Solution to Exercise 5. Sensitivity analisis of R_0 for SIP, SIPD, SIPF and SIPDF models

As in Lesson 6, local sensitivity of R_0 for each model has been analyzed through the sensitivity index Ω. The normalized sensitivity index of R_0 with respect to any parameter p_i at a fixed value p^0 is

$$\Omega_{p_i}^{R_0} = \frac{\partial R_0}{\partial p_i} \times \frac{p_i}{R_0}\bigg|_{p_i=p^0} \tag{1}$$

The parameter values have been selected uniformly distributed (i.e. at increments of 10%) over the parameter's full or at least wide range of feasible values. The sensivity index of R_0 models for each parameter is presented in Figure 1 as the solution to Excercise 5.

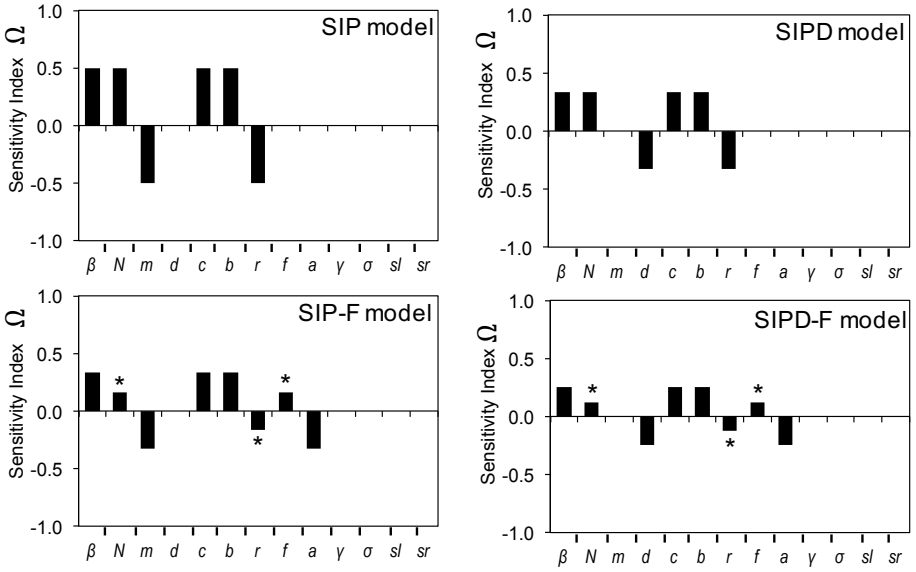

Figure 1: Sensitivity analysis (SA) of R_0 to the parameters for the models SIP, SIPD, SIPF and SIPDF. The sensitivity index represents the unit R_0 change per unit change in the given parameter. The asterisks mark parameters for which the sensitivity index was not constant over the evaluated range. For these parameters, the sensitivity index obtained for the baseline value of the parameter is shown.

The analysis for each parameter was computed at a 0-1 parameter range for all parameters except for b (0-10000), and N (0-200), while the rest of the parameters were held constant with these baseline values: $\beta = 0.001$, $m = 0.1$, $d = 0.1$, $c = 0.1$, $b = 10000$ $r = 0.1$, $a = 0.1$, $f = 0.001$, $N = 100$.