

DGE-CRED Model Practical Sessions

1.1 Practical Session 1

Task 1.1: Create an Excel input file with 12 subsectors and 1 region.

- Use the **CreateRawExcelInputFile.m** file, located in the Functions/Miscellaneous folder. You need to run it in the main directory of the model `'../DGE_CRED_Model/'` and select “add path”, as opposed to “change path.”
- Subsector names: Rice, Agriculture excluding rice, Aquaculture, Forestry, Water, Energy, Manufacturing, Construction, TransportWater, TransportLand, Health, Services.
- Region name: Vietnam.
- regional climate variables names: surface temperature (Celsius), surface windspeed (m/s), surface precipitation flux (mm), sunshine (hour per day), surface relative humidity (percent), heatwaves per year, maximal consecutive dry days, maximal consecutive wet days, number of storms (equivalent to average historic storm), number of floods (equivalent to historic floods), number of forest fires, landslides.
- regional climate variables symbols: tas, SfcWind, pr, sunshine, hurs, heatwave, maxdrydays, maxwetdays, storms, floods, fires, landslides.
- national climate variables names: sea level (cm).
- national climate variables symbols: SL.

Task 1.2: Run the **RunSimulation.m** file.

- Test whether the created input file is a valid input to conduct simulations.
 - Run the model simulation in the baseline scenario.
 - Execute the program with 12 subsectors and 1 region.

Task 1.3: Calibrate the model.

- Fill the Excel file **ModelSimulationandCalibration12Sectorsand1Regions.xlsx** with the following data on
 - Subsectoral exports, imports, and intermediate products

Sector	Export Share	Import Share	Intermediate Products
Rice	0.0121	0.0003	0.5592
Agriculture excluding rice	0.1410	0.0407	0.6669
Aquaculture	0.7670	0.0002	0.7111
Forestry	0.3750	0.0446	0.5527
Water	0.0010	0.0001	0.6108
Energy	0.0082	0.0202	0.5776
Manufacturing	0.3368	0.8331	0.8198
Construction	0.0010	0.0001	0.7585
Transport Water	0.1872	0.0001	0.7508
Transport Land	0.1001	0.0010	0.5507

- Initial values

Variable	Value
Initial population	0.907280
Initial value added/GDP	1.86
Import share	0.223
Initial housing area	23
Initial employment level	0.15
Initial investment into housing	0.005

- Once the values have been added to the Excel file, use the program ***UpdateDataExcel.m*** to fill for structural parameters and baseline scenario values.

Task 1.4: Define the Baseline scenario.

- Define the subsectoral value added and employment growth rates, as well as population projections.
- Use data located in the ***BaselineProjections.xlsx*** file, under the ExcelFiles/Data directory.

Task 1.5: Plot the Value Added for all sectors.

- Use the ***BaselineKeyindicators.xlsx*** Excel file in the ExcelFiles/Figures directory.

1.2 Practical Session 2

Task 2.1: Create the SSPP 126 and SSP 585 sensations.

- Create the two scenarios in the ***ModelSimulationandCalibration12Sectorsand1Regions.xlsx*** file.
- Copy the climate variables from the Excel file ***ClimateChangeScenarios.xlsx*** in the ExcelFiles/Data folder.

Task 2.2: Run the SSPs scenarios and plot the resulting GDP.

- Modify the ***RunSimulations.m*** file.
- Use the ***BaselineKeyIndicators.xlsx***, located in the *ExcelFiles/Figures* folder, to plot GDP.
- What do you observe? Why?

Task 2.3: Include damages induced by temperature for the rice and agriculture excluding rice sectors.

- Rice production declines by 3% for each additional degree Celsius.
- Agricultural production excluding rice declines by 0.6% for each additional degree Celsius.

Task 2.4: Include damages induced by sea-level rise for the rice and agriculture excluding rice sectors.

- Use the data in the ***Damages.xlsx*** file, located in the *ExcelFiles/Data* folder.
- Use the VLOOKUP function to map land loss in the ***Damages.xlsx*** to damages in the ***ModelSimulationandCalibration12Sectorsand1Regions.xlsx*** file.
- 1% change in agricultural land loss leads to 1% change in TFP i.e., damages are a one-to-one when mapping land loss to sea-level rise.

1.3 Practical Session 3

Task 3.1: Define damages for the forestry sector.

- Use the data in the ***Damages.xlsx*** file, located in the *ExcelFiles/Data* folder.
- Each fire results in 0.000926% of the forest area in Vietnam is burned.
- For this exercise, consider the potential of adaptation measures as well. If all adaptation measures are implemented, the burned area per fire declines to 0.000592%.

Task 3.2: Define adaptation for the forestry sector.

- Use the data in the ***Damages.xlsx*** file, located in the *ExcelFiles/Data* folder.
- Define adaptation scenarios for the forestry sector in new sheets in the ***ModelSimulationandCalibration12Sectorsand1Regions.xlsx*** file, named "SSP126AdaptForestry" and "SSP585AdaptForestry."

Task 3.3: Define damages to the capital stock of the forestry sector instead of to TFP

- Create a new workbook called *ModelSimulationandCalibration12Sectorsand1Regions_D_K_4.xlsx*.
- In *RunSimulation.m*, define sSensitivity to “_D_K_4.”

Task 3.4: Assume a doubling of annual fires in the SSP 585 scenario.

- Create a new scenario sheet named “SSP585_highfire” with twice as many fires per year as in the SSP585.
- Evaluate the impact of twice as many fires on consumption, GPD and investment.
- How would you describe the relationship between percentage consumption loss and annual number of fires? Is it linear or non-linear?

1.4 Practical session 4

Task 4.1: Define damages for the housing/construction sector by storms.

- Use the Damages.xlsx file to define the damages.
- Assume that in Vietnam, storms occur in four out of five years.
- If a storm occurs, it creates damage to the housing stock reported in cell H49 of the sheet construction In the Damages.xlsx file.

Task 4.2: Define damages for the housing/construction sector by sea level.

- Use the Damages.xlsx file to define the damages.
- Here you need to use the VLOOKUP function to include the damages for different sea levels.
- Damages/Benefits are reported in A25:H45.

Task 4.3: Include adaptation measures against storms.

- Use the Damages.xlsx file to define the adaptation costs.
- Define the scenarios SSP126_AdaptConstruction and SSP585_AdaptConstruction
- Damages caused by storms are zero if all adaptation measures have been implemented.
- Adaptation costs are reported in Q48:W88.

Task 4.4: Include adaptation measures against sea level.

- Use the Damages.xlsx file to define the adaptation costs.
- Damages caused by sea level are zero if the cumulative adaptation expenditures exceed the required cumulative adaptation expenditures associated with the respective bin.
- The cumulative adaptation expenditures are reported in the range **A26:O45** in the Construction sheet of the **ModelSimulationandCalibration12Sectorsand1Regions.xlsx** file.

1.5 Practical session 5

Task 5.1: Define damages for the transport sector caused by temperature.

- Use the *Damages.xlsx* file to implement the damages.
- Assume that only in years with abnormal heatwaves (above the 90 percentile of SSP126 distribution) do the damages materialise.
- Damages to the road stock will reduce the capital stock in the transportation sector.
- The *Damages.xlsx* file states the damages induced by abnormal heatwaves in row 115.

Task 5.2: Define damages for the transport sector caused by sea level.

- Use the *Damages.xlsx* file to implement the damages.
- In order to map the impact of sea-level rise on the road stock, use the **VLOOKUP** function to find the corresponding sea-level bin.
- The damages caused for different sea levels on the road stock are reported in the *Damages.xlsx* file in the sheet Transport. The range is **A27:O46**.

Task 5.3: Define damages for the transport sector caused by landslides.

- Use the *Damages.xlsx* file to implement the damages.
Use the **VLOOKUP** function to map the percentiles of the maximum consecutive wet days in a year with the damages reported.
- The damages caused by different landslides on the road stock are reported in the *Damages.xlsx* file in the sheet Transport. The range is **A182:C212**.

Task 5.4: Implement adaptation measures for the Transport sector against temperature.

- Use the *Damages.xlsx* file to implement the damages.
- Costs are reported in the *Damages.xlsx* file in the sheet Transport. The range is **O81:O111**.

Task 5.5: Implement adaptation measures for the Transport sector against sea-level

- Use the Damages.xlsx file to implement the costs.
- Here use the costs reported in the ***Damages.xlsx*** file in the sheet Transport. The range is ***O81:P111***.

Task 5.6: Implement adaptation measures for the Transport sector against landslides

- Use the Damages.xlsx file to implement the costs.
- Here use the costs reported in the ***Damages.xlsx*** file in the sheet Transport. The range is ***N151:N180***.