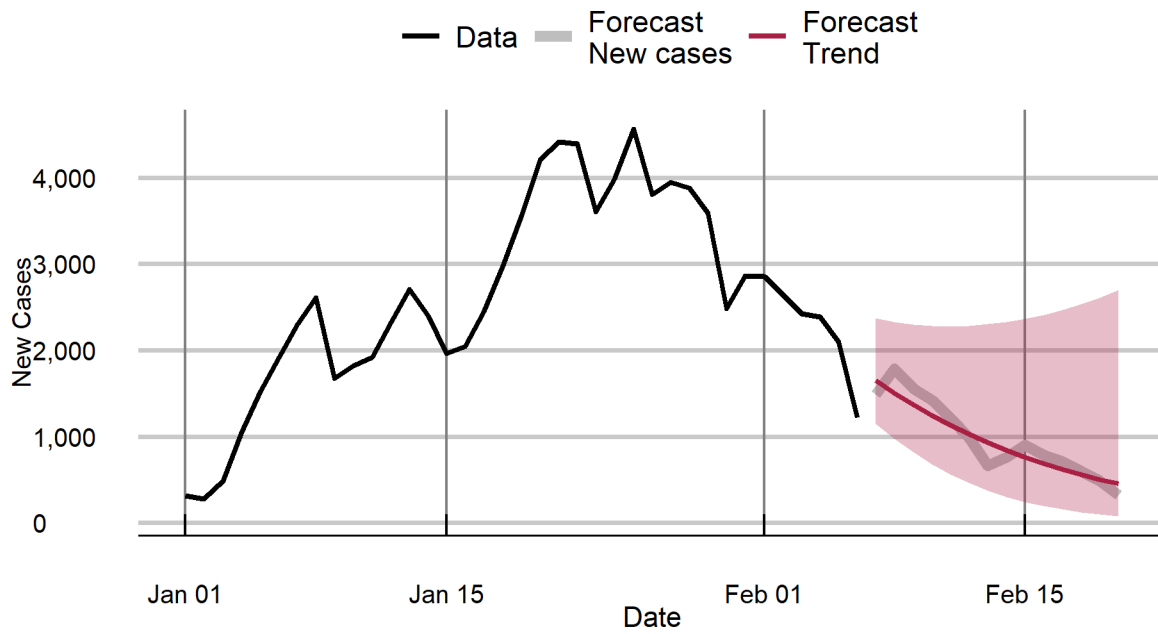
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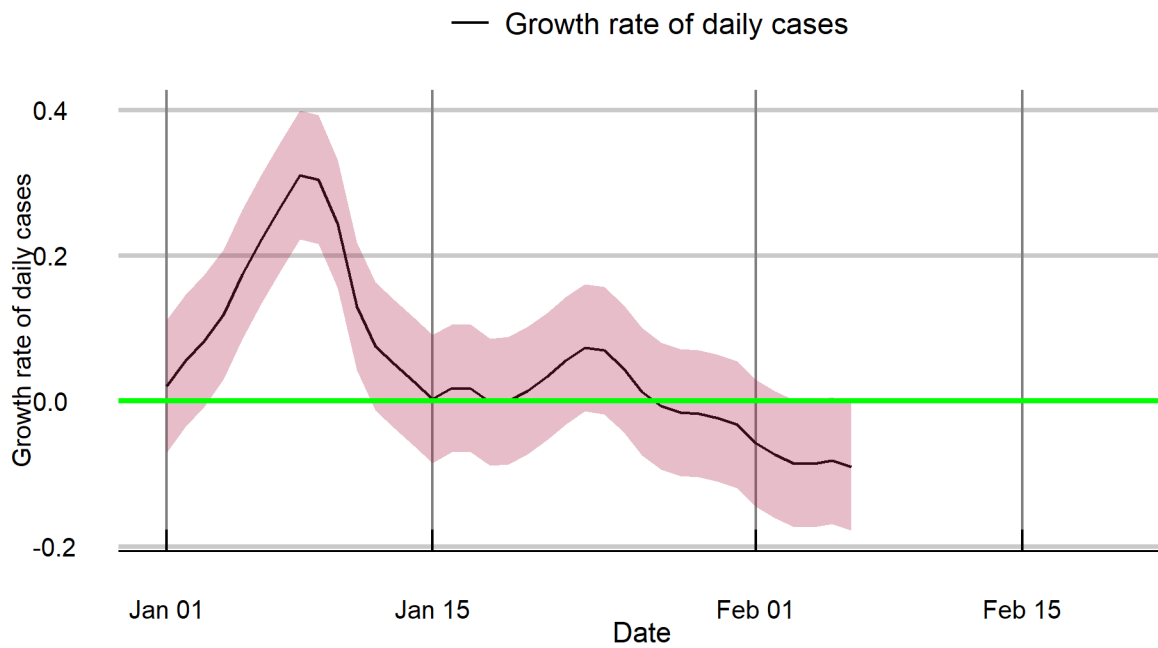
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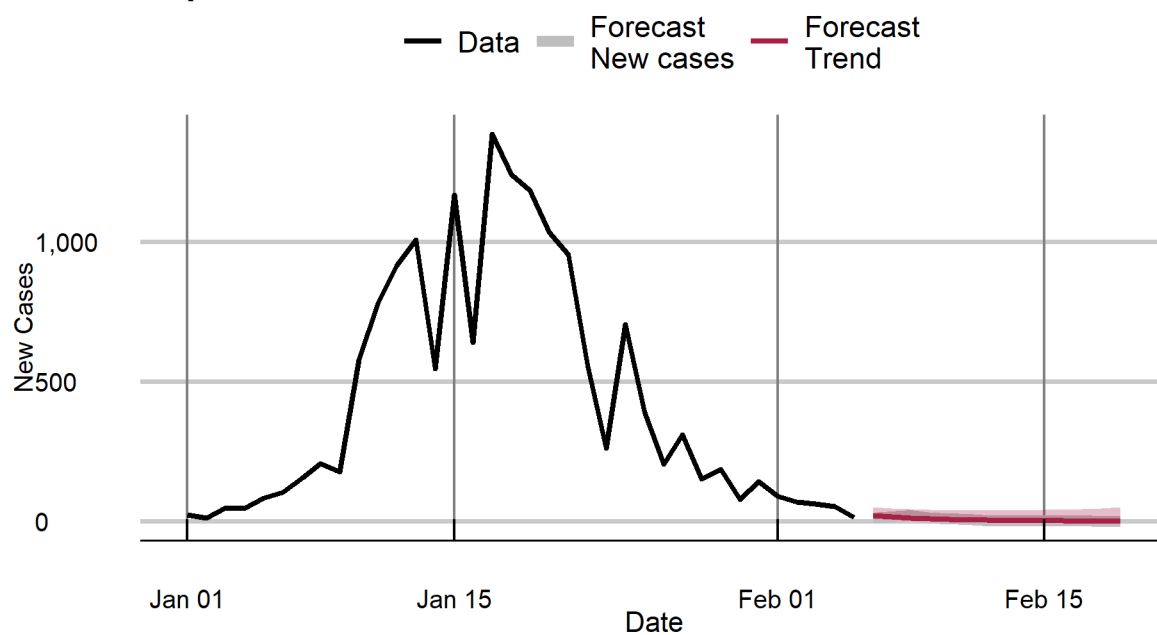
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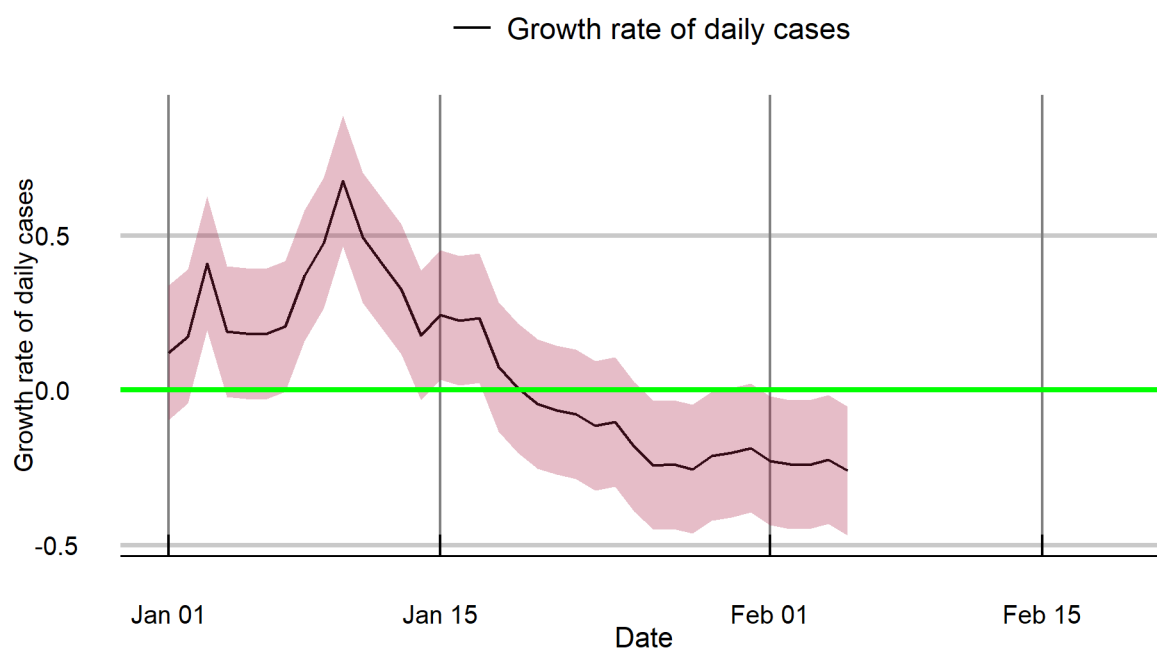
Telangana



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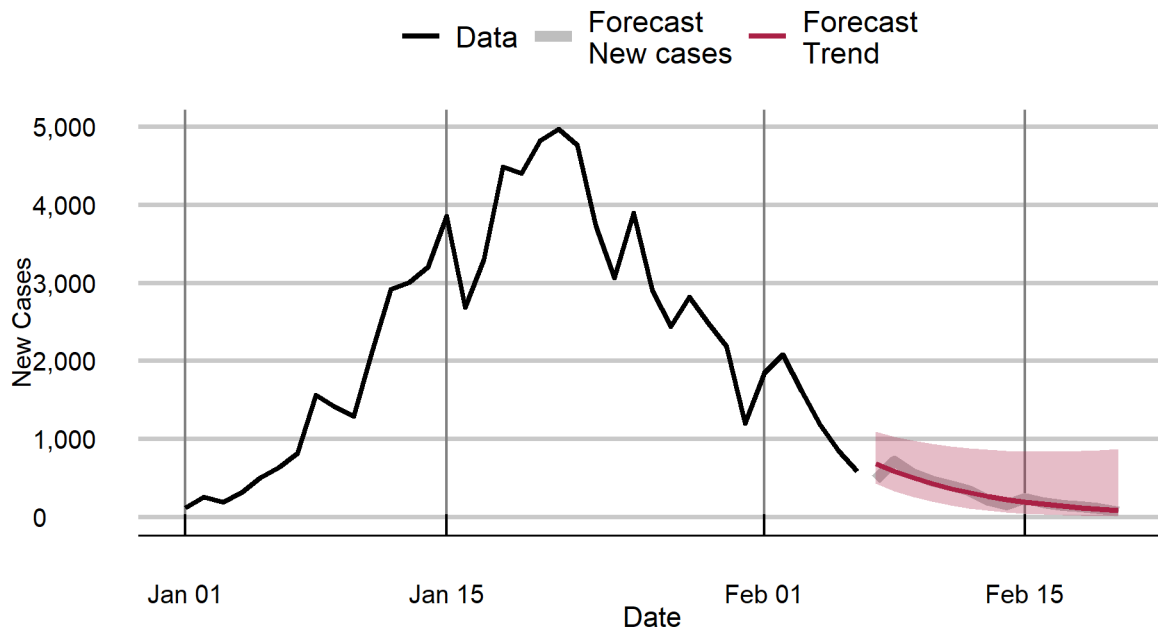


Tripura

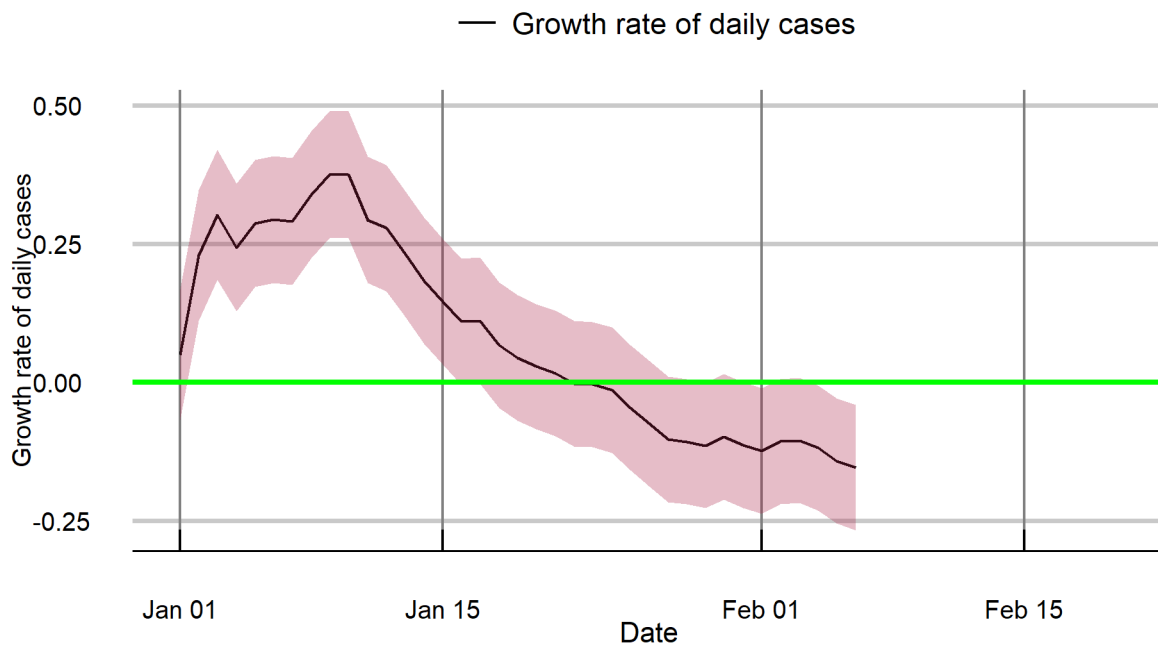


Note: Forecasts are for 6 to 19 February, based on data till 5 February 2022.

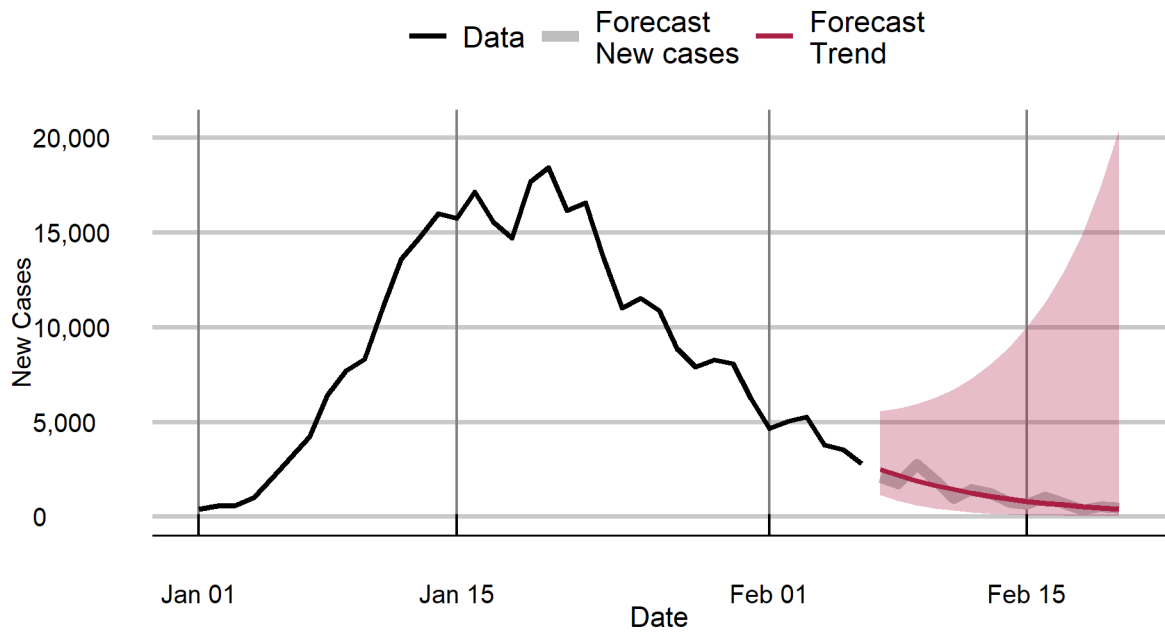
Uttarakhand



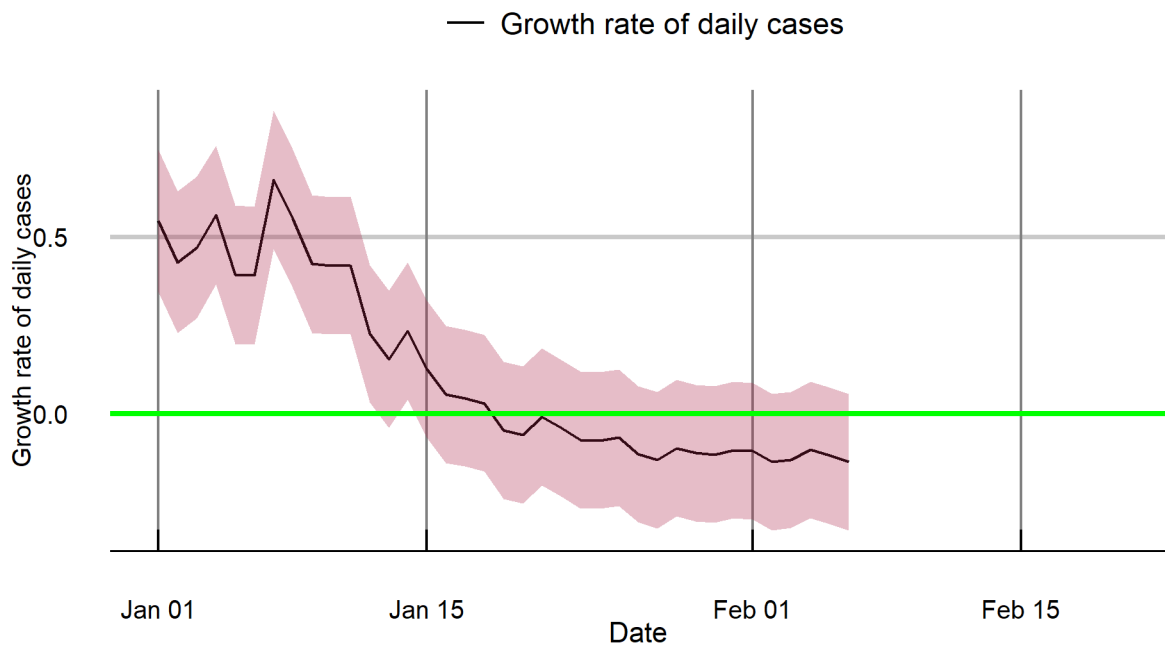
Uttarakhand



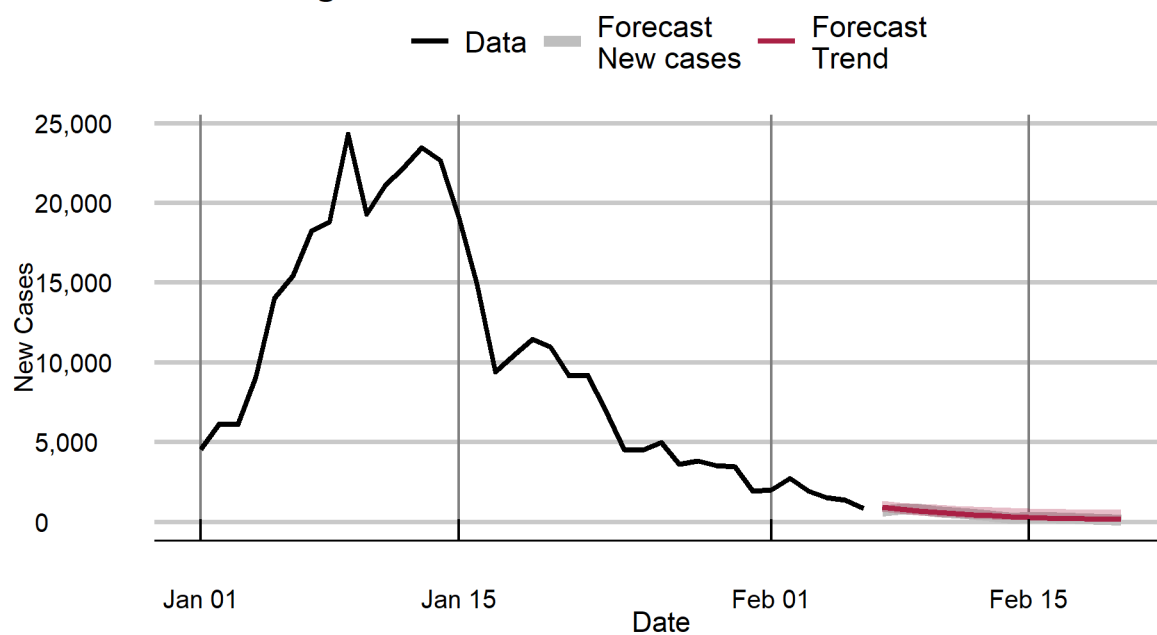
Uttar Pradesh



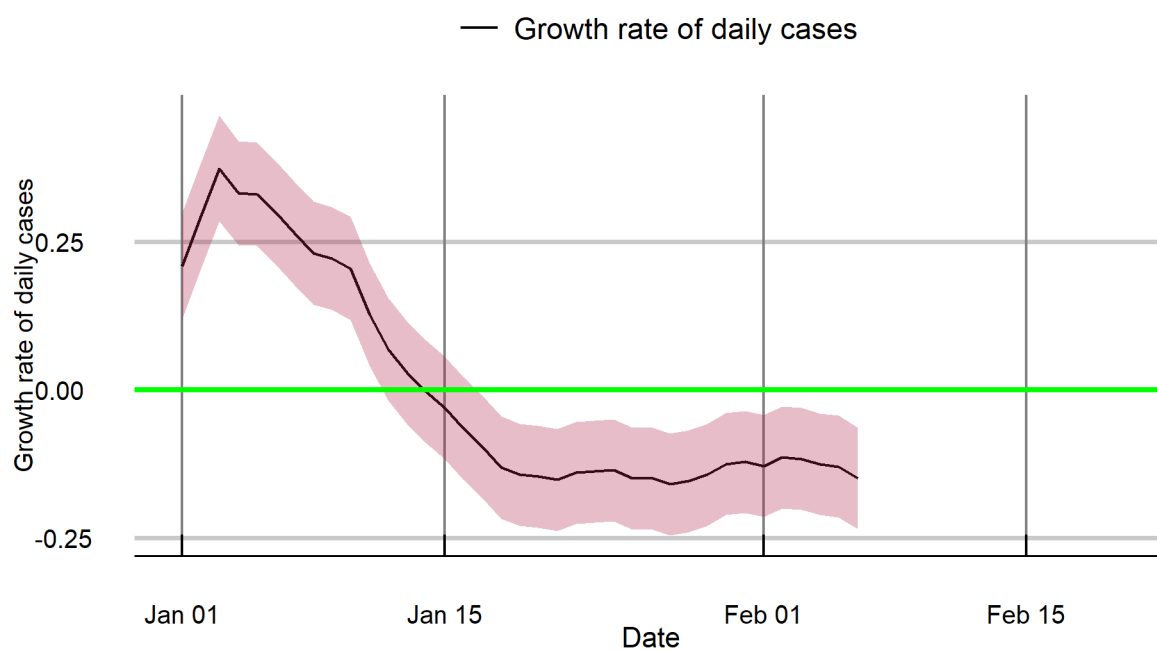
Uttar Pradesh



West Bengal



West Bengal



Notes

This tracker was developed by researchers at Cambridge Judge Business School and National Institute of Economic and Social Research, working with Health Systems Transformation Platform in India, as part of a pandemic monitoring series devoted to India and its states and union territories. It provides short term forecasts of the trajectory of the pandemic, identifying states and union territories that are at risk of increases in infection incidence.

Data: COVID-19 confirmed cases data are sourced from Johns Hopkins University (JHU), Center for Systems Science and Engineering (CSSE) and COVID19-Bharat API.

New cases: forecasts. Forecasts above are based on a structural time series model that uses all the data in estimation but adapts to the trend emerging in the most recent period.

The method is described in: Harvey, A. and P. Kattuman (2020). Time series models based on growth curves with applications to forecasting coronavirus. *Harvard Data Science Review*, Special issue 1 - COVID -19. <https://hdsr.mitpress.mit.edu/pub/ozgix0yn/release/2> , and Harvey, A., P. Kattuman, and C. Thamotheram (2021). Tracking the mutant: forecasting and nowcasting COVID-19 in the UK in 2021. *National Institute Economic Review*. 256, 110-126. doi:10.1017/nie.2021.12.

New cases: growth rate. The filtered trends presented for daily growth rates of cases are estimated using the Kalman filter, applied to the observed series. The method filters out day of the week effects and random noise to reveal the underlying signal. Unlike methods such as the moving average, this method adapts the trend to changes in real time and characterises underlying patterns of surges or attenuations that are hidden in the volatile series. The method is described in the papers listed above.

R: The *R*-estimates are based on the nowcast of the growth rate; the estimation approach is described in Harvey, A. and P. Kattuman (2021). A farewell to R: Time series models for tracking and forecasting epidemics. *Journal of the Royal Society Interface*, 18, 20210179, <https://royalsocietypublishing.org/doi/10.1098/rsif.2021.0179>. The confidence interval is based on one standard deviation, with coverage of 68%.

Note: The accuracy of forecasts rely on the quality of the published data. Further, changes in government pandemic policies and in transmission relevant social behaviour may lead realised numbers to deviate from forecasts.

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