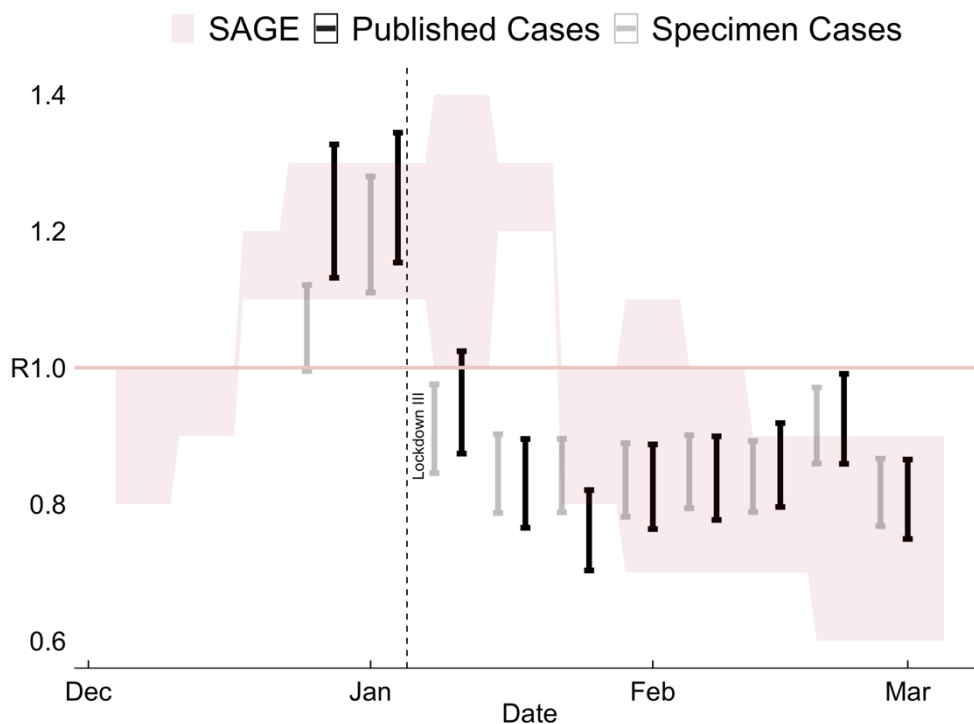


Reproduction Number (R) and Forecasts of New Cases: Admissions and Deaths to Reduce Rapidly

Figure 1 - UK R – NIESR and SAGE



Shaded pink area is SAGE upper and lower bounds (www.gov.uk/guidance/the-r-number-in-the-uk)
NIESR estimates of R show ± 1 standard deviation confidence intervals estimated on published and specimen cases. For specimen cases, we discard the last 3 days data.

Main points

- The NIESR estimates use a new time series model to project new cases of Covid-19 and produce timely estimates of the R number. In addition, we also produce forecasts of hospital admissions and deaths due to Covid-19. The forecasts reported here were made using publicly available data on 2nd March 2021.
- Figure 1 shows that the Reproduction number, R, which is the average number of secondary infections currently generated by an infected individual, **returned to 0.75 – 0.85 by the end of February** from a range of 0.9 – 1.0 where it had been the week before.

- Should these pandemic variables in the UK continue to fall at the current rate, by 8th March when schools reopen, trend daily cases are forecast to be around 4,300, hospital admissions around 600 and number of deaths close to 200 (Figures 2-4).
- Looking further ahead to when non-essential retail is scheduled to reopen on the 12th April, we expect trend daily cases to be around 700, admissions around 200 and deaths below 50 (Figures 2-4). To the extent that the re-opening increases transmission these numbers are likely to increase. On the other hand, these numbers could decrease to the extent that the vaccination programme reduces transmission. It will be interesting to see which of these effects dominate in the subsequent data.
- Figure 5 shows that all regional R number estimates are again below one, which was not the case last week. Currently, the South West has the lowest R number while Northern Ireland and Yorkshire and the Humber again have the highest.

“According to the latest data on new cases, our work shows an R number for the UK in the range 0.75 – 0.85, taking it back to the range that it has been in since mid-January. Interestingly, our model forecasts for admissions and deaths were revised downwards through to early February, settling later than those for new cases. This may be due to the reduction in cases from reduced mobility during lockdown translating into subsequent reductions in admissions and deaths with a lag. Our forecasts of pandemic variables sit well with recent [evidence](#) on the efficacy of the first dose of the vaccine in protecting against symptomatic Covid-19 for the over 70s, consequently reducing admissions and deaths as vaccines have been rapidly rolled-out since early 2021.”

Dr Craig Thamotheram
Senior Economist - Macroeconomic Modelling and Forecasting

Results

Figure 2 provides forecasts of daily cases of Covid-19 for the period until mid-April and highlights the underlying number of new cases to be expected on the key dates in the Government’s roadmap: school re-opening on the 8th March, outdoor association on the 29th March and non-essential retail reopening on the 12th April.

- If the recent trends continue, by 8th March when schools reopen, trend daily cases are forecast to be around 4,300, falling to 1500 by the 29th of March and to 700 by 12th of April.

Figure 2 - UK forecast of new COVID-19 cases

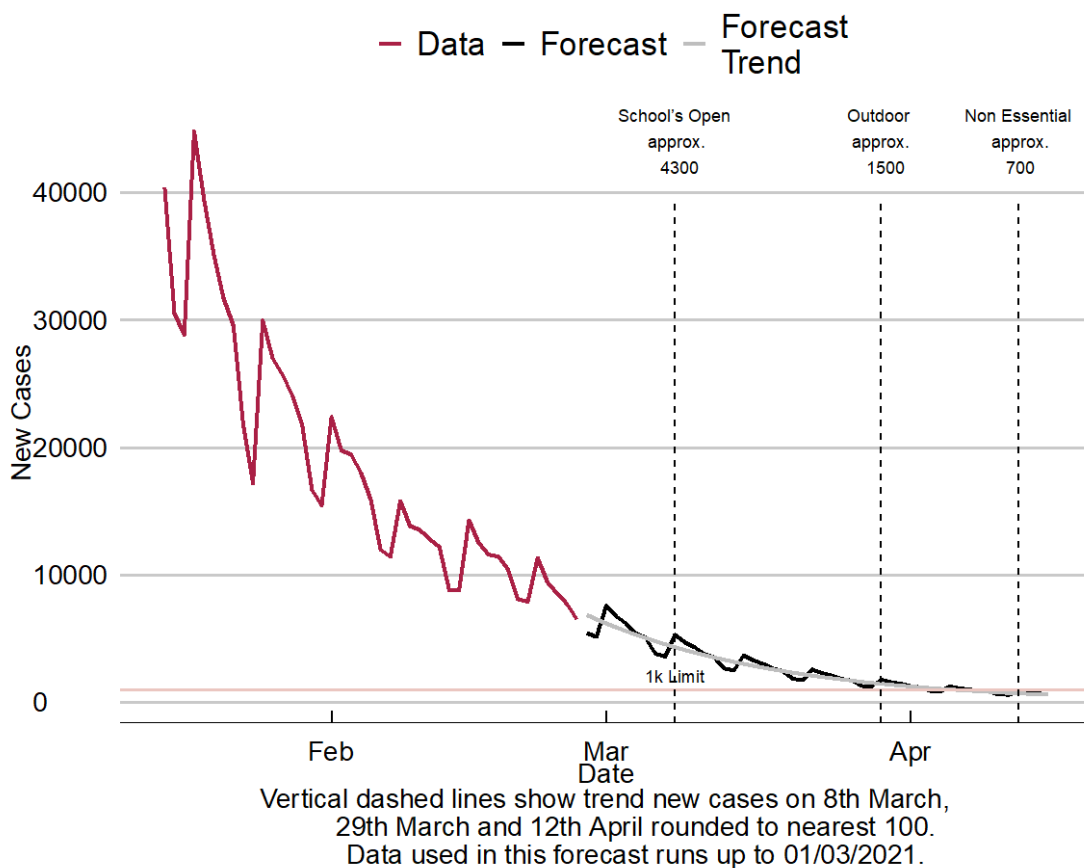
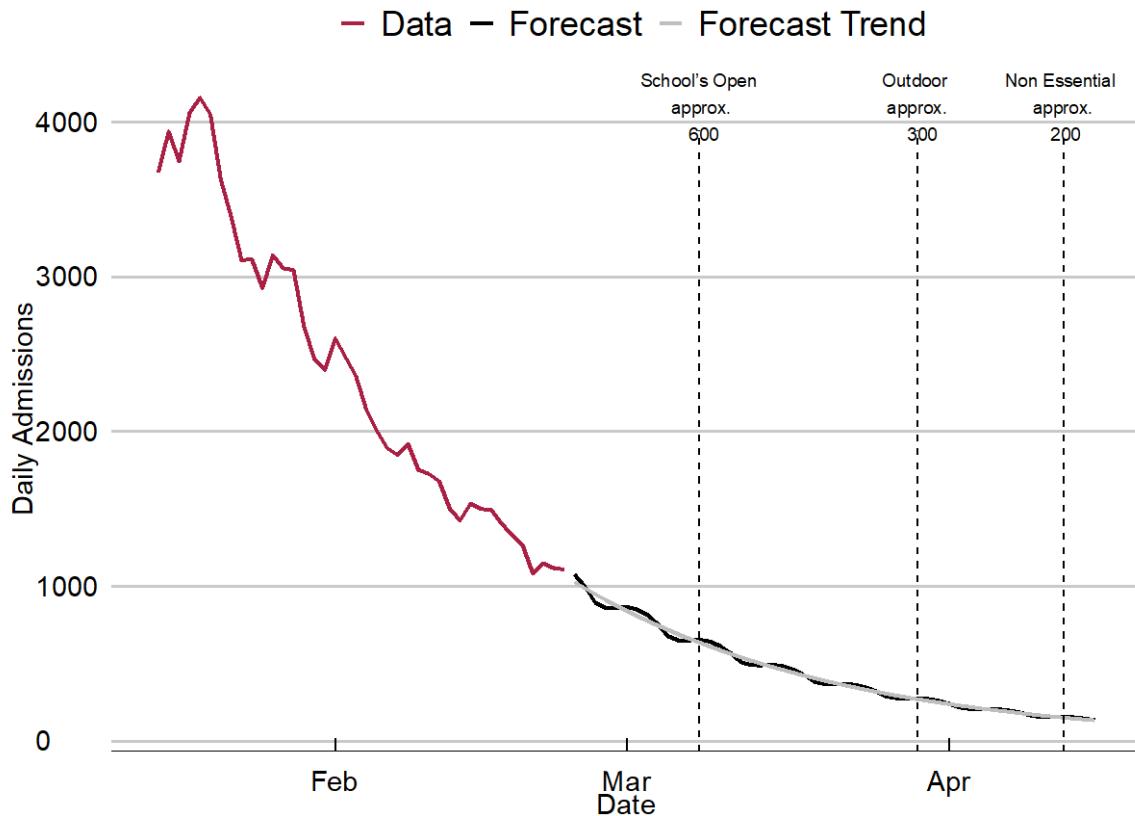


Figure 3 provides forecasts of daily hospital admissions for Covid-19 until mid-April and highlights the underlying number of new admissions to be expected on the key dates in the Government’s roadmap: school re-opening on the 8th March, outdoor association on the 29th March and non-essential retail reopening on the 12th April.

- By 8th March when schools reopen, hospital admissions are forecast to be around 600, falling to 300 by the 29th of March and to 200 by 12th of April.

Figure 3 – UK forecast of daily Covid-19 hospital admissions

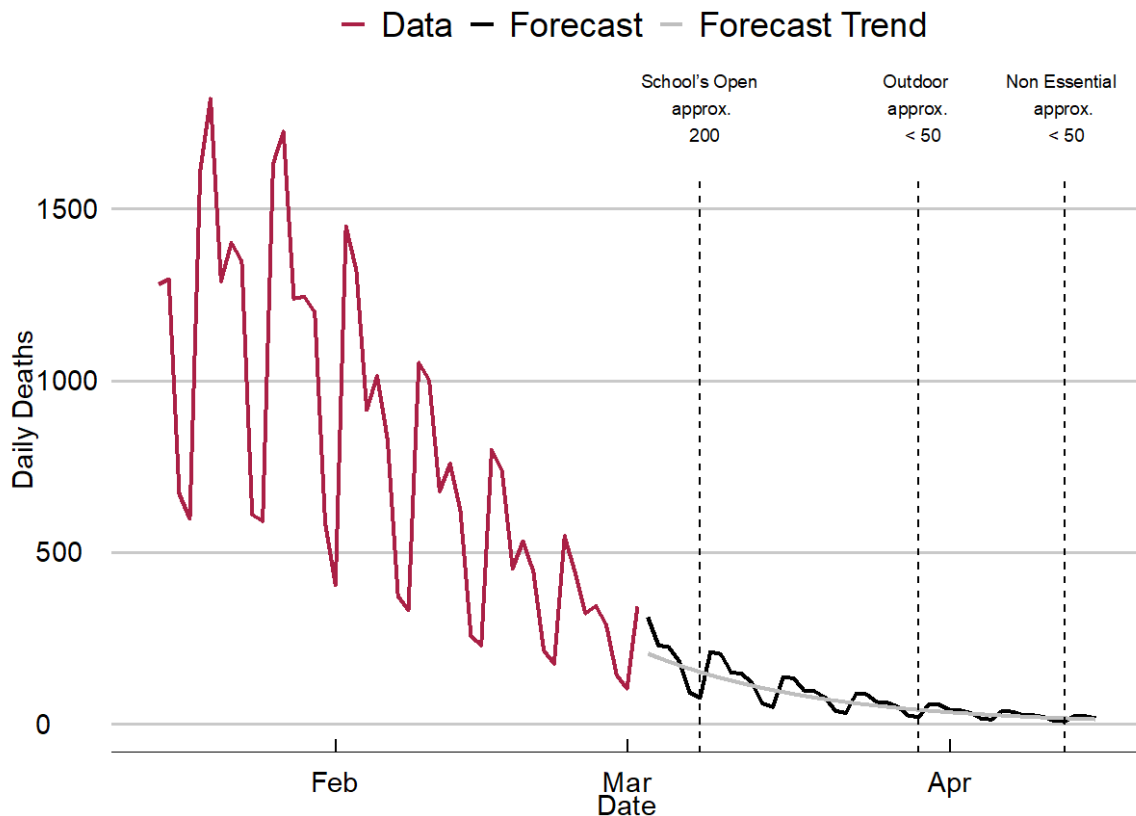


Vertical dashed lines show trend Admissions on 8th March, 29th March and 12th April rounded to nearest 100. The data used in this forecast runs up to 23/02/2021.

Figure 4 provides forecasts of daily deaths due to Covid-19 until mid-April and highlights the underlying number of daily deaths to be expected on the key dates in the Government’s roadmap: school re-opening on the 8th March, outdoor association on the 29th March and non-essential retail reopening on the 12th April.

- By 8th March when schools reopen, daily deaths are forecast to be around 200, falling below 50 by the 29th of March.

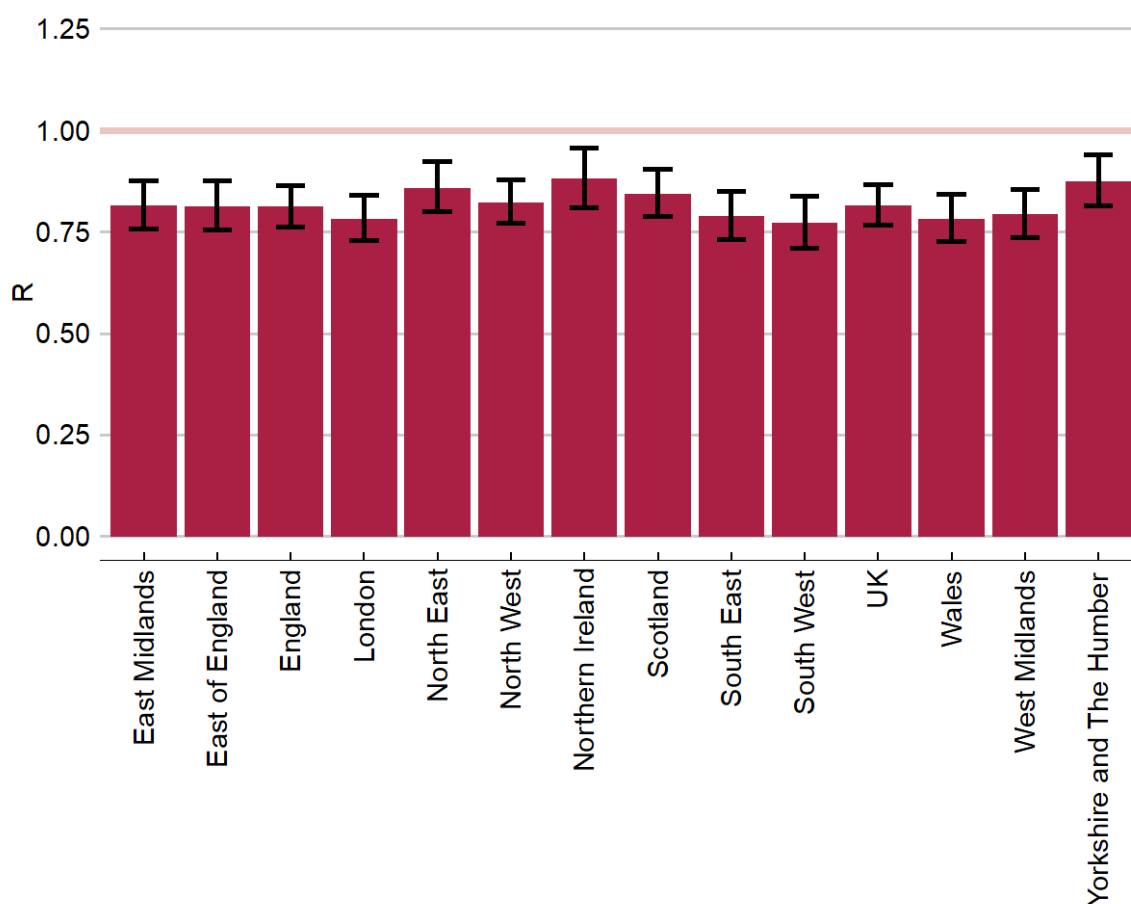
Figure 4 – UK forecast of daily Covid-19 deaths



Vertical dashed lines show trend DeathsPublish on 8th March, 29th March and 12th April rounded to nearest 100. The data used in this forecast runs up to 02/03/2021.

- Figure 5 provides regional R number estimates. As of 26th February 2021, all regional R number estimates are below one.
- Among nations of the UK, Northern Ireland has the largest R number (0.88) and Wales has the lowest (0.78).
- Among regions of England, Yorkshire and Humber has the highest R number (0.88) and the South West has the lowest (0.77).

Figure 5 - UK Regional R



Bar chart shows point estimates of R and the ± 1 standard deviation confidence intervals

Background

NIESR aims to set out projections of the future path of the Covid-19 epidemic in the United Kingdom, its constituent nations and the regions of England, based on current policies.

NIESR will be producing weekly updates on Thursdays, projecting new cases and estimating the R number using a class of time series models developed by Prof. Andrew Harvey and Dr. Paul Kattuman of Cambridge University; see [Harvey and Kattuman \(2020a\)](#). The models generate forecasts by extracting changing trends from historical data. They are relatively simple and transparent, and their specifications can be assessed by standard statistical test procedures. The advantage of the time series approach is that it can adapt very quickly to the most recent information and hence produce timely estimates. This flexibility enables the effects of changes in policy, virus mutations and human behaviour to be tracked. The models are data driven and so are different from the structural models used by epidemiologists which rely on assumptions about transmission and behaviour; see [Avery et al \(2020\)](#).

A description of the methods used to produce these estimates and an evaluation of their forecasting performance can be found in Harvey, Kattuman, and Thamotheram (2021).

Data

Data: COVID-19 confirmed cases and deaths data are sourced from <https://coronavirus.data.gov.uk>

Caveat

The model relies on historical data and does not incorporate future outlined changes in the underlying environment. Thus, it is important to read the forecasts in this context. For example, the current forecasts make no assumptions about the effect of reopening the schools on increasing transmissions. On the other hand, the effect of the vaccine program will be in the opposite direction.

Authors

Professor Andrew Harvey is Emeritus Professor of Econometrics at the University of Cambridge and a Fellow of Corpus Christi College. He has published over 100 articles and is the author of four books: *The Econometric Analysis of Time Series* (1981), *Time Series Models* (1981), *Forecasting. Structural Time Series Models and the Kalman Filter* (1989) and *Dynamic models for Volatility and Heavy Tails* (2013). He is a Fellow of the British Academy and the Econometric Society.

Dr Paul Kattuman is a reader in Economics at Cambridge University. He has been a Senior Research Fellow at the University of Cambridge Department of Applied Economics, and a lecturer in economics at Durham. He has held Visiting Professorships at Université Paris 12 and Paris-Est Créteil and was appointed Grupo Santander Visiting Professor at Universidad Complutense de Madrid. He was visiting Faculty Scholar at the Kennedy School of Government, and at the Department of Statistics, both at Harvard University.

Dr Craig Thamotheram is a Senior Economist at NIESR. Prior to joining NIESR, he studied Engineering at Imperial and obtained a PhD in Economics at Warwick. He has work experience as a post-doc in macro and financial econometrics.

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Notes for editors

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