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**Note:**

The per-capita contact rate between any two individuals.

The per-capita rate of recovery once infectious.

Exposure InfectionRate

**Want:**

SL high transmission, low fatality 🡪 : GUI < SL

GUI low transmission, high fatality 🡪 GUI > SL

**Models:**

1. Simple SIR Model
2. With **only 1 least square** based on Infectious cases
3. With **2 least square** based on Infectious cases and death cases
4. SEIR Model
5. SEIR with import and mortality rate
6. Try to search for minimum least square for S0, I0 .
7. Try to plot different population size.
8. Try to use a set effective population size

**Models:**

1. Simple SIR Model
2. With **only 1 least square** based on Infectious cases



0.7916 0.0916 R0 = 8.6389



0.9505 0.0257 R0 = 37.0355

**Conclusion:** Support

**Remark:** Good at capturing Not good at fitting recovered or death cases

1. With **2 least square** based on Infectious cases and death cases

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1.3618 0.2845 R0 = 4.7874

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1.0309 0.0577 R0 = 17.8686

**Conclusion:** Support

**Remark:** Not good at predicting GUI, perhaps we need SEIR

1. SEIR Model

y0 = [1997 0 3 0]



0.0170 -0.5382 -0.5138

y0 = [9997 0 3 0]



1..3240 0.8605 -0.1309

**Conclusion:** Fail to Support

**Remark:** Not good at predicting, Doesn’t make sense to have negative parameters

**Issue:** Initial Condition is crucial!!! But the initial condition here doesn't work well.

1. SEIR with import and mortality rate

y0 = [1997 0 3 0]



y0 = [9997 0 3 0]



**Conclusion:** Support

**Remark:** Fit better, but negative mortality doesn’t make sense.

1. Try to search for minimum least square for S0, I0 .

This takes 5 dimension Monte Carlos. My Matlab fails.

1. Another way is to plot different population size.





1. Or I use a set effective population size.