Supplementary Information for

Unifying the communicable disease spreading paradigm with Gompertzian growth

Nonlinear Dynamics

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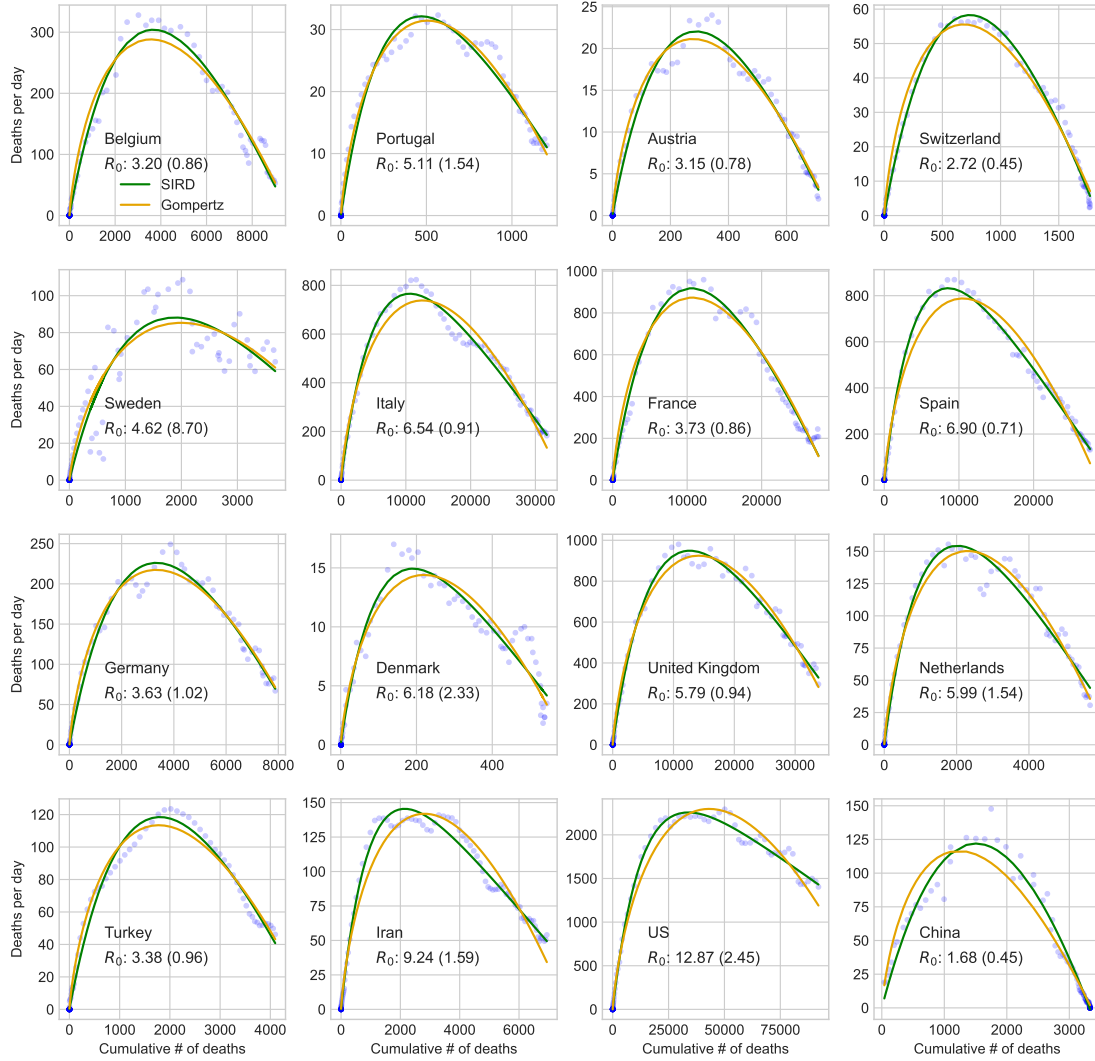
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Fig. S1. Cumulative diseased plotted against number of days after $Y(t)/Y_{max} > 0.005$, comparing an SIRD with a Gompertz model. Both models are fit using non-linear least squares according to equations (1) and (11) in the text. Fitting is done with Python-Scipy and a 6-day windowed average of deaths. The basic reproduction number, R_0 is computed as specified in the Methods. Observations are taken from the Github repository compiled by the Center for Systems Science and Engineering (CSSE) at Johns Hopkins University, Baltimore, USA (1).

Table S1. Estimated values for the SIRD model fitted to various countries' observations as shown in Figure 1 using notation from eq. (12). Standard deviation estimates is given in the paranthesis corresponding to the last significant digit of the reported number.

	$\eta \times 10^{-1}$	$\xi \times 10^4$	$\kappa \times 10^2$
Belgium	94(8)	3.2(2)	9.3(7)
Portugal	6.6(4)	35(2)	4.5(3)
Austria	6.9(5)	40(3)	8.7(6)
Switzerland	22(1)	13.6(7)	11.0(5)
Sweden	19(5)	8(2)	3(1)
Italy	137(3)	1.77(5)	3.71(1)
France	240(10)	1.24(7)	8.1(4)
Spain	145(2)	2.27(5)	4.75(8)
Germany	61(4)	3.9(3)	6.5(5)
Denmark	2.7(2)	96(8)	4.3(3)
United Kingdom	181(5)	1.39(5)	4.3(1)
Netherlands	29(1)	8.9(5)	4.3(2)
Turkey	34(3)	6.8(5)	6.9(6)
Iran	22.3(4)	10.4(4)	2.51(7)
US	312(5)	0.76(2)	1.83(7)
China	130(30)	3.5(5)	26(4)

Table S2. Estimated values for the Gompertz model fitted to various countries' observations, as shown in Figure 1 using notation from eq. (1).

	$\nu \times 10$	$\beta \times 10^2$	$\tilde{Y} \times 10^2$
Belgium	9.3(1)	8.1(2)	10.1(9)
Portugal	6.15(3)	6.22(7)	7.0(3)
Austria	6.98(5)	7.6(1)	7.8(4)
Switzerland	8.08(6)	8.1(1)	8.9(5)
Sweden	4.9(1)	4.3(2)	6(1)
Italy	7.60(6)	5.88(7)	8.4(4)
France	10.2(1)	8.2(1)	11.0(8)
Spain	9.41(9)	7.5(1)	10.2(7)
Germany	7.56(6)	6.53(8)	8.4(4)
Denmark	5.94(7)	6.5(2)	6.8(7)
United Kingdom	8.46(5)	6.54(7)	9.3(4)
Netherlands	7.34(6)	6.52(8)	8.2(4)
Turkey	7.04(5)	6.38(8)	7.9(4)
Iran	5.87(6)	5.04(8)	6.7(4)
US	7.53(7)	5.32(7)	8.4(5)
China	9.8(1)	9.4(2)	10(1)

References

1. Dong E, Du H, Gardner L (2020) An interactive web-based dashboard to track COVID-19 in real time. *The Lancet infectious diseases* 20(5):533–534.