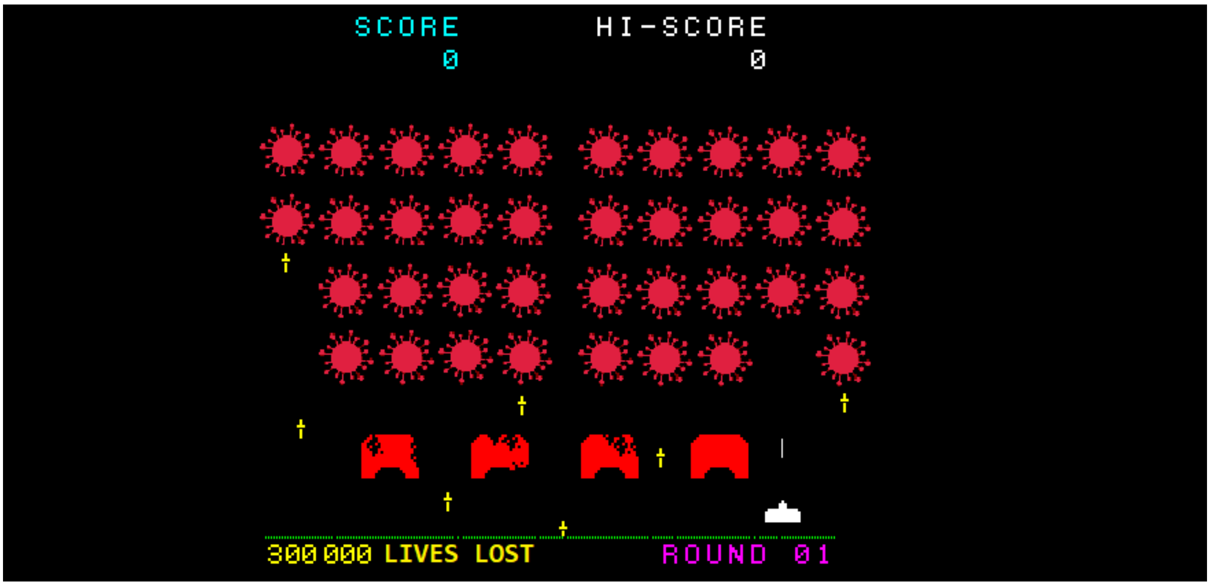


300 000 US lives lost by time of the presidential election

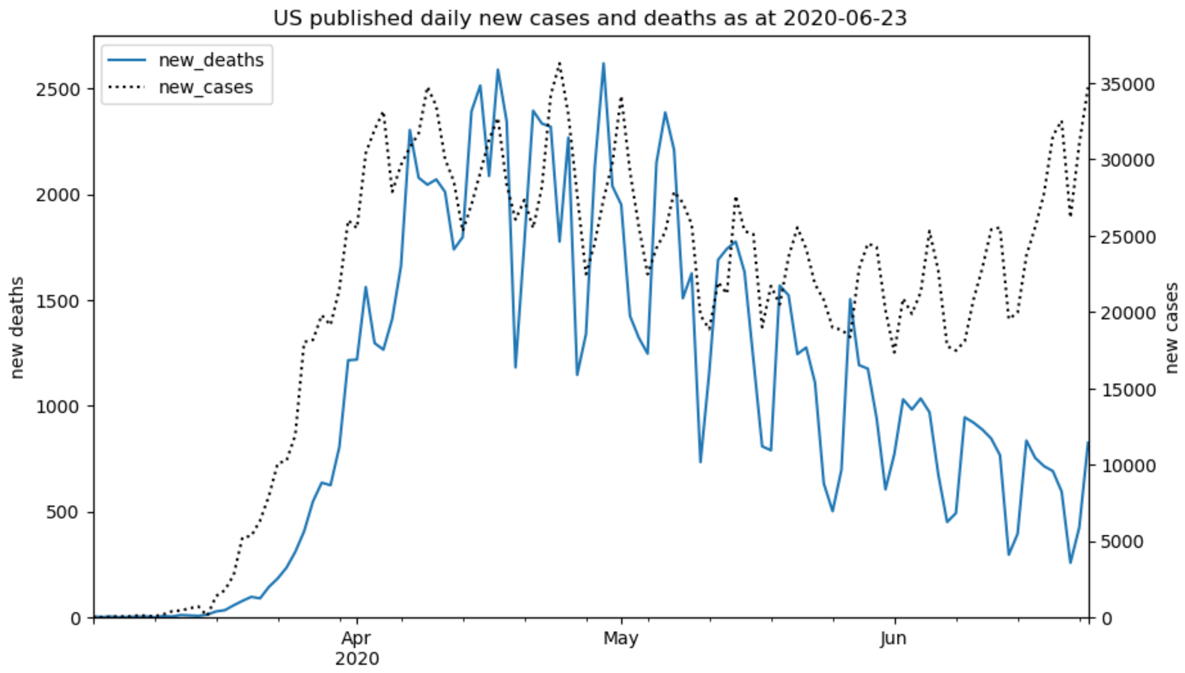
https://www.linkedin.com/pulse/300-000-us-lives-lost-time-presidential-election-mark-greenwood/

Published on June 24, 2020

Mark Greenwood

Nearly 1 in every 1000 residents in the US are likely to have died from covid-19 by the time of the November election.

To date 121 000 deaths have been reported in the Johns Hopkins covid-19 database.

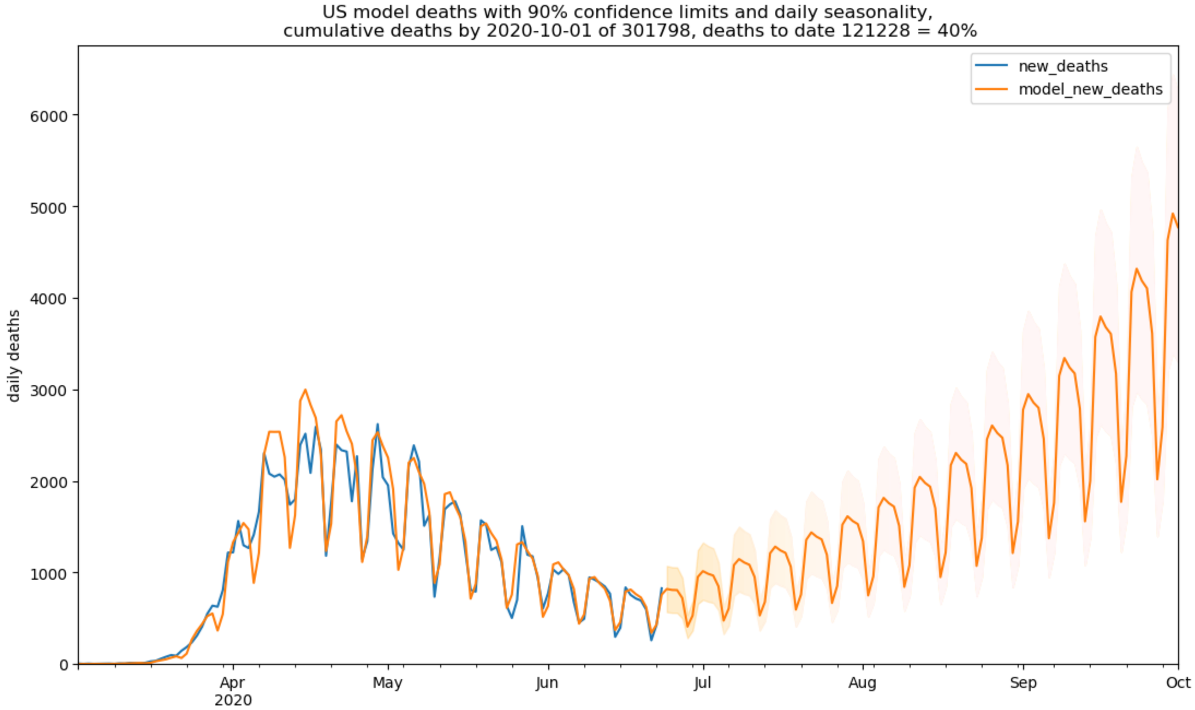


Deaths appear to still be trending down, despite a surge in new cases. How can any model project such a huge death toll?

There are 131 days to go before November 4th. So far June has averaged 720 deaths a day, well below the peak of 2620 in late April. When lockdown started to unwind, the government dismissed a FEMA projection showing daily deaths would exceed this peak.

*fivethirtyeight.com compares projections from US scientists and academics. These give a range for likely deaths to the end of the following month. By the end of July the projections show a median of **150k** deaths, varying from the **129 - 136k** range of UCLA to the **130 - 177k** range of Los Alamos National Laboratory.*

My simple model estimates **159k** deaths by end of July, with steady growth beyond this if present conditions and survival rates persist:

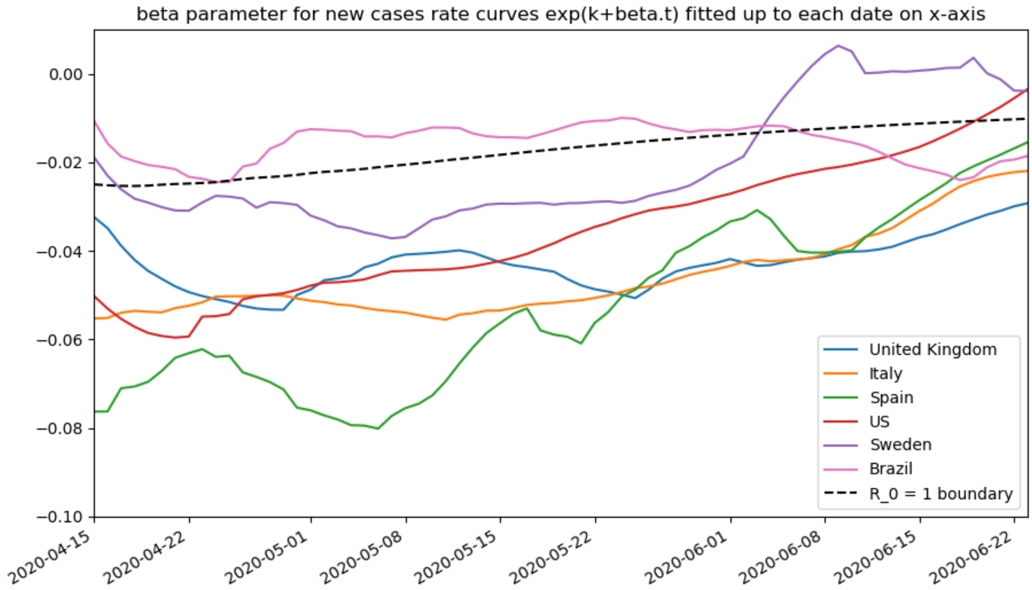


The charts for various countries are updated daily and saved to the github repo here, along with the code to produce the charts, so the daily evolution of the projections can be traced.

Any projection has three elements: ***growth in new cases****, the case* ***survival rate*** *and the* ***delay until death*** *for those unfortunate enough not to survive infection.*

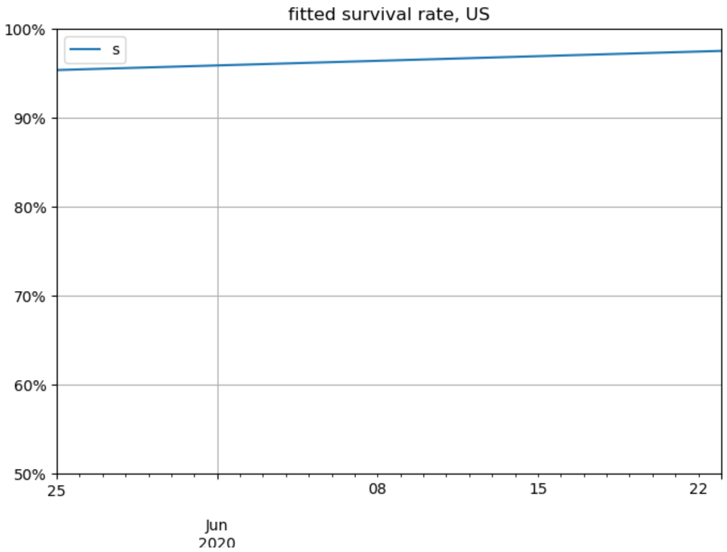
The simple model fits *exp(k+βt)* to the **growth rate of new cases** as a ratio of cases to date, where *t* is defined as the number of days since there were at least 100 cases. We use a rolling 7-day average for new cases to address weekday reporting patterns. A negative parameter *β* implies the rate of growth of new cases is declining with time.

Because the new cases rate here is the ratio to all cases to date, a constant number of new cases each day is consistent with a negative *β*, that gradually tends to zero. We plot this boundary as a dashed line in the chart below. This $R_0 = 1$ line marks the delicate balance between declining and exponentially increasing infections.



The US experience since the peak daily deaths is shown in red in the chart above. As expected, the beta parameter has gradually increased since the easing of the lockdown. This is also true of other countries with high covid-19 mortality. However, the new cases growth parameter β for the US is now consistent with an R_0 above 1. Each new case is ultimately responsible for the infection of more than one other person, producing an exponentially increasing number of cases.

The model allows for the **survival rate** to vary linearly, in order to account for the improvements we are seeing. The US data now implies a 97.5% survival rate for all cases:



While we await vaccines and therapies, the use of Dexamethasone to aid treatment of the severely ill is just one such positive influence on survival rates. Projected deaths are, of course, very sensitive to survival rates. If infections increase to 100k new cases a day (from 35k presently), a 1% improvement in the case survival rate will see a projection of 2500 deaths a day reduce to 1500 deaths a day.

The **delay between a positive test result and dying** from covid-19 has a mean of 8.3 days in the model - and it is slowly increasing. This explains why we have yet to see an increase in deaths resulting from the dramatic rise in cases.

Quantifying the effect of easing the lockdown

Without arguing the merits of easing the lockdown, we can use the model to compare the projected deaths using parameters frozen a month ago with those now.

As of 23 May 2020 the model projected deaths to 31 August 2020 of **153k**. The case survival rate was then much lower, at 94.7%.

The latest projection shows **213k** deaths to 31 August 2020, even with the much improved current survival rate of 97.5%. The difference is 60 000 lives.

The issues for society are obviously far more complex than this simple analysis, but society should avoid any false sense of optimism and follow scientists, not politicians, in order to save lives.