

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

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On behalf of:



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Task 1: Calibration workbook and the Baseline scenario.

- Use the CreateRawExcelInputFileRobust.m in the miscellaneous folder.
- 3 Sectors are: Rice, Agriculture, forestry and fishing; Industry; Services
- 4 Subsectors are: Rice; Agriculture, forestry and fishing excluding rice; Industry; Services
- Region: Vietnam without MRD; MRD
- Climate variables regional: surface temperature (Celsius) (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, the sector structure is the following: sSubsecstart = [1, 3, 4], sSubsecend = [2, 3, 4].

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 and paste them in Column C D E.
- Delete empty rows.
- 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 (exo_D_1_2), please use the paths provided in the ClimateScenariosSSPRegions2MRI.xlsx file.
- Run simulations.

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 value added Y_{1_1} , Y_{1_2} .
- Create a graph depicting the deviation between the SSP 585 and Baseline path for employment N_{1_1} , N_{1_2} .
- Create a graph depicting the deviation between the SSP 585 and Baseline path for capital K_{1_1} , K_{1_2} .
- Change the variables listed in line 2 and compute deviations between the Baseline and SSP scenarios.
- 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.
- Run simulation and plot graph in `Figure.xlsx`.
- 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.
- Run simulation and plot graph in `Figure.xlsx`.
- 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.
- Growing the new variant increases running costs by 1 percent of GDP today annually after all farmers switch to the new variant.
- The crop yield of the new variant is 50 percent less affected by climate change compared to the old 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 new scenario called SSP585_AdaptPrivate. Use the variable `exo_IAP_1_2` to account for the additional expenditures $= 0.05 \times \text{timeperiod} \times 0.01$.
- The impact of climate change depends on the time farmers have to switch to the new crop is $= (0.05 \times \text{timeperiod} \times 0.5) + (1 - (0.05 \times \text{timeperiod})) \times D_{MRD}^{SSP585}$.
- Run simulation and plot graph in Figure.xlsx. Is this adaptation measure effective?

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

- Create new sheet SSP585_AdaptPublic.
- Assume the same adaptation measure as in Task 7.
- This time adaptation measures are financed by public government expenditures exo_GA_1_2 (column G).
- Run simulation and plot graph in Figure.xlsx.
- 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?