

DGE–CRED Practical Session 3: Implementation of damages on the agriculture sector

Andrej Drygalla, Katja Heinisch and Christoph Schult* | October 2022
Halle Institute for Economic Research

giz Deutsche Gesellschaft
für Internationale
Zusammenarbeit (GIZ) GmbH

IWH
Leibniz-Institut für
Wirtschaftsforschung Halle

On behalf of:



Federal Ministry
for the Environment, Nature Conservation
and Nuclear Safety

of the Federal Republic of Germany

Task 1: Calibration workbook and the Baseline scenario.

- Use the CreateRawExcelInputFileRobust.m in the function folder.
- Sectors are: Rice, Agriculture, forestry and fishing; Industry; Services
- Subsectors are: Rice; Agriculture, forestry and fishing excluding rice; Industry; Services
- Region: Vietnam without MRD; MRD
- Climate variables regional: surface temperature (tas)
- Climate variables national: sea level (SL)
- Use the Calibration.xlsx file and copy the Sheet Data and the Baseline sheet into the ModelSimulationandCalibration4Sectorsand2Region.xlsx.
- Run the Baseline scenario.

Task 2: Create SSP 119, 245 and 585 scenarios.

- Use the ClimateScenariosSSPRegions2MRI.xlsx in the data folder.
- Create a sheet for SSP119, SSP245 and SSP585.
- Copy the climate data for temperature and sea level into the sheet.
- Define damages for rice in the Mekong River Delta and in Vietnam without MRD.
 - ▶ In Vietnam, without the Mekong River Delta, the effect of a 1°C increase in temperature reduces crop yields (exo_D_1_1) by 3 percent.
 - ▶ For the Mekong River Delta, please use the paths provided in the ClimateScenariosSSPRegions2MRI.xlsx file.

Task 3: Create a graph to illustrate the impact of damages to the rice sector on GDP and its components.

- Use the Figures.xlsx file in the Data folder.
- Open the ResultsScenarios4Sectorsand2Regions.xlsx file.
- Change the value in Cell A4 to ResultsScenarios4Sectorsand2Regions.

Task 4: Create a graph to illustrate the impact of damages to the rice sector on regional value-added, employment, and capital stock.

- Use the Figures.xlsx file in the Data folder.
- Create a graph depicting the deviation between the SSP 585 and Baseline path for Y_1_1, Y_1_2.
- Create a graph depicting the deviation between the SSP 585 and Baseline path for N_1_1, N_1_2.
- Create a graph depicting the deviation between the SSP 585 and Baseline path for K_1_1, K_1_2.
- What do you observe?

Task 5: Adaptation to climate change in the rice sector (labour tax).

- Assume that the government wants to compensate rice farms in the Mekong River Delta for the loss in crop yields by lowering taxes on labour expenses paid by firms (exo_tauNF_1_2) by 10 percent.
- Create a scenario `SSP585_AdaptTaxLab` and add a column with the name `exo_tauNF_1_2`.
- Reduce the tax rate paid by farmers in the Mekong River Delta by 10 percent.
- Is this adaptation measure effective?

Task 6: Adaptation to climate change in the rice sector (capital tax).

- Assume that the government wants to compensate rice farms in the Mekong River Delta for the loss in crop yields by lowering taxes on capital expenses paid by firms (exo_tauKF_1_2) by 10 percent.
- Create a scenario `SSP585_AdaptTaxCap` and add a column with the name `exo_tauKF_1_2`.
- Reduce the tax rate paid by farmers in the Mekong River Delta by 10 percent.
- Is this adaptation measure effective?

Task 7: Private adaptation to climate change in the rice sector (new crop variant).

- Assume that a new rice variant is more heat resistant and is less exposed to the salinity of the soil.
- Only 5 percent of farmers can switch to the new variant per year.
- The crop yield of the new variant is 50 percent less affected by climate change compared to the old variant.
- Growing the new variant increases running costs by 1 percent of GDP today annually after all farmers switch to the new variant.
- Assume that all farmers eventually switch to the new variant and that the adaptation costs are directly proportional to the share of farmers who have already switched to the new variant.
- Implement the measure in a scenario called SSP585_AdaptPrivate. Use the variable `exo_IAP_1_2` to account for the additional expenditures.
- Is this adaptation measure effective?

Task 8: Public adaptation to climate change in the rice sector (new crop variant).

- Assume the same adaptation measure as in Task 7.
- This time adaptation measures are financed by public government expenditures
exo_GA_1_2
- What differences do you observe compared to Task 7?

Task 9: What adaptation measure is the best to reduce the loss in consumption?

- What adaptation measure can reduce the consumption loss the most?
- Is it ok to compare only the differential in consumption levels?