DGE–CRED Practice Session 6: Scenario Analyses

Andrej Drygalla, Katja Heinisch and Christoph Schult* | August 2020
Halle Institute for Economic Research

giz Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH

IWH Halle Institute for Economic Research
Member of the Leibniz Association

On behalf of:
Federal Ministry for the Environment, Nature Conservation and Nuclear Safety
of the Federal Republic of Germany

* Research assistance by Yoshiki Wiskamp is greatly acknowledged.

Outline I

1. Task 1: Run the Baseline scenario
2. Task 2: COVID–19
3. Task 3: Calibrate the damage functions for the agricultural sector.
4. Task 4: RCP 8.5 average
5. Task 5: Impact of temperature on the industry sector.
6. Task 6: Sea level rise and the agricultural sector.

Outline II

Task 1: Run only the `Baseline` scenario for the DGE–CRED model.

- Make sure that the number of sectors and regions is 3, respectively.
- Modify the `RunSimulations.m` file.
- Plot the national share of agriculture to GDP with the Excel file `Results3Scetors3Regions.xlsx`.

Task 2: Try to include the impact of COVID–19.

- *The Economist* assumes a decline in net exports by 55% in 2020 compared to 2019. Source: `https://country.eiu.com/vietnam`
- Define a shock `exo_NX` such that net exports are approximately 55% lower in 2020 than in 2019.
- First you should take a look at the results for the baseline scenario to define the shock size.
- Plot the growth rate of national GDP for the two scenarios.

Task 3: Calibrate the damage functions for the agricultural sector.

- Assume that crop yields in all regions decline by 4.5% for a one degree increase in temperature.
- What parameters need to be modified in the Excel file `ModelSimulationsandCalibration3Sectors3Regions.xlsx`?
- Define a Scenario called `RCP_45_Average` use the excel file `RCPScenarios.xlsx` and run a simulation.
- What is the impact on GDP growth rates?

Task 4: Define the RCP 8.5 average scenario and simulate it.

- Add the Scenario to your figure for task 3.
- Why is the negative effect on GDP decreasing over time?

Task 5: Impact of temperature on the industry sector.

- Assume that with a one degree increase in temperature total factor productivity declines by 4%.
- Modify the respective damage functions coefficients.

Task 6: Sea level rise and the agricultural sector.

- 39% of agricultural land in the Mekong River Delta is at risk of inundation if the sea level rises by 100 cm.
- A 100 cm increase in sea level exposes about 16% of the agricultural land in the Red River Delta.
- For other regions only 2% of agricultural land is at risk of inundation.
- Modify the respective damage coefficients.

Task 7: Building a dike in the Mekong River Delta.

- A dike is a capital good which needs maintenance.
- The coastline of the Mekong River Delta is 600 km long.
- Building a dike along the coastline of the Mekong River Delta of one meter height costs roughly 24 billion Euro or roughly 15% of the GDP of Vietnam in 2016.
- We assume that the damage caused by inundation can be reduced to zero if the height of the dike exceeds the change in sea level.

Task 8: Run sensitivity analysis for RCP 4.5 and 8.5.

- Define the Scenarios RCP 4.5 lower, upper and RCP 8.5 lower, upper.