**PCR4ALL**

**Counterfactual scenarios for the epidemiological/economic model**

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*Outcome dimensions*

The SEIRS model should replicate the entire period of the Covid-19 pandemic and report the following output on a daily (or weekly) basis:

* Number of infected individuals
* Number of hospitalized individuals not in intensive care
* Number of hospitalized individuals in intensive care
* Number of deaths

*Baseline scenario*

The baseline scenario is the real-life situation, i.e., what happened during the pandemic. In principle we could retrieve official data on infected, hospitalized, and dead individuals. However, it could be better to rely on the simulations from the model for sake of comparability. This way, baseline and counterfactual scenarios come from the same source; measurement errors take place in both cases and get largely absorbed when making the comparison.

*Counterfactual scenarios*

The counterfactual scenarios consider different policies to fight the pandemic. Provided that data allow to do this (by estimating in a different manner the scaling parameters b\*), we consider the following scenarios:

* Counterfactual #0: No policy at all (i.e., no fight to the pandemic)
* Counterfactual #1: Social distancing
* Counterfactual #2: Moderate testing (Y% of the population)
* Counterfactual #3: Massive testing (Z% of the population)
* Counterfactual #4: Lockdown
* Counterfactual #5: Vaccination

Combinations of policies are also possible, but they would also make more complicated the interpretation of the results. Focusing on just one policy per scenario seems the best approach.

*Issues*

1) When to implement a policy. Of course, a policy may be more or less useful, and more or less effective depending on when it is implemented. We could follow an automatic rule for all Counterfactuals 1-5, that is:

* Start with no policy at all.
* Implement the policy whenever, in the previous week, i) the number of hospitalized individuals not in intensive care is above X1 or ii) the number of hospitalized individuals in intensive care is above X2.
* Stop the implementation as soon as both indicators are below the thresholds.

2) Counterfactual #5. While the other counterfactuals solely rely on policy decisions, this scenario also depends on technological progress and the discovery of an effective vaccine. Since this generally takes time, it is not possible to adopt it very soon. Realistically, this policy could be implemented not earlier than 12-18 months since the start of the pandemic.