Problem Sheet 1

A

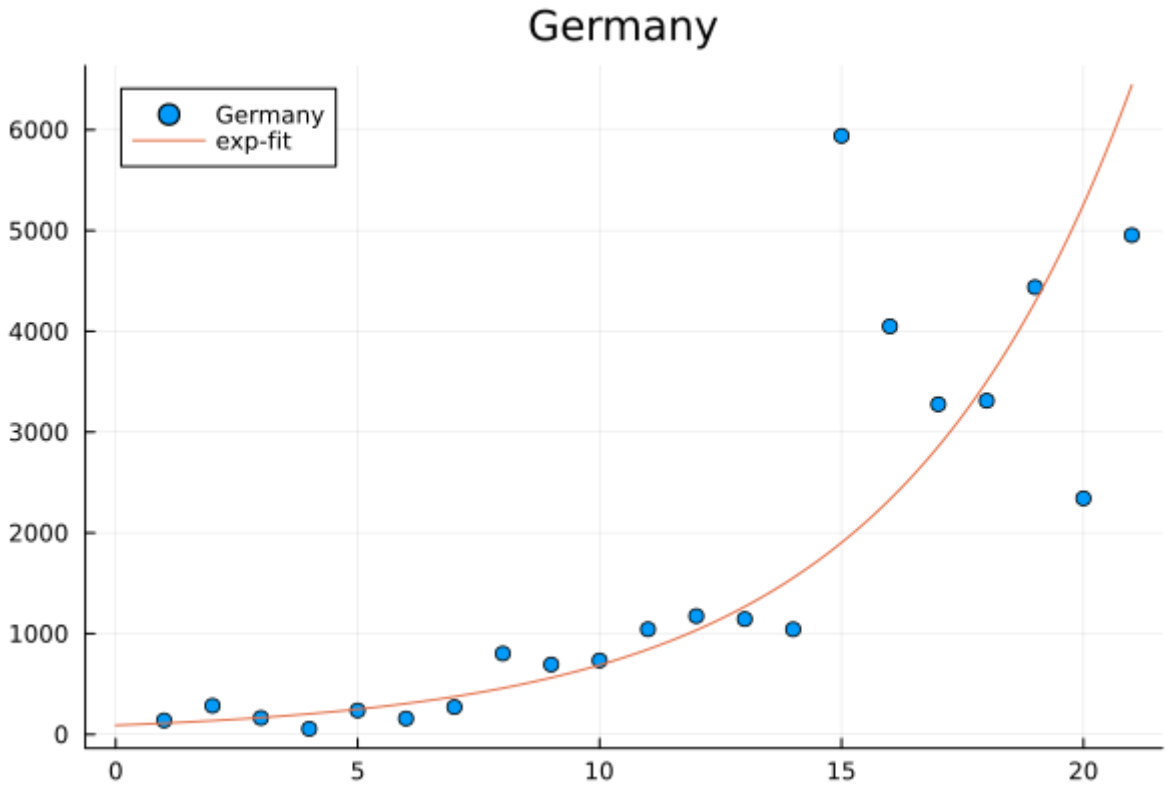
Given the DGL $\frac{dI}{dT}=\beta SI- \gamma I $ and the assumption $S = N = const.$ can be simplified:

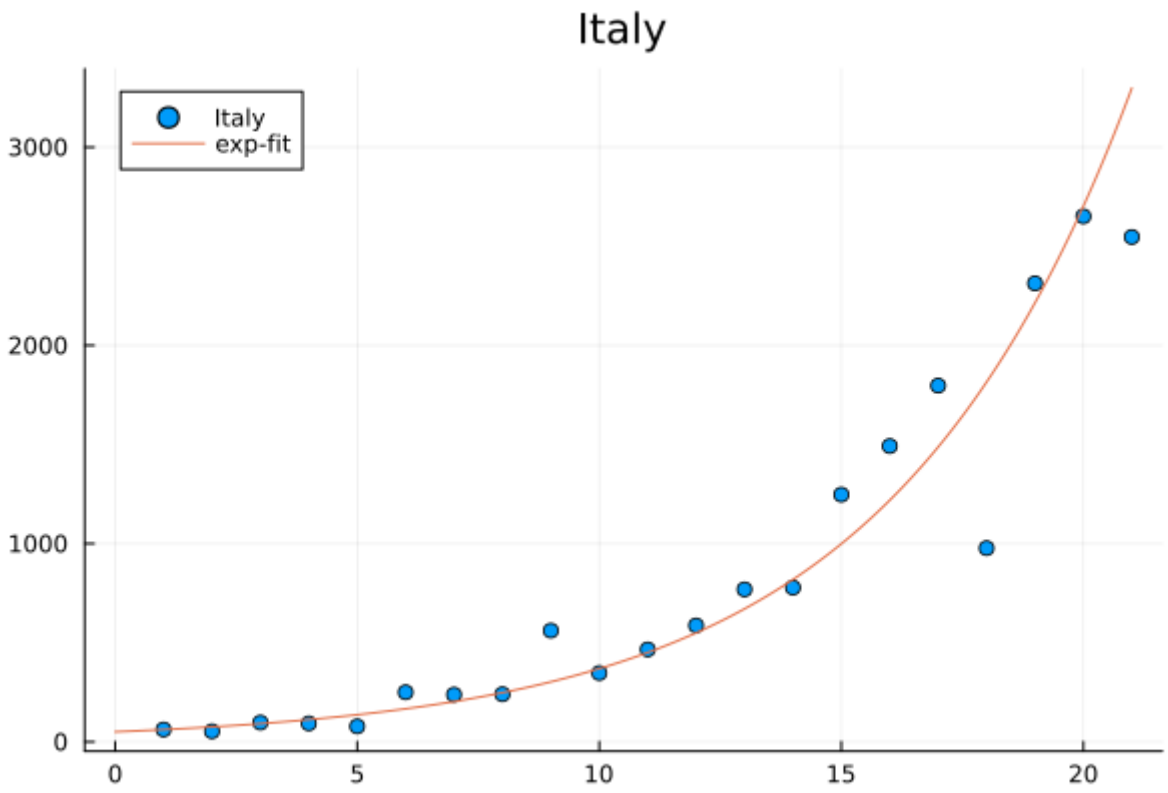
$$\frac{dI}{dT}=\beta NI- \gamma I = I(\beta N- \gamma)$$

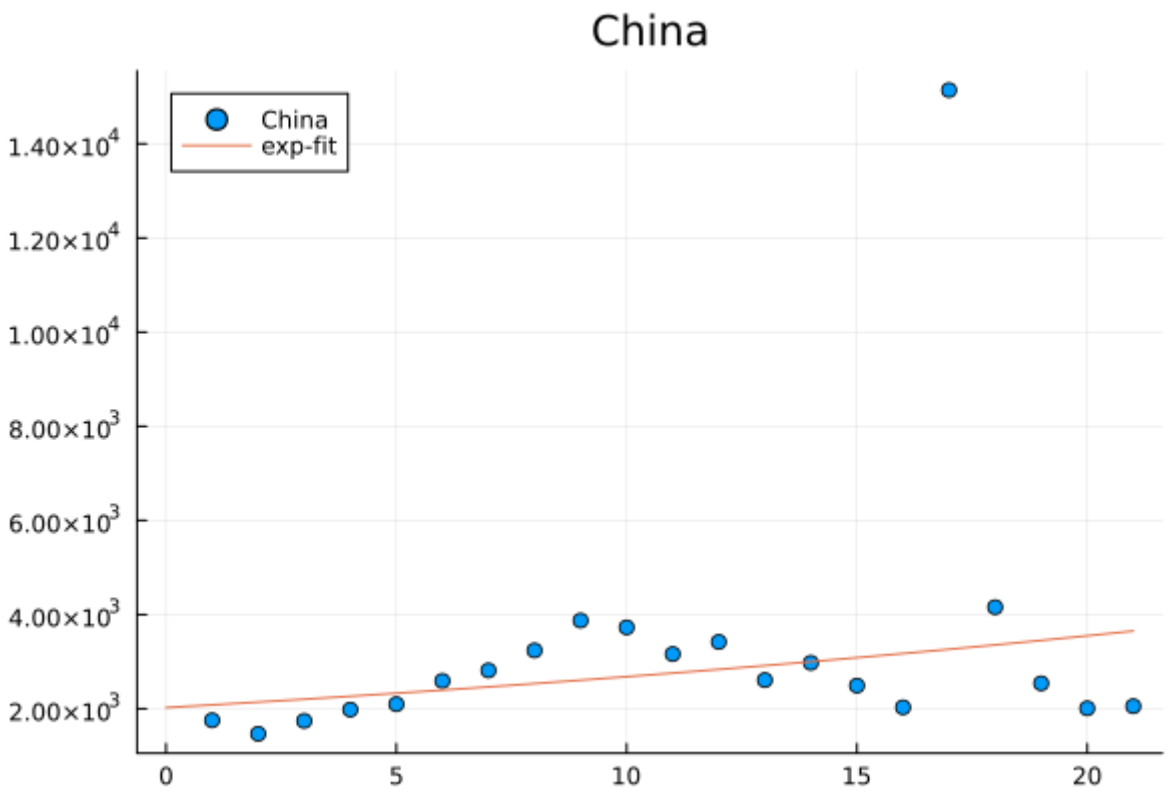
Since this DGL is linear in I, the solution of the DGL can be determined as:

$$ I(t) = I_0 *e^{\beta N - \gamma}$$

B







The fit provides us with following results:

Country	**λ**	**R_0**
Germany	0.203	2.62
Italy	0.199	2.59
China	0.028	1.224

C

Our Fit-Funktion only works under the desease fre equilibrium (DSE) Assumtion. For longer time Series this Assumtion is no longer true, so the Fit will get worse.

D

Since $R_0 = \frac{\beta N}{\gamma}$ it is dependet from the Population size N, China as a denser populated contry should have higher R_0 values. This is not the case, mainly because our model cannot respect influences like restriktions etc.