DGE–CRED Practical Session 1: Model comparison

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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: Create the ModelSimulationandCalibration3Sectorsand1Region.xlsx File

- Use the CreateRawExcelInputFileRobust.m in the function folder under Miscellaneous
- Sectors and subsectors are: Agriculture, forestry and fishing; Industry; Services
- Region: Vietnam
- Climate variables regional: surface temperature (tas)
- Climate variables national: sea level (SL)

Task 1: Solution

CreateRawExcelInputFileRobust.m

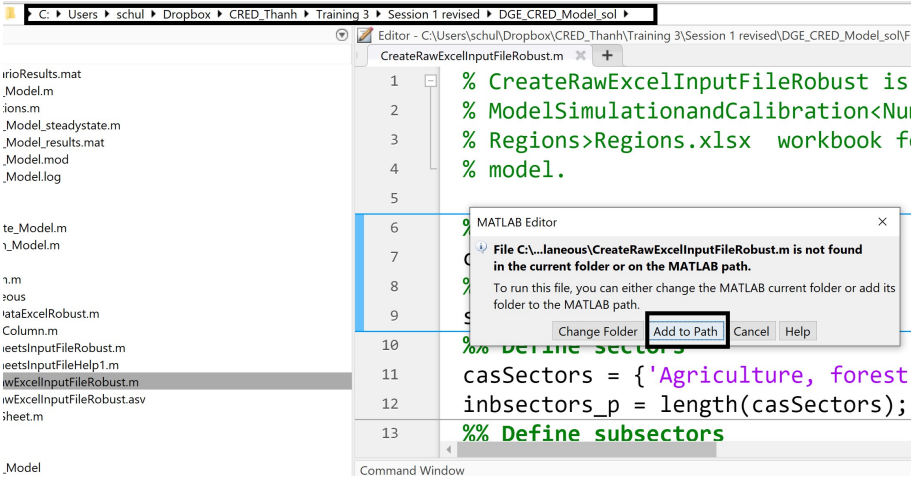
```
% define working directory path
sPathWD = pwd();
%% Define sectors
casSectors = {'Agriculture, forestry and fishing'; 'Industry'; 'Services'};
inbsectors_p = length(casSectors);
%% Define subsectors
casSubSectors = {'Agriculture, forestry and fishing'; 'Industry'; 'Services'};
inbsubsectors_p = length(casSubSectors);
%% Define regions
casRegions = {'Vietnam'};
inbregions_p = length(casRegions);

%% Define regional climate variables
casClimateVarsRegionalName = {'surface temperature (Celsius)'};
casClimateVarsRegional = {'tas'};

%% Define national climate variables
casClimateVarsNationalName = {'Sea level'};
casClimateVarsNational = {'SL'};
casClimateVars = [casClimateVarsRegional casClimateVarsNational];

```

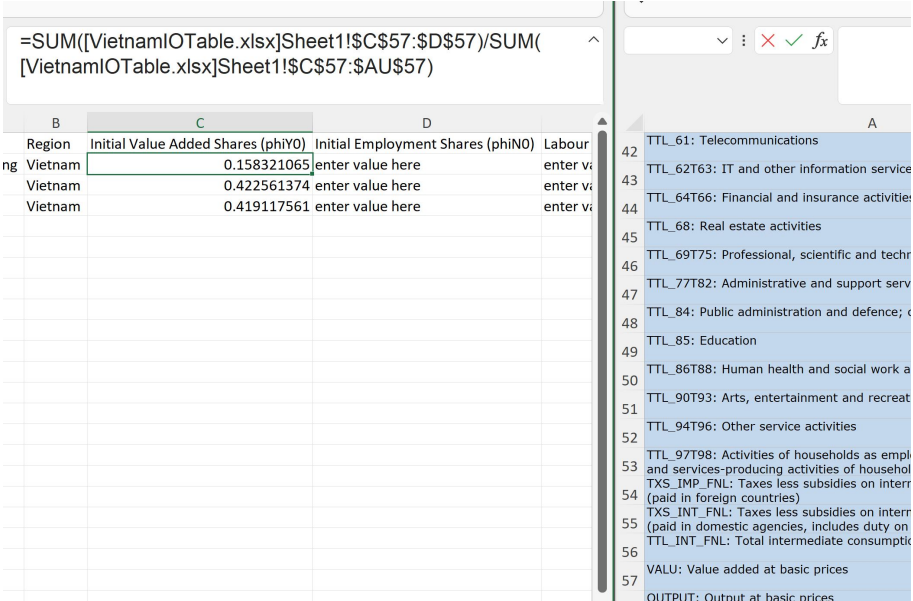
Task 1: Make sure you run the script in the right directory and use addpath



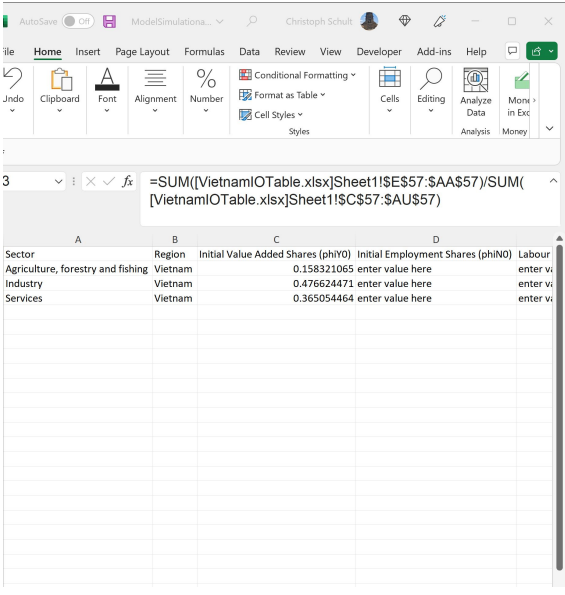
Task 2: Calibrate the value-added shares of the model

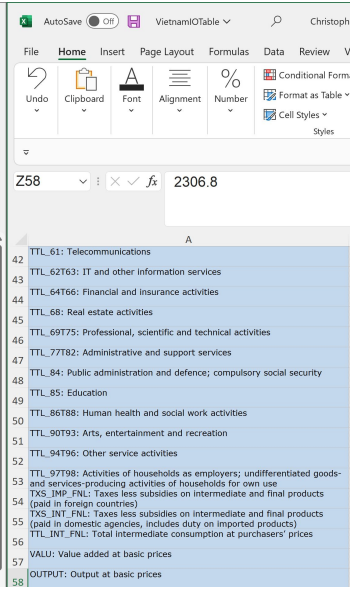
- Use the Vietnam IO Table.xlsx to compute value-added shares for different sectors in Vietnam.
- For agriculture, forestry and fishery, use the value added stated in the IO Table row 57 for agriculture, forestry plus fishing and aquaculture.
- For industry, use all sectors from Mining and Quarrying (column E) to Construction (column AA)
- For services, use all sectors after construction (column AB) to the last column with value added (column AU).
- Check whether the sum is equal to one.

Task 2: Agriculture, forestry and fishery

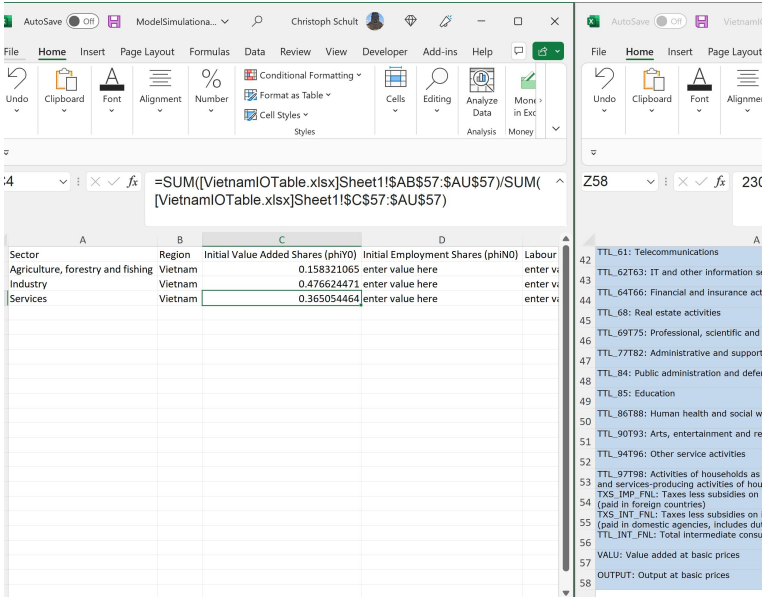


Task 2: Industry and construction





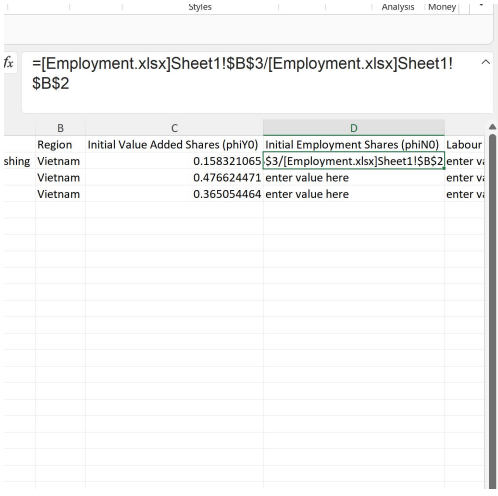
Task 2: Services

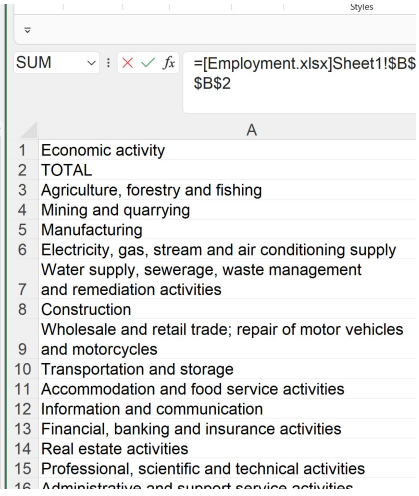


Task 3: Calibrate the employment shares

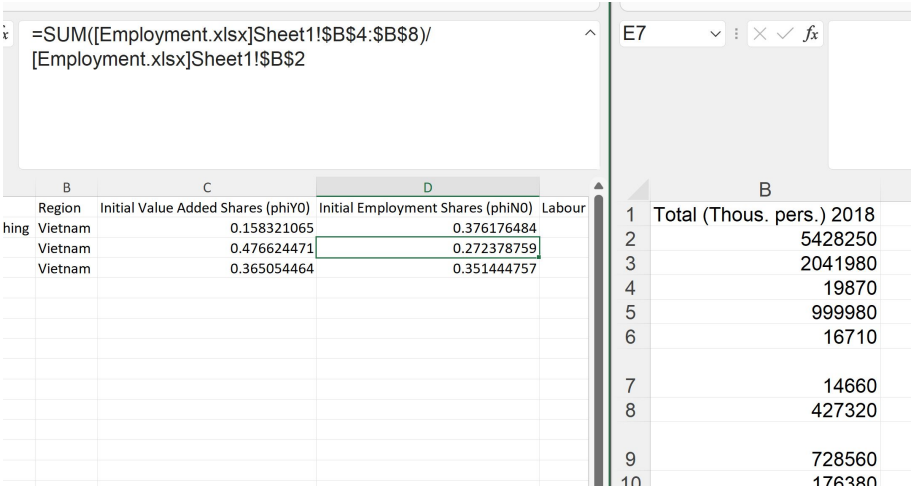
- Use the Employment.xlsx file to compute employment shares for different sectors in Vietnam.
- For industry, use all sectors from Mining and Quarrying to Construction
- For services, use the remaining ones.
- Check whether the sum is one.

Task 3: Agriculture, forestry and fishery

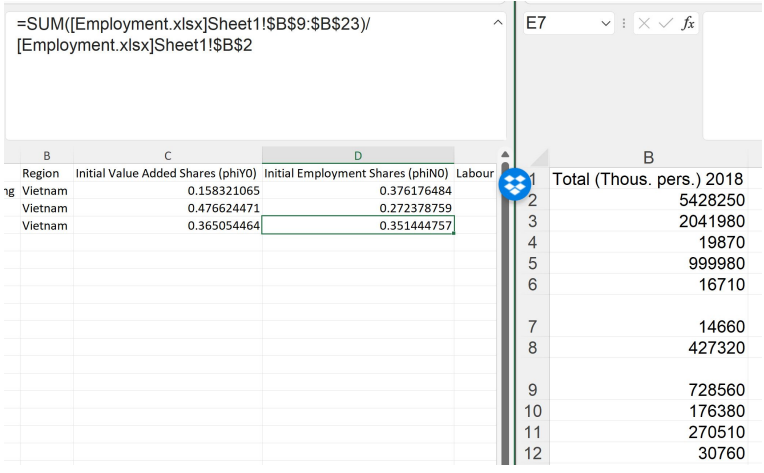




Task 3: Industry



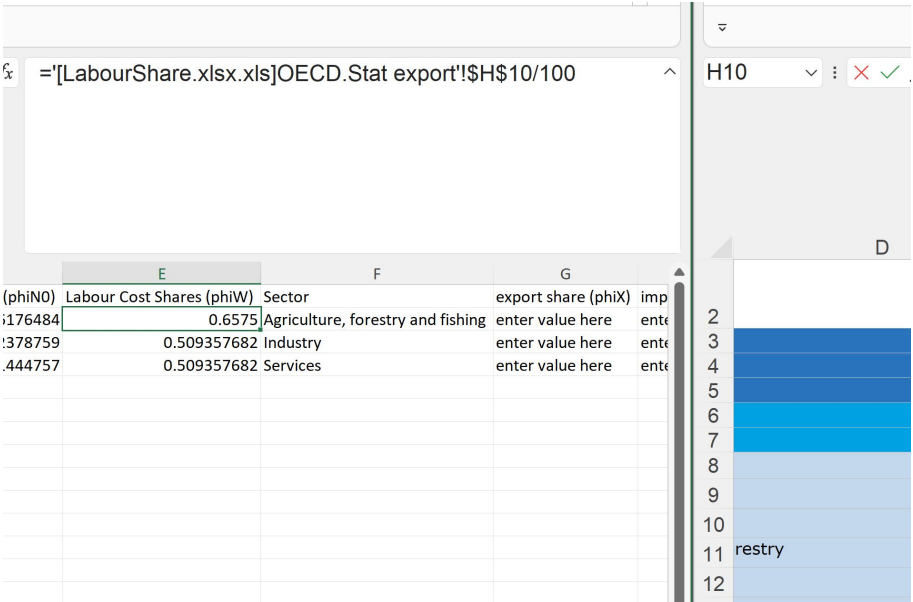
Task 3: Services



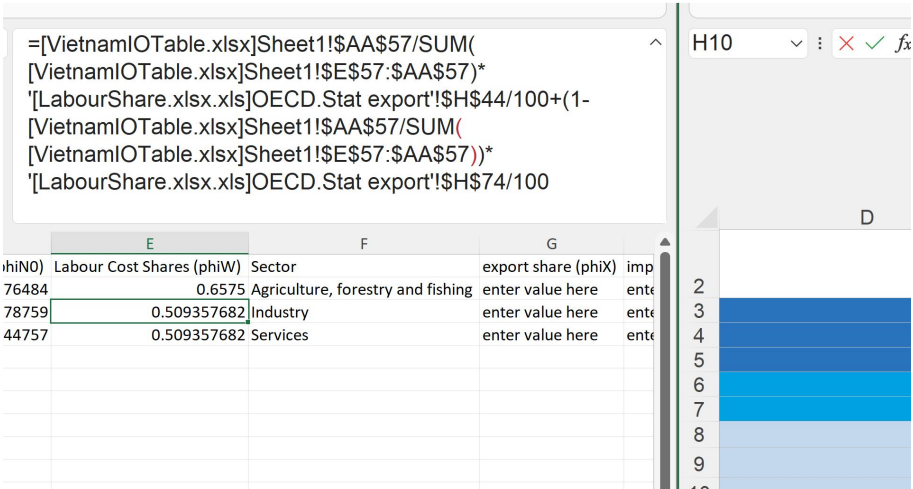
Task 4: Calibrate labour cost shares

- Use the LabourShare.xlsx file to calibrate labour costs relative to value-added.
- For agriculture, forestry and fishery, use row 10.
- For industry use row 74 and row 44 and weight them with the value added share of each sector.
- For services, use row 75.
- Divide the values by 100.

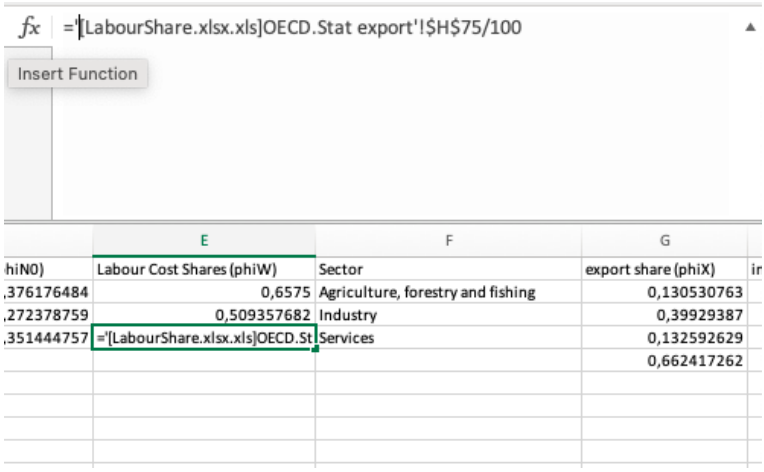
Task 4: Agriculture, forestry and fishery



Task 4: Industry



Task 4: Services

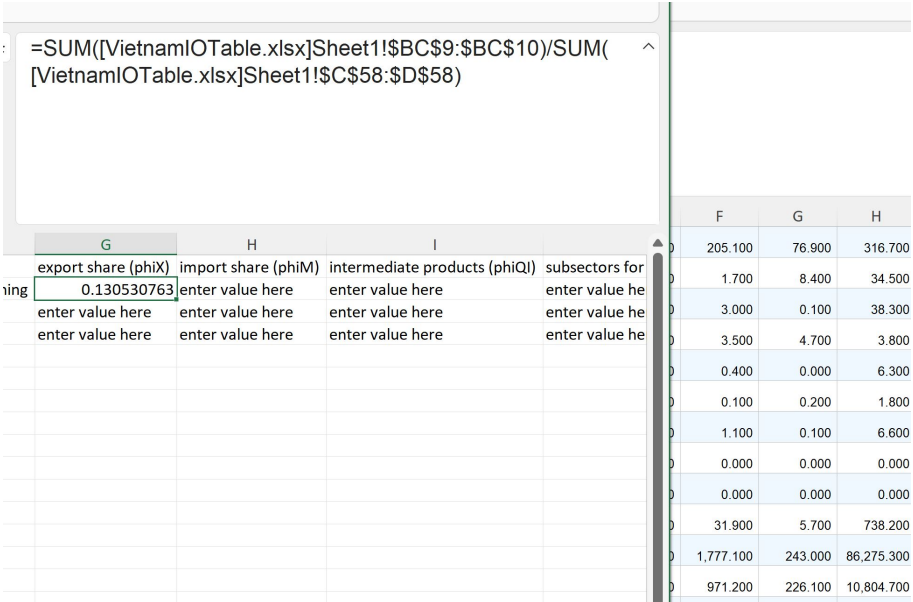


	E	F	G	
hiN0)	Labour Cost Shares (phiW)	Sector	export share (phiX)	ir
,376176484	0,6575	Agriculture, forestry and fishing	0,130530763	
,272378759	0,509357682	Industry	0,39929387	
,351444757	='[LabourShare.xlsx.xls]OECD.St	Services	0,132592629	
			0,662417262	

Task 5: Calibrate export shares

- Use the Vietnam IO Table.xlsx to compute export shares relative to the output of the respective sectors.
- Divide the individual cells in column BC by cells in row 58.
- Use the same sectoral classification as in task 1.

Task 5: Agriculture, forestry and fishery



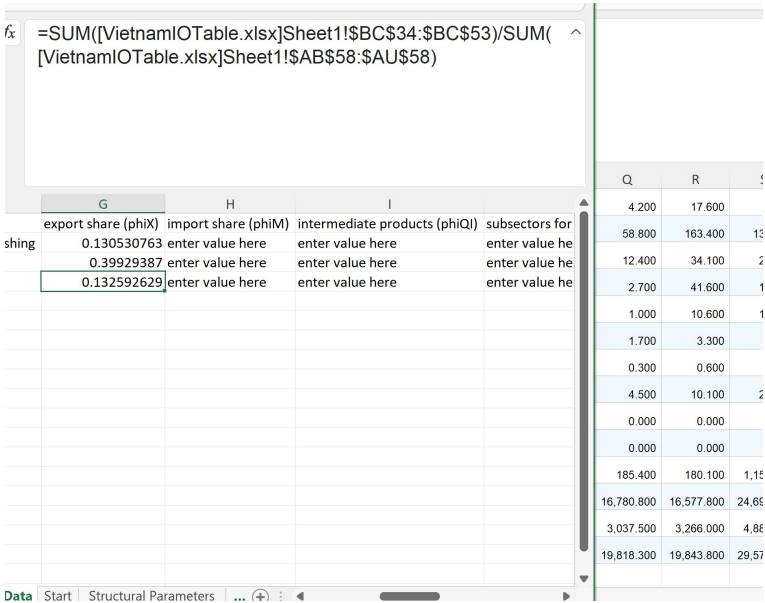
Task 5: Industry

=SUM([VietnamIOTable.xlsx]Sheet1!$BC$11:$BC$33)/SUM([VietnamIOTable.xlsx]Sheet1!$E$58:$AA$58)

	G	H	I	
	export share (phiX)	import share (phiM)	intermediate products (phiQI)	subsectors for
ıg	0.130530763	enter value here	enter value here	enter value he
	0.39929387	enter value here	enter value here	enter value he
	enter value here	enter value here	enter value here	enter value he

Q	R	S	T
4.200	17.600	5.400	1
58.800	163.400	139.700	8
12.400	34.100	25.600	3
2.700	41.600	13.100	
1.000	10.600	11.200	
1.700	3.300	2.400	
0.300	0.600	1.200	
4.500	10.100	27.200	1
0.000	0.000	0.000	
0.000	0.000	0.000	
185.400	180.100	1,155.700	25
16,780.800	16,577.800	24,693.600	16,00
3,037.500	3,266.000	4,885.100	4,97

Task 5: Services



Task 6: Calibrate import shares

- Use the Vietnam IO Table.xlsx to compute import shares relative to total imports for each sector.
- Use the values in column BD.
- Use the same sectoral classification as in task 1.

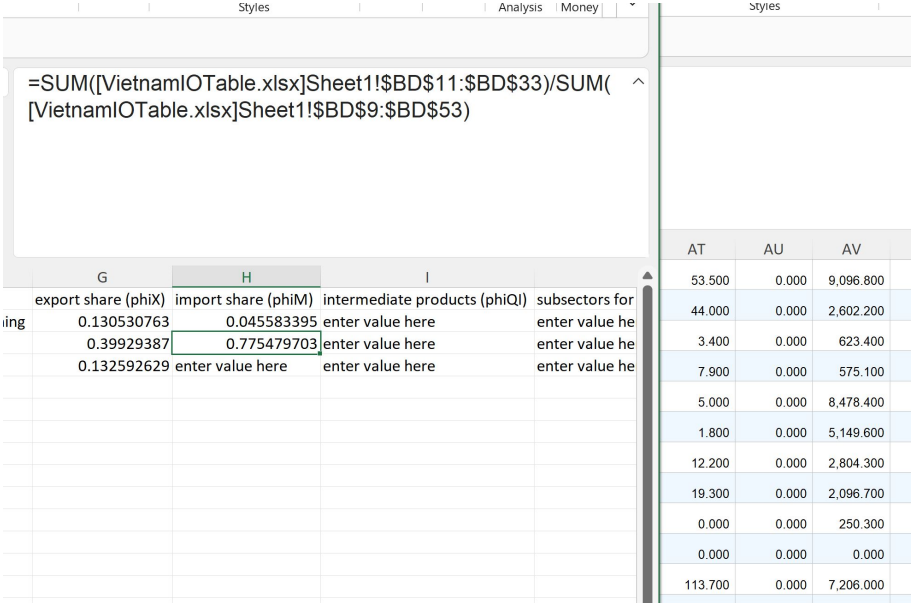
Task 6: Agriculture, forestry and fishery

=SUM([VietnamIOTable.xlsx]Sheet1!$BD$9:$BD$10)/SUM([VietnamIOTable.xlsx]Sheet1!$BD$9:$BD$53)

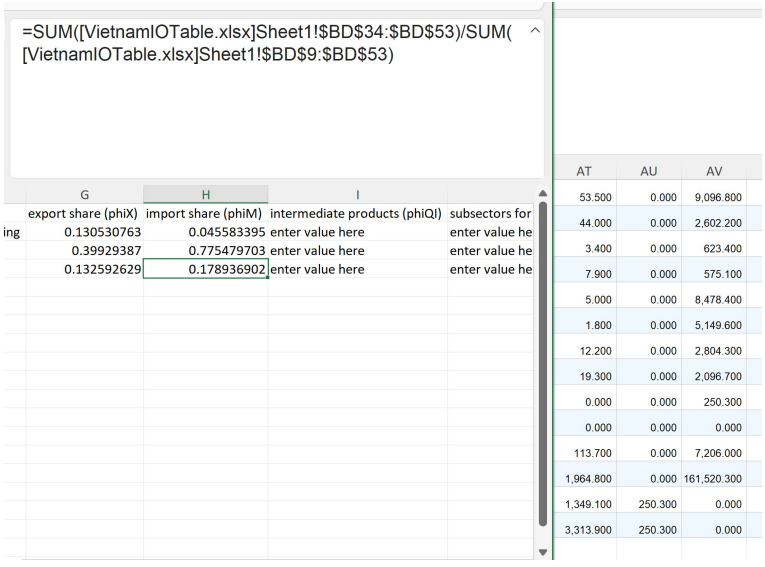
	G	H	I	
	export share (phiX)	import share (phiM)	intermediate products (phiQI)	subsectors for
ning	0.130530763	0.045583395	enter value here	enter value he
	0.39929387	enter value here	enter value here	enter value he
	0.132592629	enter value here	enter value here	enter value he

AT	AU	AV	A
53.500	0.000	9,096.800	
44.000	0.000	2,602.200	
3.400	0.000	623.400	
7.900	0.000	575.100	
5.000	0.000	8,478.400	11
1.800	0.000	5,149.600	17
12.200	0.000	2,804.300	5
19.300	0.000	2,096.700	27
0.000	0.000	250.300	
0.000	0.000	0.000	
113.700	0.000	7,206.000	1
1,964.800	0.000	161,520.300	82
1,349.100	250.300	0.000	

Task 6: Industry and construction



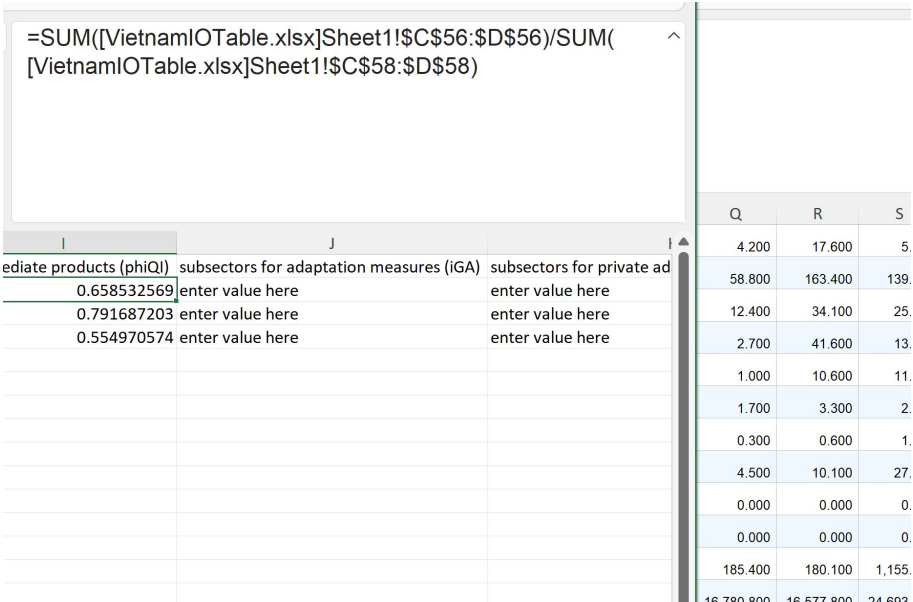
Task 6: Services



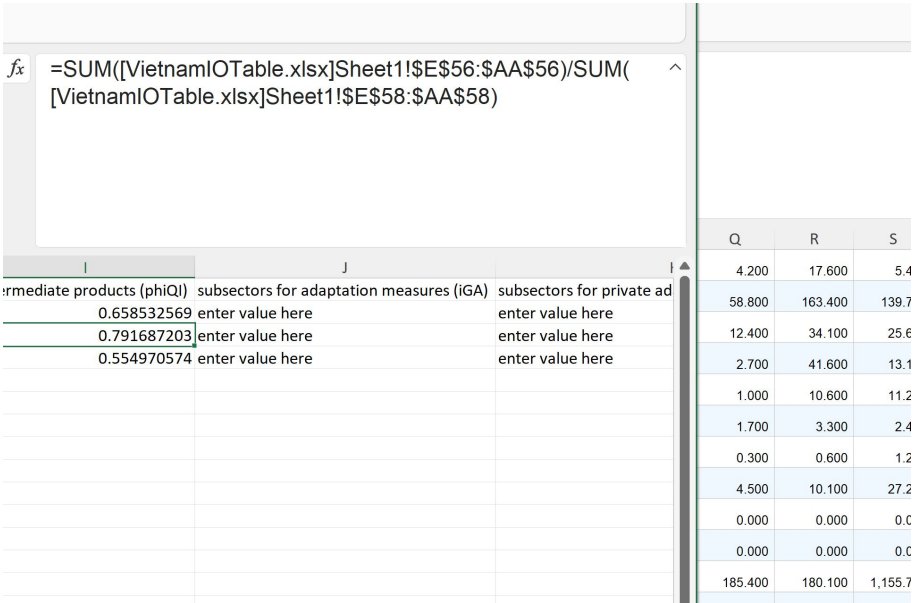
Task 7: Calibrate intermediate input shares.

- Use the Vietnam IO Table.xlsx to compute intermediate input shares relative to the total output of each sector.
- Use the values in rows 56 and 58.
- Use the same sectoral classification as in task 1.

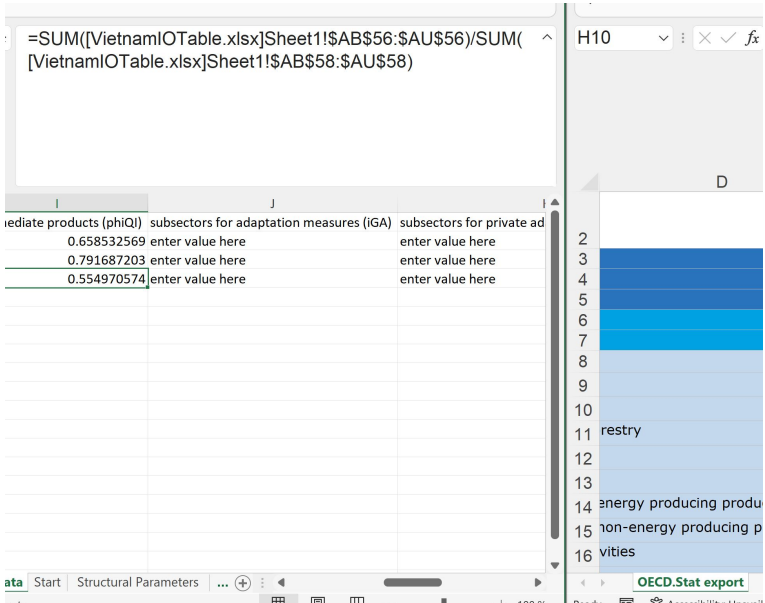
Task 7: Agriculture, forestry and fishery



Task 7: Industry and construction



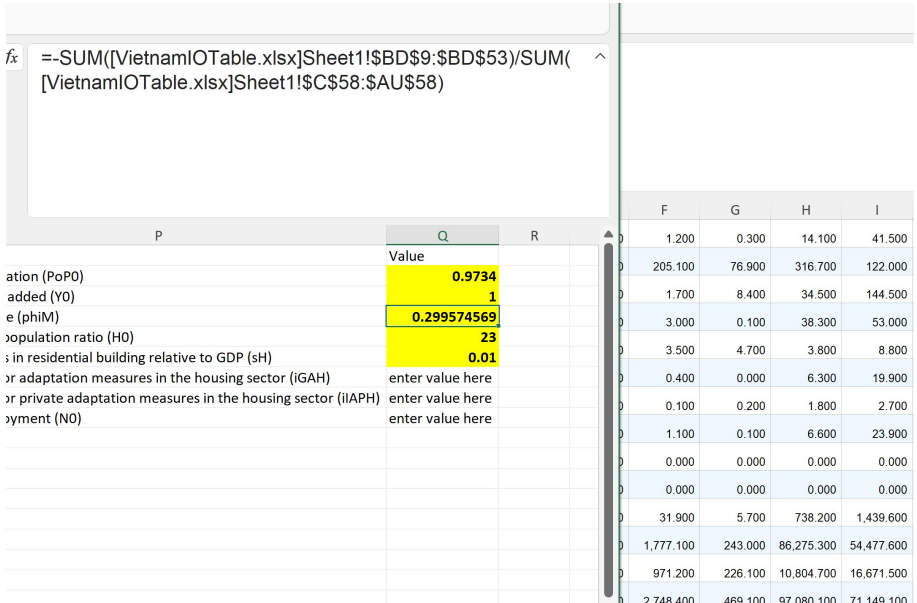
Task 7: Services



Task 8: Calibrate initial population, GDP, import share, housing to population ratio and investments in residential buildings.

- Set initial population to $\frac{97340000}{100000000}$.
- Initial GDP is 1.
- Import share is the absolute value of the sum of the range BD9 to BD55 in VietnamIOTable.xlsx.
- Housing to population ratio is 23.
- Investments in residential buildings is 0.01.

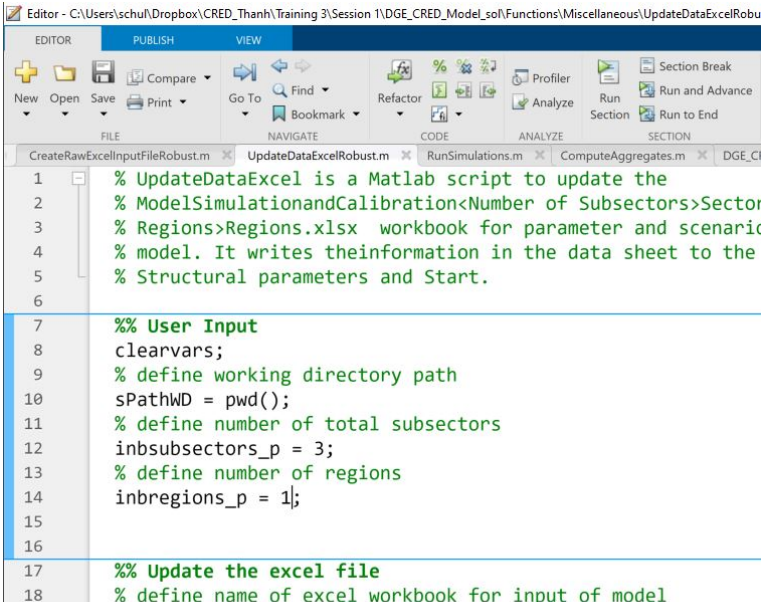
Task 8: Solution



Task 9: Run UpdateDataExcelFileRobust.m

- Modify line with inbsubsectors_p and inbregions_p such that you have 3 sectors and 1 region.

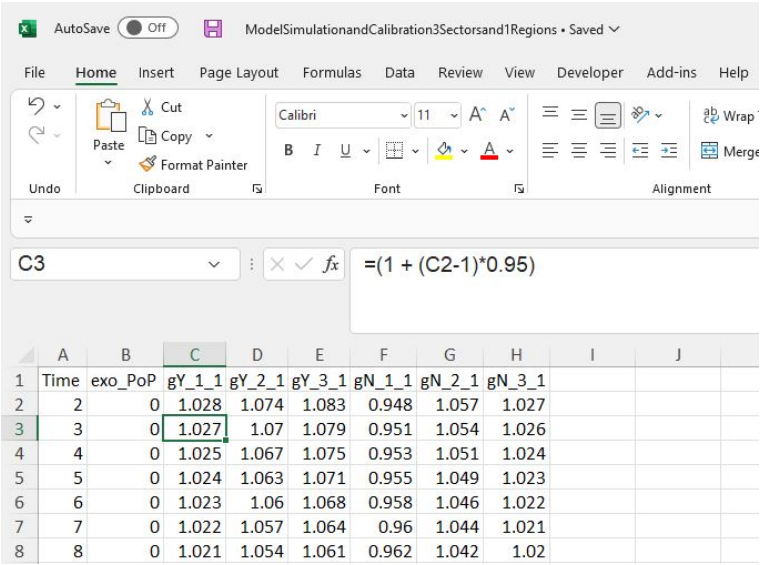
Task 9: Solution



Task 10: Create the Baseline scenario for simulation.

- In the Baseline worksheet, define growth paths for value-added and employment for the different sectors.
- For agriculture, forestry and fishery use an annual growth rate of 2.8 per cent for value-added and -5.2 per cent for employment.
- For industry, use an annual growth rate of 7.4 percent for value-added and 5.7 percent for employment.
- For services use an annual growth rate of 8.3 percent for value-added and 2.7 percent for employment.
- Assume a factor of decay of 0.95.

Task 10: Solution

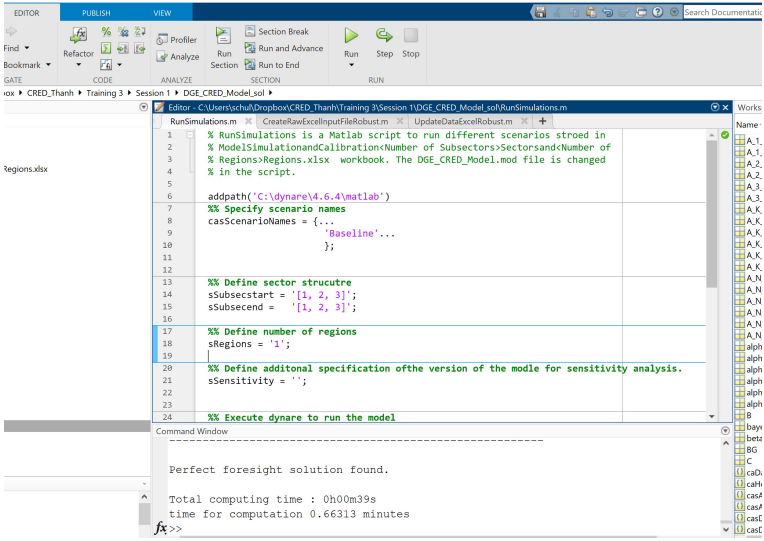


	A	B	C	D	E	F	G	H	I	J
1	Time	exo_PoP	gY_1_1	gY_2_1	gY_3_1	gN_1_1	gN_2_1	gN_3_1		
2	2	0	1.028	1.074	1.083	0.948	1.057	1.027		
3	3	0	1.027	1.07	1.079	0.951	1.054	1.026		
4	4	0	1.025	1.067	1.075	0.953	1.051	1.024		
5	5	0	1.024	1.063	1.071	0.955	1.049	1.023		
6	6	0	1.023	1.06	1.068	0.958	1.046	1.022		
7	7	0	1.022	1.057	1.064	0.96	1.044	1.021		
8	8	0	1.021	1.054	1.061	0.962	1.042	1.02		

Task 11: Run the Baseline scenario.

- Open RunsImulation.m file in Matlab.
- Check whether you add the right dynare version.
- Check whether you have the correct number of sectors and subsectors specified (1,2,3).
- Check whether you have the correct number of regions specified (1).
- Run the script.

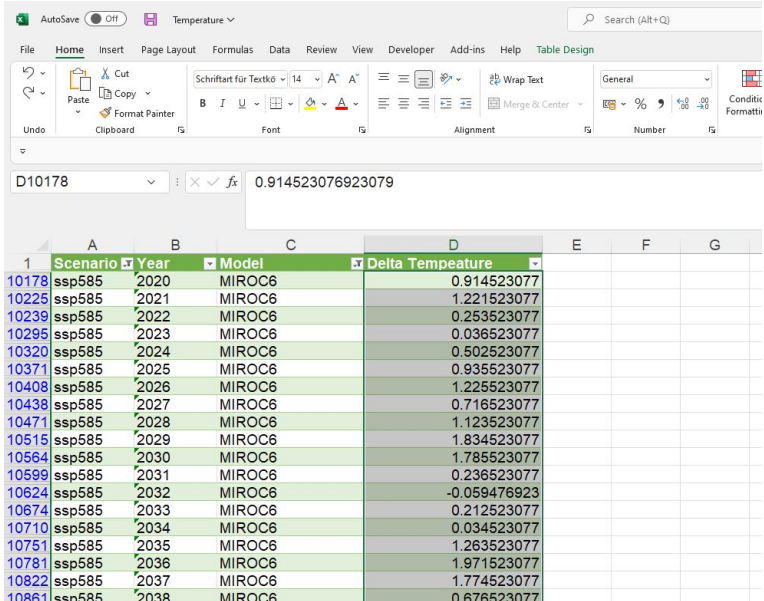
Task 11: Solution



Task 12: Create the SSP 585 scenario.

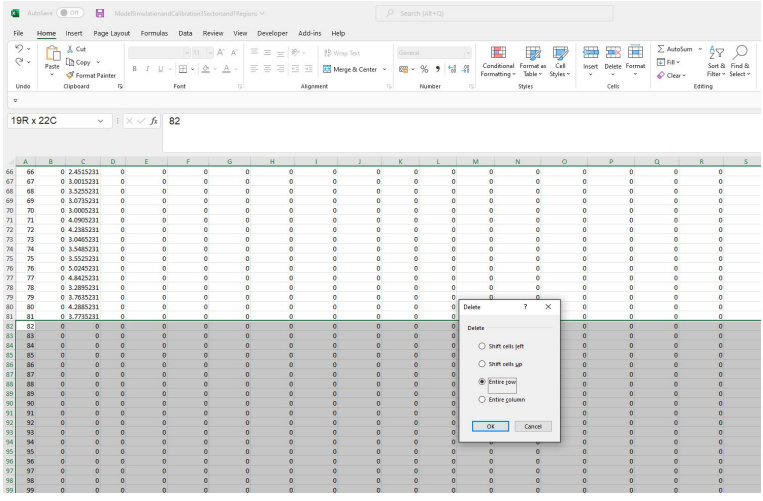
- Copy the Scenario sheet in the ModelSimulationandCalibration3Sectorsand1Region.xlsx file and name the copy SSP585.
- Please open the Temperature.xlsx file.
- Select the model MIROC6 and copy the change in temperature
- Delete all rows after row 81.
- Assume that a 1°C leads to a decline in TFP by 3.6 percent

Task 12: Select the right scenario and model



	A	B	C	D	E	F	G
1	Scenario	Year	Model	Delta Tempeature			
10178	ssp585	2020	MIROC6	0.914523077			
10225	ssp585	2021	MIROC6	1.221523077			
10239	ssp585	2022	MIROC6	0.253523077			
10295	ssp585	2023	MIROC6	0.036523077			
10320	ssp585	2024	MIROC6	0.502523077			
10371	ssp585	2025	MIROC6	0.935523077			
10408	ssp585	2026	MIROC6	1.225523077			
10438	ssp585	2027	MIROC6	0.716523077			
10471	ssp585	2028	MIROC6	1.123523077			
10515	ssp585	2029	MIROC6	1.834523077			
10564	ssp585	2030	MIROC6	1.785523077			
10599	ssp585	2031	MIROC6	0.236523077			
10624	ssp585	2032	MIROC6	-0.059476923			
10674	ssp585	2033	MIROC6	0.212523077			
10710	ssp585	2034	MIROC6	0.034523077			
10751	ssp585	2035	MIROC6	1.263523077			
10781	ssp585	2036	MIROC6	1.971523077			
10822	ssp585	2037	MIROC6	1.774523077			
10861	ssp585	2038	MIROC6	0.676523077			

Task 12: Copy to SSP 585 sheet and delete unnecessary rows

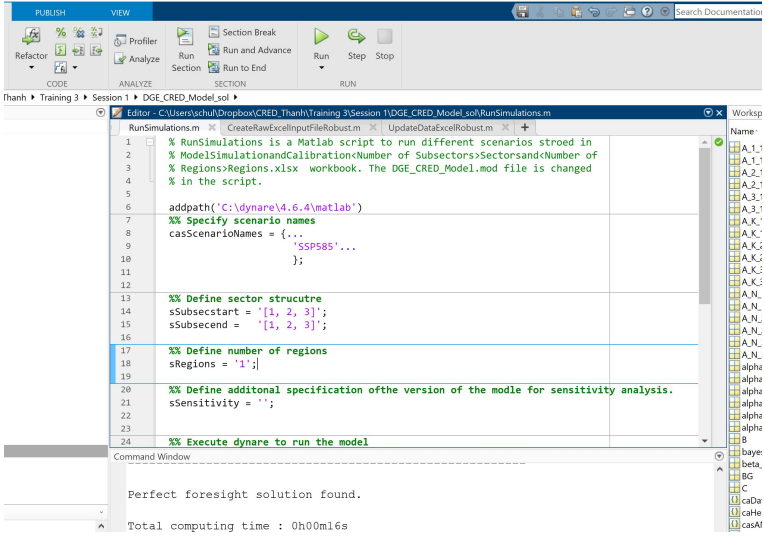


Task 12: Define damages on TFP for all sectors

=0.036*$C2

D	E	F	G	H	I	J	K	L	M
:o_SL	exo_GA_1_1	exo_GA_2_1	exo_GA_3_1	exo_IAP_1_1	exo_IAP_2_1	exo_IAP_3_1	exo_D_1_1	exo_D_2_1	exo_D_3_1 e:
0	0	0	0	0	0	0	0.0332079	0.0332079	0.0332079
0	0	0	0	0	0	0	0.0437396	0.0437396	0.0437396
0	0	0	0	0	0	0	0.0090101	0.0090101	0.0090101
0	0	0	0	0	0	0	0.0019567	0.0019567	0.0019567
0	0	0	0	0	0	0	0.0183191	0.0183191	0.0183191
0	0	0	0	0	0	0	0.033653	0.033653	0.033653
0	0	0	0	0	0	0	0.0443297	0.0443297	0.0443297
0	0	0	0	0	0	0	0.0263218	0.0263218	0.0263218
0	0	0	0	0	0	0	0.0401301	0.0401301	0.0401301
0	0	0	0	0	0	0	0.0660563	0.0660563	0.0660563
0	0	0	0	0	0	0	0.0645197	0.0645197	0.0645197
0	0	0	0	0	0	0	0.0084913	0.0084913	0.0084913

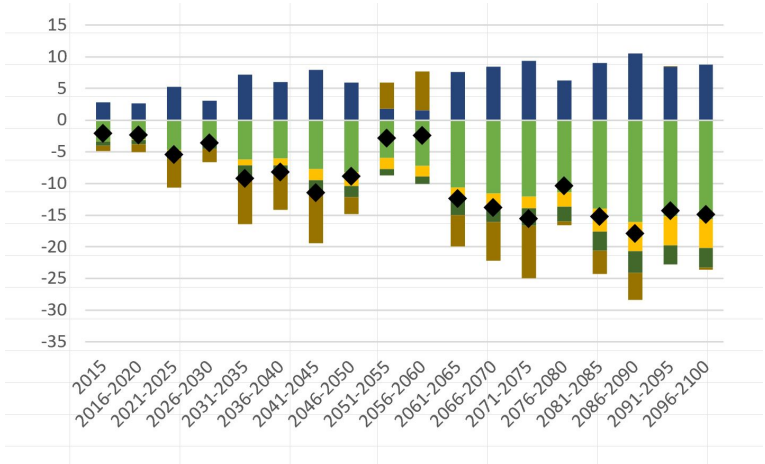
Task 12: Run the SSP 585 scenario



Task 13: Create a Figure to illustrate the impact of climate change on GDP and its components.

- Use the Data/Figures.xlsx file to illustrate the differences between GDP, consumption, investment and net exports in the Baseline and the SSP 585 scenario.
- Make sure the ResultsScenarios3Sectorsand1Regions.xlsx file is open.
- Change the cell value A2 in sheet Var to ResultsScenarios3Sectorsand1Regions.
- Further adapt the names of the variables you want to illustrate for GDP (Y), consumption (C), investment (I), Net exports (NX) and Housing Expenditures.
- Interpret the results.

Task 13: Figure for GDP and its components



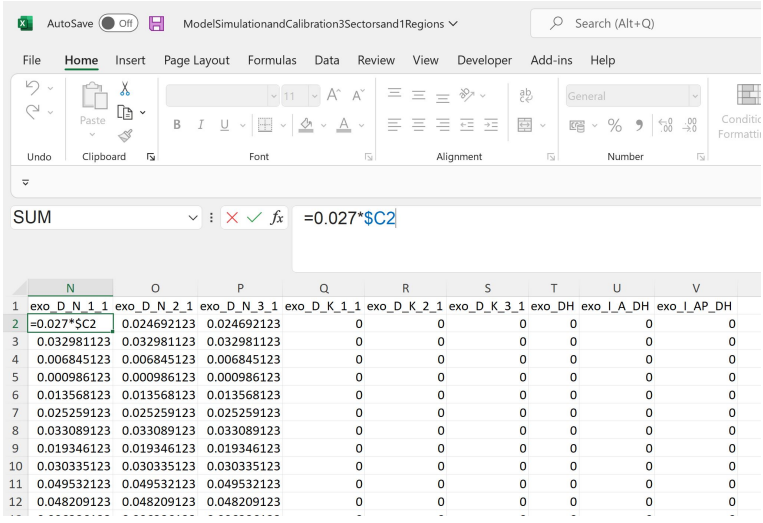
Task 13: Interpretation

- Impact on GDP mainly follows the damages on TFP.
- GDP components react differently to TFP shock.
- Consumption, investment, government and housing expenditure decline, while net exports increase.

Task 14: Add Damages to labour productivity, crop yields and mortality.

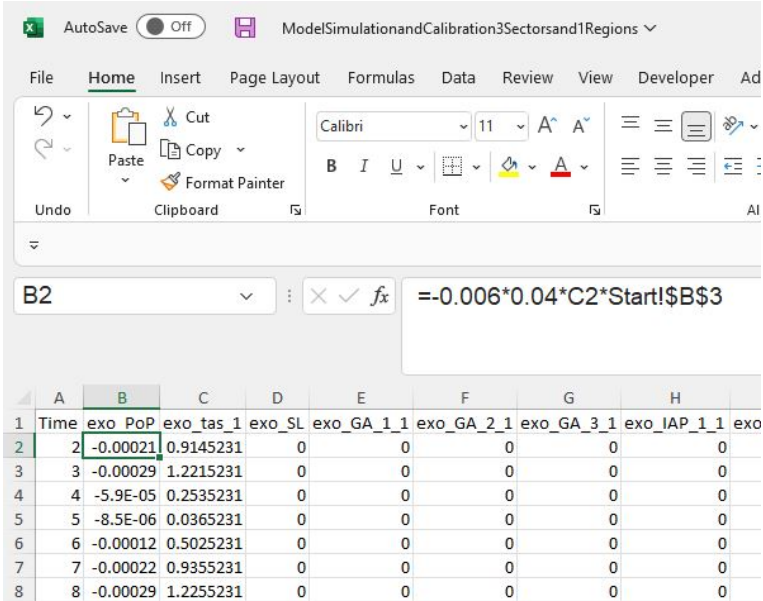
- Assume that labour productivity declines with 1°C by 2.7 percent.
- Crop yields decline by 6.9 percent for 1°C.
- Assume that the mortality rate in Vietnam is 0.6 percent, and for each 1°C increase, the mortality rate increases by 4 percent.
- Include the damages into the SSP 585 scenario and rerun it.
- Take a look at the impact of climate change on GDP and its components.

Task 14: Labour productivity



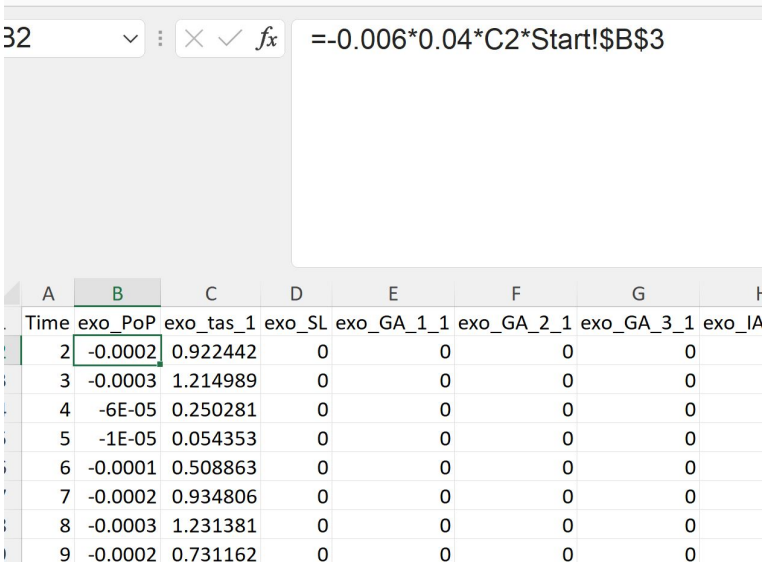
	N	O	P	Q	R	S	T	U	V
1	exo_D_N_1_1	exo_D_N_2_1	exo_D_N_3_1	exo_D_K_1_1	exo_D_K_2_1	exo_D_K_3_1	exo_DH	exo_I_A_DH	exo_I_AP_DH
2	=0.027*$C2	0.024692123	0.024692123	0	0	0	0	0	0
3	0.032981123	0.032981123	0.032981123	0	0	0	0	0	0
4	0.006845123	0.006845123	0.006845123	0	0	0	0	0	0
5	0.000986123	0.000986123	0.000986123	0	0	0	0	0	0
6	0.013568123	0.013568123	0.013568123	0	0	0	0	0	0
7	0.025259123	0.025259123	0.025259123	0	0	0	0	0	0
8	0.033089123	0.033089123	0.033089123	0	0	0	0	0	0
9	0.019346123	0.019346123	0.019346123	0	0	0	0	0	0
10	0.030335123	0.030335123	0.030335123	0	0	0	0	0	0
11	0.049532123	0.049532123	0.049532123	0	0	0	0	0	0
12	0.048209123	0.048209123	0.048209123	0	0	0	0	0	0

Task 14: Crop yields



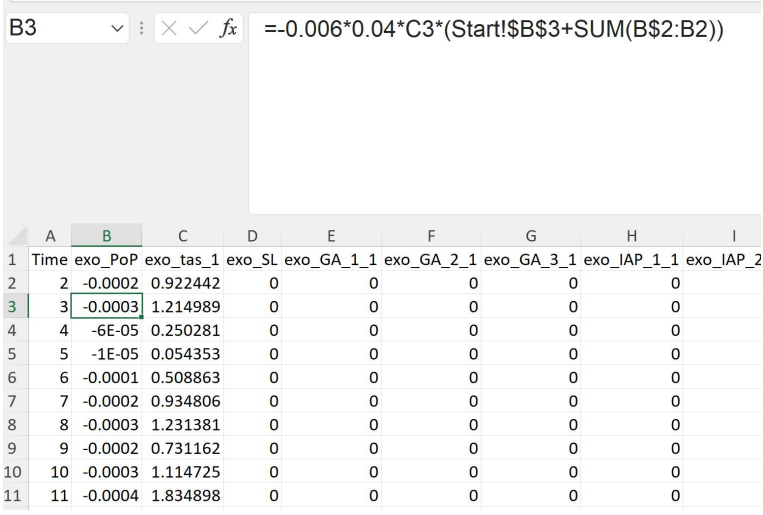
	A	B	C	D	E	F	G	H	
1	Time	exo_PoP	exo_tas_1	exo_SL	exo_GA_1_1	exo_GA_2_1	exo_GA_3_1	exo_IAP_1_1	exo
2	2	-0.00021	0.9145231	0	0	0	0	0	
3	3	-0.00029	1.2215231	0	0	0	0	0	
4	4	-5.9E-05	0.2535231	0	0	0	0	0	
5	5	-8.5E-06	0.0365231	0	0	0	0	0	
6	6	-0.00012	0.5025231	0	0	0	0	0	
7	7	-0.00022	0.9355231	0	0	0	0	0	
8	8	-0.00029	1.2255231	0	0	0	0	0	

Task 14: Mortality (I)



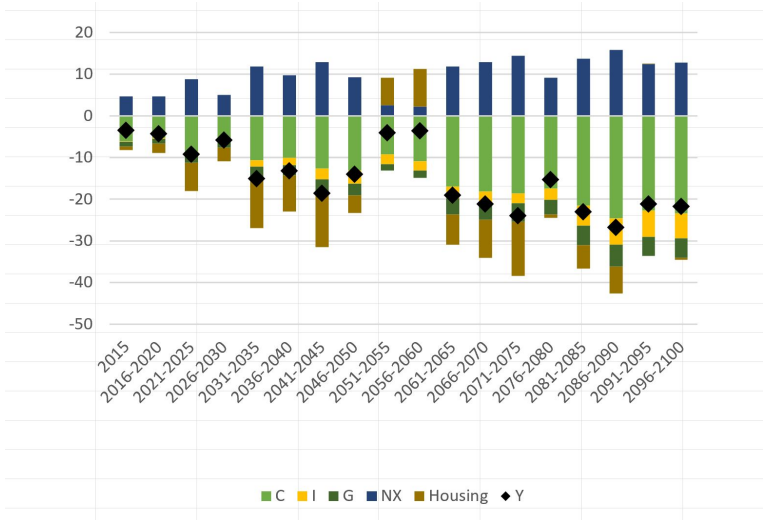
	A	B	C	D	E	F	G	H
	Time	exo_PoP	exo_tas_1	exo_SL	exo_GA_1_1	exo_GA_2_1	exo_GA_3_1	exo_IA
2	2	-0.0002	0.922442	0	0	0	0	
3	3	-0.0003	1.214989	0	0	0	0	
4	4	-6E-05	0.250281	0	0	0	0	
5	5	-1E-05	0.054353	0	0	0	0	
6	6	-0.0001	0.508863	0	0	0	0	
7	7	-0.0002	0.934806	0	0	0	0	
8	8	-0.0003	1.231381	0	0	0	0	
9	9	-0.0002	0.731162	0	0	0	0	

Task 14: Mortality (II)



	A	B	C	D	E	F	G	H	I
1	Time	exo_PoP	exo_tas_1	exo_SL	exo_GA_1_1	exo_GA_2_1	exo_GA_3_1	exo_IAP_1_1	exo_IAP_2
2	2	-0.0002	0.922442	0	0	0	0	0	
3	3	-0.0003	1.214989	0	0	0	0	0	
4	4	-6E-05	0.250281	0	0	0	0	0	
5	5	-1E-05	0.054353	0	0	0	0	0	
6	6	-0.0001	0.508863	0	0	0	0	0	
7	7	-0.0002	0.934806	0	0	0	0	0	
8	8	-0.0003	1.231381	0	0	0	0	0	
9	9	-0.0002	0.731162	0	0	0	0	0	
10	10	-0.0003	1.114725	0	0	0	0	0	
11	11	-0.0004	1.834898	0	0	0	0	0	

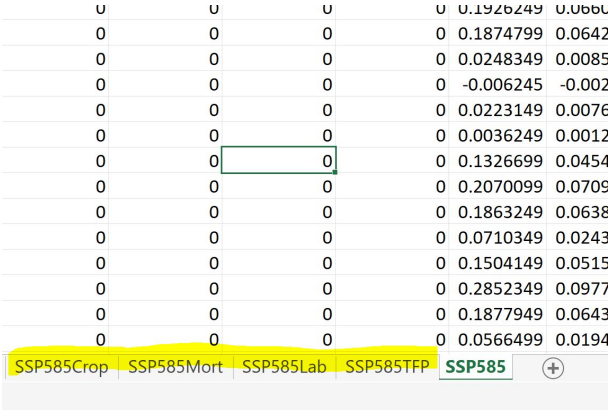
Task 14: GDP Components



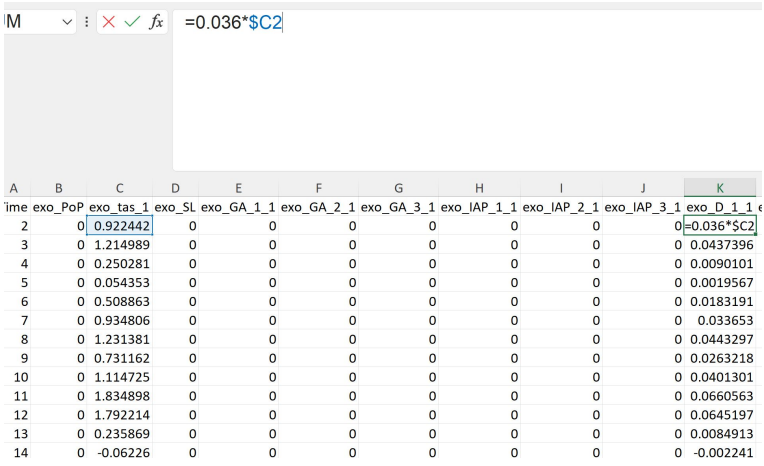
Task 15: Create scenarios to compare the impact of the different damage types.

- Create SSP585TFP, SSP585Lab, SSP585Mort, SSP585Crop.
- SSP585TFP, only TFP shocks are turned on.
- SSP585Lab only labour productivity shocks are turned on.
- SSP585Mort only mortality shocks are turned on.
- SSP585Crop only crop yield shocks are turned on.

Task 15: Copy SSP585 sheet and rename the copies to SSP585TFP, SSP585Lab, SSP585Mort, SSP585Crop

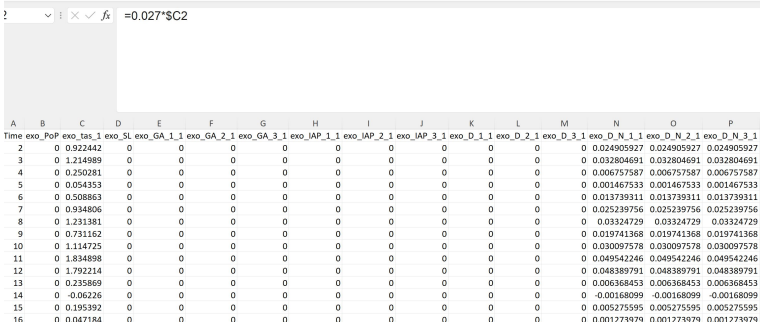


Task 15: SSP585TFP



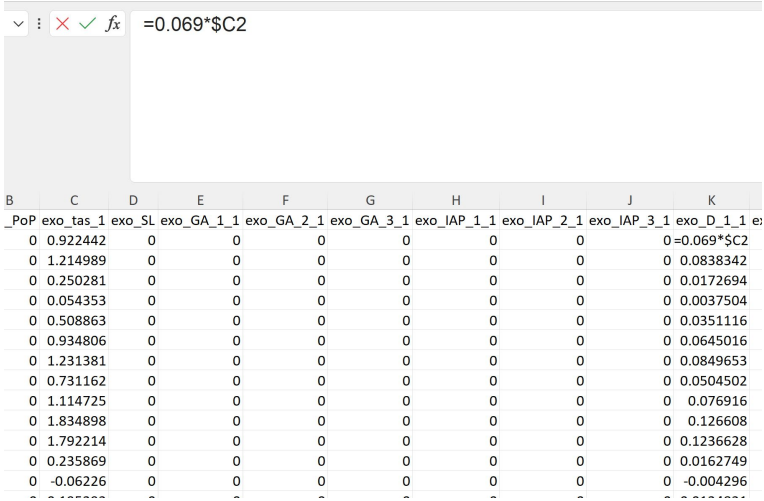
A	B	C	D	E	F	G	H	I	J	K
ime	exo_PoP	exo_tas_1	exo_SL	exo_GA_1_1	exo_GA_2_1	exo_GA_3_1	exo_IAP_1_1	exo_IAP_2_1	exo_IAP_3_1	exo_D_1_1
2	0	0.922442	0	0	0	0	0	0	0	=0.036*$C2
3	0	1.214989	0	0	0	0	0	0	0	0.0437396
4	0	0.250281	0	0	0	0	0	0	0	0.0090101
5	0	0.054353	0	0	0	0	0	0	0	0.0019567
6	0	0.508863	0	0	0	0	0	0	0	0.0183191
7	0	0.934806	0	0	0	0	0	0	0	0.033653
8	0	1.231381	0	0	0	0	0	0	0	0.0443297
9	0	0.731162	0	0	0	0	0	0	0	0.0263218
10	0	1.114725	0	0	0	0	0	0	0	0.0401301
11	0	1.834898	0	0	0	0	0	0	0	0.0660563
12	0	1.792214	0	0	0	0	0	0	0	0.0645197
13	0	0.235869	0	0	0	0	0	0	0	0.0084913
14	0	-0.06226	0	0	0	0	0	0	0	-0.002241

Task 15: SSP585Lab



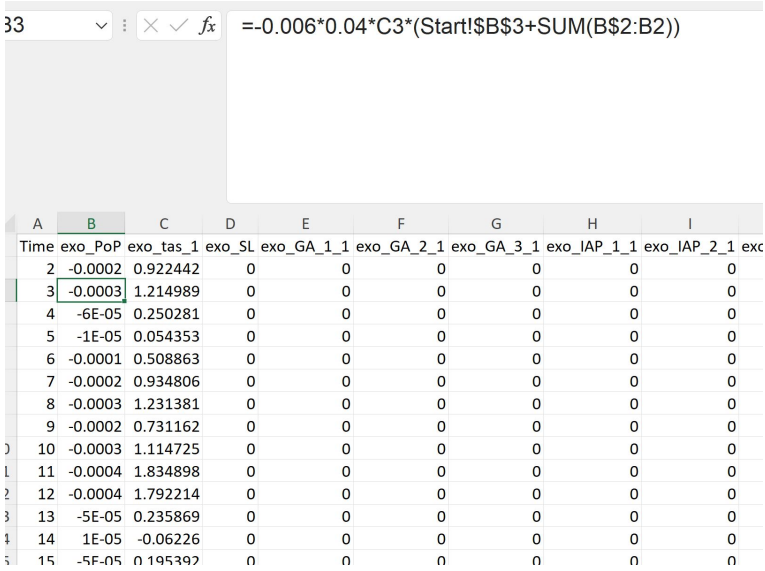
Time	exo_PoP	exo_tas_1	exo_SL	exo_GA_1_1	exo_GA_2_1	exo_GA_3_1	exo_IAP_1_1	exo_IAP_2_1	exo_IAP_3_1	exo_D_1_1	exo_D_2_1	exo_D_3_1	exo_D_N_1_1	exo_D_N_2_1	exo_D_N_3_1
2	0	0.922442	0	0	0	0	0	0	0	0	0	0	0.024905927	0.024905927	0.024905927
3	0	1.214989	0	0	0	0	0	0	0	0	0	0	0.032804691	0.032804691	0.032804691
4	0	0.250281	0	0	0	0	0	0	0	0	0	0	0.006757587	0.006757587	0.006757587
5	0	0.054353	0	0	0	0	0	0	0	0	0	0	0.001467533	0.001467533	0.001467533
6	0	0.508863	0	0	0	0	0	0	0	0	0	0	0.013739311	0.013739311	0.013739311
7	0	0.934806	0	0	0	0	0	0	0	0	0	0	0.025239756	0.025239756	0.025239756
8	0	1.231381	0	0	0	0	0	0	0	0	0	0	0.03324729	0.03324729	0.03324729
9	0	0.731162	0	0	0	0	0	0	0	0	0	0	0.019741368	0.019741368	0.019741368
10	0	1.114725	0	0	0	0	0	0	0	0	0	0	0.030097578	0.030097578	0.030097578
11	0	1.834898	0	0	0	0	0	0	0	0	0	0	0.049542246	0.049542246	0.049542246
12	0	1.792214	0	0	0	0	0	0	0	0	0	0	0.048389791	0.048389791	0.048389791
13	0	0.235869	0	0	0	0	0	0	0	0	0	0	0.006368453	0.006368453	0.006368453
14	0	-0.06226	0	0	0	0	0	0	0	0	0	0	-0.00168099	-0.00168099	-0.00168099
15	0	0.195392	0	0	0	0	0	0	0	0	0	0	0.005275595	0.005275595	0.005275595
16	0	0.047184	0	0	0	0	0	0	0	0	0	0	0.001273979	0.001273979	0.001273979

Task 15: SSP585Mort



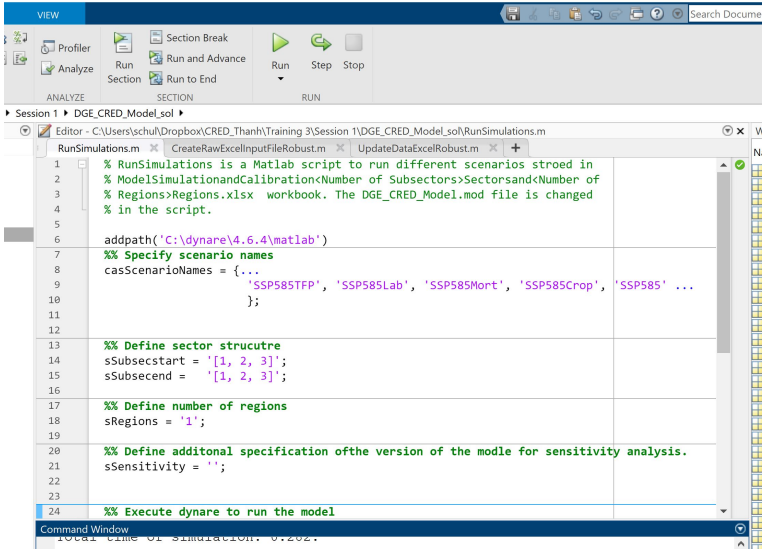
B	C	D	E	F	G	H	I	J	K
_PoP	exo_tas_1	exo_SL	exo_GA_1_1	exo_GA_2_1	exo_GA_3_1	exo_IAP_1_1	exo_IAP_2_1	exo_IAP_3_1	exo_D_1_1	e
0	0.922442	0	0	0	0	0	0	0	=0.069*$C2	
0	1.214989	0	0	0	0	0	0	0	0.0838342	
0	0.250281	0	0	0	0	0	0	0	0.0172694	
0	0.054353	0	0	0	0	0	0	0	0.0037504	
0	0.508863	0	0	0	0	0	0	0	0.0351116	
0	0.934806	0	0	0	0	0	0	0	0.0645016	
0	1.231381	0	0	0	0	0	0	0	0.0849653	
0	0.731162	0	0	0	0	0	0	0	0.0504502	
0	1.114725	0	0	0	0	0	0	0	0.076916	
0	1.834898	0	0	0	0	0	0	0	0.126608	
0	1.792214	0	0	0	0	0	0	0	0.1236628	
0	0.235869	0	0	0	0	0	0	0	0.0162749	
0	-0.06226	0	0	0	0	0	0	0	-0.004296	

Task 15: SSP585Crop



	A	B	C	D	E	F	G	H	I	
	Time	exo_PoP	exo_tas_1	exo_SL	exo_GA_1_1	exo_GA_2_1	exo_GA_3_1	exo_IAP_1_1	exo_IAP_2_1	exc
	2	-0.0002	0.922442	0	0	0	0	0	0	
	3	-0.0003	1.214989	0	0	0	0	0	0	
	4	-6E-05	0.250281	0	0	0	0	0	0	
	5	-1E-05	0.054353	0	0	0	0	0	0	
	6	-0.0001	0.508863	0	0	0	0	0	0	
	7	-0.0002	0.934806	0	0	0	0	0	0	
	8	-0.0003	1.231381	0	0	0	0	0	0	
	9	-0.0002	0.731162	0	0	0	0	0	0	
	10	-0.0003	1.114725	0	0	0	0	0	0	
	11	-0.0004	1.834898	0	0	0	0	0	0	
	12	-0.0004	1.792214	0	0	0	0	0	0	
	13	-5E-05	0.235869	0	0	0	0	0	0	
	14	1E-05	-0.06226	0	0	0	0	0	0	
	15	-5E-05	0.195392	0	0	0	0	0	0	

Task 15: RunSimulation.m

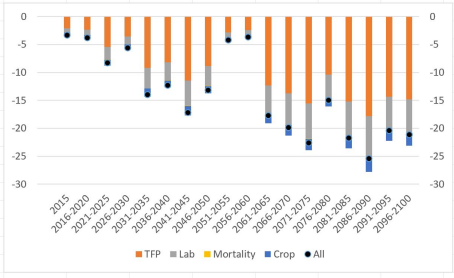


Task 16: Create a figure to illustrate which impact channel matters the most for GDP.

- Use the figure for GDP components from Task 14 as a basis.
- Modify the figure such that you can see the GDP effect for each damage type as a stacked bar and all damage types simultaneously as a point.
- What impact channel is the most severe one?

Task 16: Figure

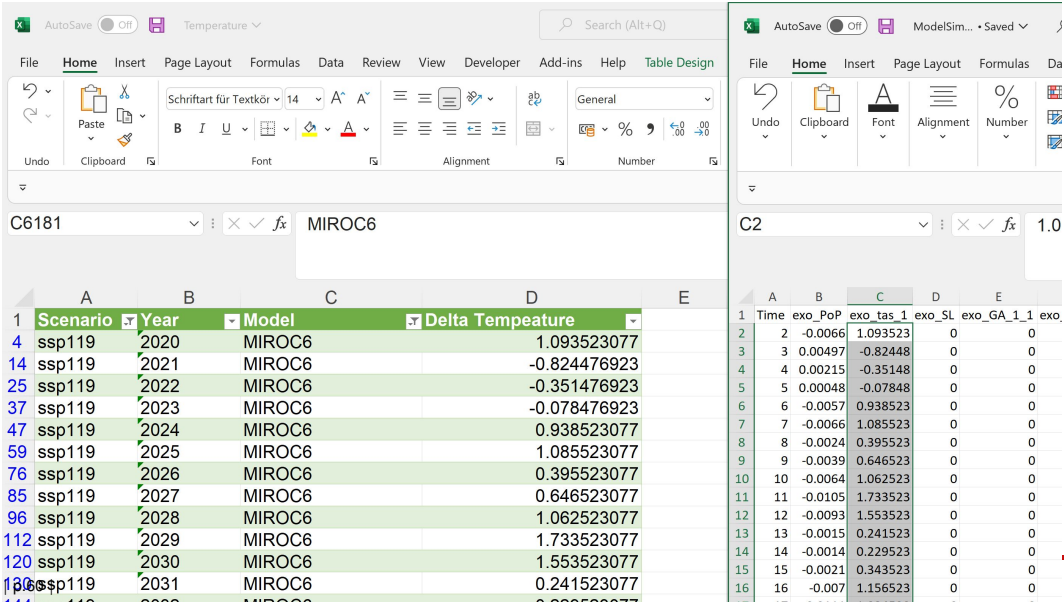
		Y	Y	Y	Y	Y	Y
	Year	Baseline	SSP585	SSP585TFP	SSP585Lab	SSP585Mo	SSP585Crop
	2014	1.333111	1.333111	1.333111	1.333111	1.333111	1.333111
sScei	2015	1.426432	1.378381	1.396867	1.414414	1.42638	1.41827
	2020	1.91706	1.844086	1.871646	1.899105	1.916899	1.907294
	2025	2.422143	2.221357	2.290086	2.368041	2.421484	2.396221
	2030	2.911066	2.747038	2.806686	2.86996	2.911066	2.891472
	2035	3.361766	2.891998	3.052598	3.238594	3.361025	3.311232
	2040	3.761517	3.298015	3.454176	3.639044	3.760893	3.71395
	2045	4.105511	3.399249	3.6354	3.919274	4.104209	4.037336
	2050	4.394601	3.814728	4.004473	4.238397	4.393378	4.338397
	2055	4.633106	4.438234	4.5027	4.578577	4.63278	4.606488
	2060	4.82707	4.648383	4.710721	4.779053	4.825942	4.802117
	2065	4.983058	4.097713	4.368392	4.730903	4.980482	4.900013
	2070	5.10742	4.092178	4.403847	4.819434	5.104901	5.013204
	2075	5.205904	4.029898	4.396354	4.877907	5.203539	5.099124
	2080	5.283489	4.493204	4.73419	5.057764	5.281888	5.208566
	2085	5.344361	4.18029	4.531141	5.008945	5.341353	5.233686
	2090	5.391973	4.019262	4.42904	4.99234	5.388091	5.258361



Task 17: Create scenarios SSP119 and 245 for the MIROC6 model and compare GDP effects with SSP585.

- Copy the sheet SSP 585 two times.
- Rename the copied sheets into SSP119 and SSP245.
- Copy the change in temperature from Temperature.xlsx into the respective sheets.

Task 17: Create SSP119



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C6181 | MIROC6

	A	B	C	D	E
1	Scenario	Year	Model	Delta Tempeature	
4	ssp119	2020	MIROC6	1.093523077	
14	ssp119	2021	MIROC6	-0.824476923	
25	ssp119	2022	MIROC6	-0.351476923	
37	ssp119	2023	MIROC6	-0.078476923	
47	ssp119	2024	MIROC6	0.938523077	
59	ssp119	2025	MIROC6	1.085523077	
76	ssp119	2026	MIROC6	0.395523077	
85	ssp119	2027	MIROC6	0.646523077	
96	ssp119	2028	MIROC6	1.062523077	
112	ssp119	2029	MIROC6	1.733523077	
120	ssp119	2030	MIROC6	1.553523077	
136	ssp119	2031	MIROC6	0.241523077	

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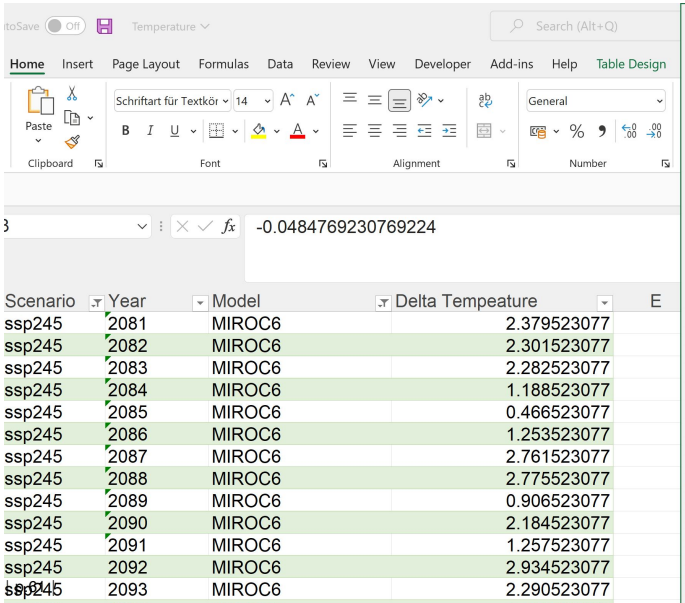
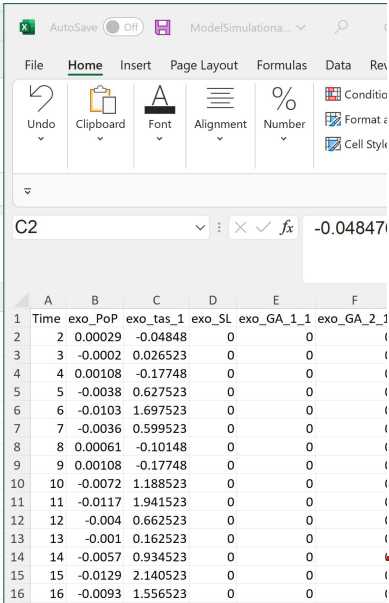
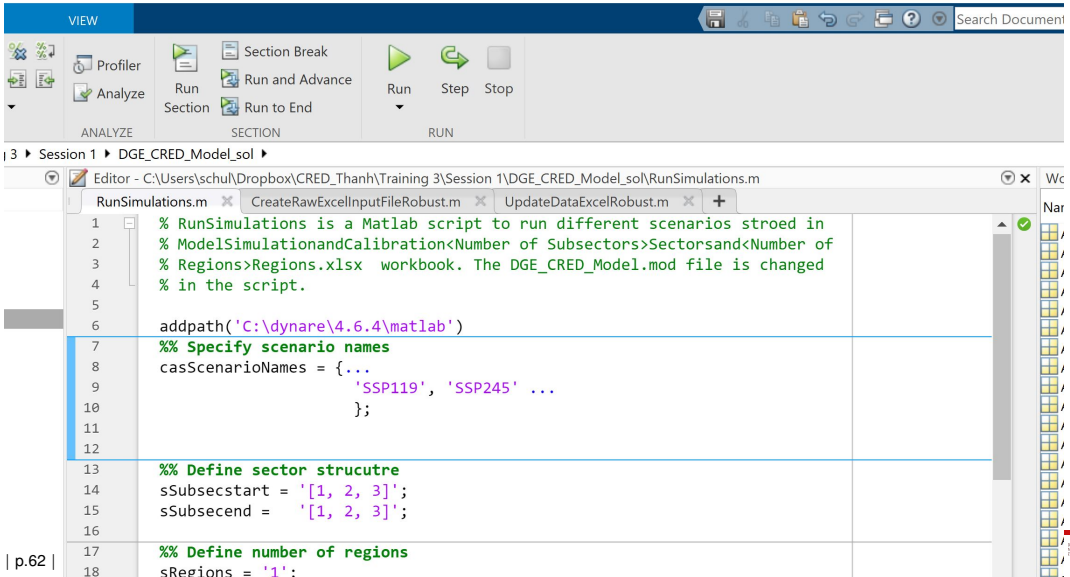
	A	B	C	D	E
1	Time	exo_PoP	exo_tas_1	exo_SL	exo_GA_1_1
2	2	-0.0066	1.093523	0	0
3	3	0.00497	-0.82448	0	0
4	4	0.00215	-0.35148	0	0
5	5	0.00048	-0.07848	0	0
6	6	-0.0057	0.938523	0	0
7	7	-0.0066	1.085523	0	0
8	8	-0.0024	0.395523	0	0
9	9	-0.0039	0.646523	0	0
10	10	-0.0064	1.062523	0	0
11	11	-0.0105	1.733523	0	0
12	12	-0.0093	1.553523	0	0
13	13	-0.0015	0.241523	0	0
14	14	-0.0014	0.229523	0	0
15	15	-0.0021	0.343523	0	0
16	16	-0.007	1.156523	0	0

Task 17: Create SSP245



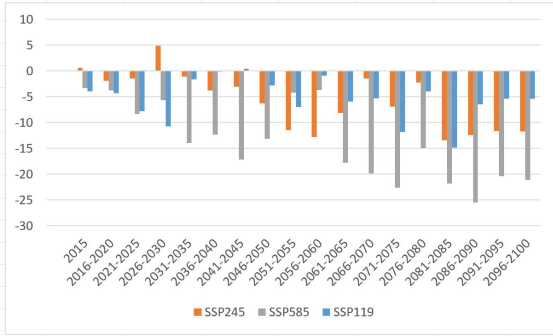


Task 17: RunSimulation.m



Task 17: Figure

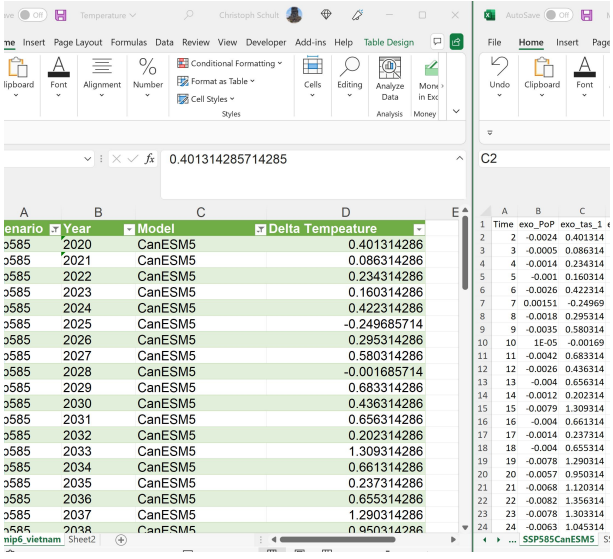
		Y	Y	Y	Y
	Year	Baseline	SSP119	SSP245	SSP585
	2014	1.333111	1.333111	1.333111	1.333111
ResultsScer	2015	1.426432	1.370287	1.434927	1.378381
	2020	1.91706	1.834551	1.880656	1.844086
	2025	2.422143	2.234096	2.386631	2.221357
	2030	2.911066	2.599281	3.05414	2.747038
	2035	3.361766	3.305697	3.325036	2.891998
	2040	3.761517	3.756602	3.619803	3.298015
	2045	4.105511	4.12298	3.978832	3.399249
	2050	4.394601	4.272813	4.119044	3.814728
	2055	4.633106	4.310902	4.103508	4.438234
	2060	4.82707	4.784212	4.207886	4.648383
	2065	4.983058	4.687899	4.575768	4.097713
	2070	5.10742	4.837592	5.033524	4.092178
	2075	5.205904	4.590922	4.844872	4.029898
	2080	5.283489	5.073515	5.165842	4.493204
	2085	5.344361	4.549113	4.626368	4.18029
	2090	5.391973	5.043244	4.721489	4.019262



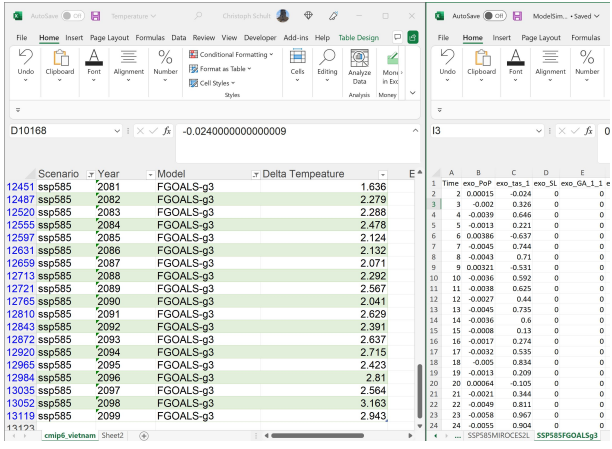
Task 18: Sensitivity Analysis SSP 585 effect for three different climate models.

- Create the following scenarios: SSP585FGOALSg3, SSP585CanESM5, SSP585MIROCES2L
- Each scenario is the SSP 585 scenario from a different climate model (FGOALS-g3, CanESM5, MIROC-ES2L).
- Note: I deleted special characters from the scenario names.
- Plot the range of results for GDP effects compared to the Baseline for the different climate models.

Task 18: Create SSP585CanESM5



Task 18: Create SSP585FGOALSg3



D10168 -0.0240000000000009

	Scenario	Year	Model	Delta Tempeature
12451	ssp585	2081	FGOALS-g3	1.636
12487	ssp585	2082	FGOALS-g3	2.279
12520	ssp585	2083	FGOALS-g3	2.288
12555	ssp585	2084	FGOALS-g3	2.478
12597	ssp585	2085	FGOALS-g3	2.124
12631	ssp585	2086	FGOALS-g3	2.132
12659	ssp585	2087	FGOALS-g3	2.071
12713	ssp585	2088	FGOALS-g3	2.292
12721	ssp585	2089	FGOALS-g3	2.567
12765	ssp585	2090	FGOALS-g3	2.041
12810	ssp585	2091	FGOALS-g3	2.629
12843	ssp585	2092	FGOALS-g3	2.391
12872	ssp585	2093	FGOALS-g3	2.637
12920	ssp585	2094	FGOALS-g3	2.715
12965	ssp585	2095	FGOALS-g3	2.423
12984	ssp585	2096	FGOALS-g3	2.81
13035	ssp585	2097	FGOALS-g3	2.564
13052	ssp585	2098	FGOALS-g3	3.163
13119	ssp585	2099	FGOALS-g3	2.943
13123				

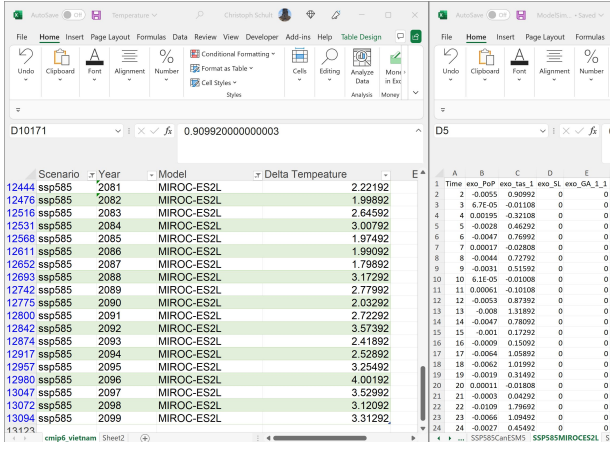
cmip6_vietnam Sheet2

I3 0

	A	B	C	D	E
1	Time	exo_PoP	exo_tas_1	exo_SI	exo_GA_1_1
2	2	0.00015	-0.024	0	0
3	3	-0.002	0.326	0	0
4	4	-0.0039	0.646	0	0
5	5	-0.0013	0.221	0	0
6	6	0.00386	-0.637	0	0
7	7	-0.0045	0.744	0	0
8	8	-0.0043	0.71	0	0
9	9	0.00321	-0.531	0	0
10	10	-0.0036	0.592	0	0
11	11	-0.0038	0.625	0	0
12	12	-0.0027	0.44	0	0
13	13	-0.0045	0.735	0	0
14	14	-0.0036	0.6	0	0
15	15	-0.0008	0.13	0	0
16	16	-0.0017	0.274	0	0
17	17	-0.0032	0.535	0	0
18	18	-0.005	0.834	0	0
19	19	-0.0013	0.209	0	0
20	20	0.00064	-0.105	0	0
21	21	-0.0021	0.344	0	0
22	22	-0.0049	0.811	0	0
23	23	-0.0058	0.967	0	0
24	24	-0.0055	0.904	0	0

... SSP585MIROCES2L SSP585FGOALSg3

Task 18: Create SSP585MIROCES2L



D10171 | 0.909920000000003

	Scenario	Year	Model	Delta Tempeature
12444	ssp585	2081	MIROC-ES2L	2.22192
12476	ssp585	2082	MIROC-ES2L	1.99892
12516	ssp585	2083	MIROC-ES2L	2.64592
12531	ssp585	2084	MIROC-ES2L	3.00792
12568	ssp585	2085	MIROC-ES2L	1.97492
12611	ssp585	2086	MIROC-ES2L	1.99092
12652	ssp585	2087	MIROC-ES2L	1.79892
12693	ssp585	2088	MIROC-ES2L	3.17292
12742	ssp585	2089	MIROC-ES2L	2.77992
12775	ssp585	2090	MIROC-ES2L	2.03292
12800	ssp585	2091	MIROC-ES2L	2.72292
12842	ssp585	2092	MIROC-ES2L	3.57392
12874	ssp585	2093	MIROC-ES2L	2.41892
12917	ssp585	2094	MIROC-ES2L	2.52892
12957	ssp585	2095	MIROC-ES2L	3.25492
12980	ssp585	2096	MIROC-ES2L	4.00192
13047	ssp585	2097	MIROC-ES2L	3.52992
13072	ssp585	2098	MIROC-ES2L	3.12092
13094	ssp585	2099	MIROC-ES2L	3.31292
13123				

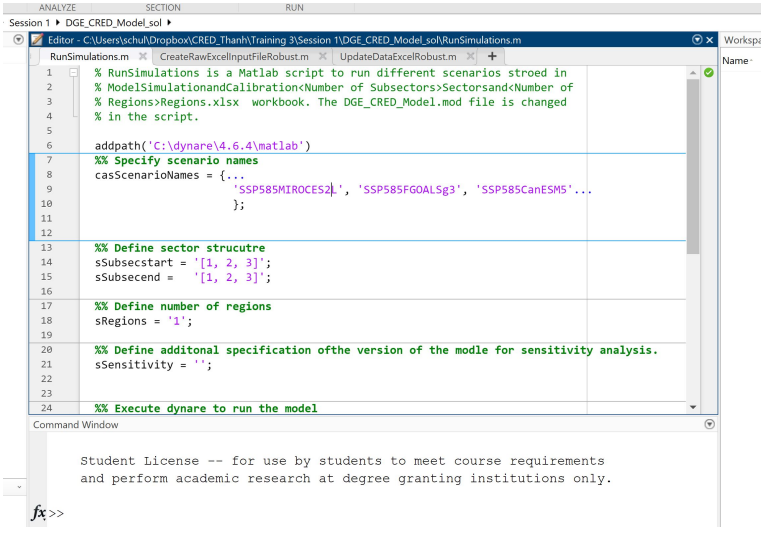
cmip6_vietnam | Sheet2

D5

	A	B	C	D	E
1	Time	exo_PoP	exo_tas_1	exo_SL	exo_GA_1_1
2	2	-0.0055	0.90992	0	0
3	3	6.7E-05	-0.01108	0	0
4	4	0.00195	-0.32108	0	0
5	5	-0.0028	0.46292	0	0
6	6	-0.0047	0.76992	0	0
7	7	0.00017	-0.02808	0	0
8	8	-0.0044	0.72792	0	0
9	9	-0.0031	0.51592	0	0
10	10	6.1E-05	-0.01008	0	0
11	11	0.00061	-0.10108	0	0
12	12	-0.0053	0.87392	0	0
13	13	-0.008	1.31892	0	0
14	14	-0.0047	0.78092	0	0
15	15	-0.001	0.17292	0	0
16	16	-0.0009	0.15092	0	0
17	17	-0.0064	1.05892	0	0
18	18	-0.0062	1.01992	0	0
19	19	-0.0019	0.31492	0	0
20	20	0.00011	-0.01808	0	0
21	21	-0.0003	0.04292	0	0
22	22	-0.0109	1.79692	0	0
23	23	-0.0066	1.09492	0	0
24	24	-0.0027	0.45492	0	0

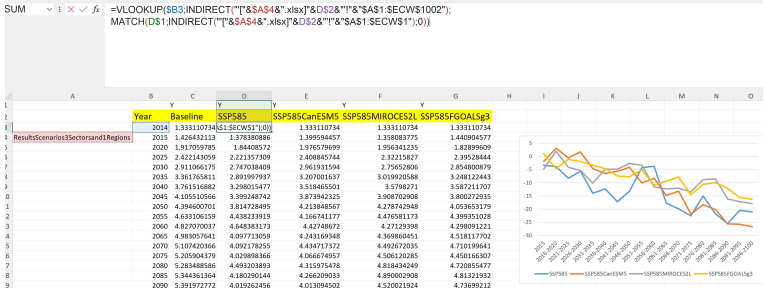
SSP585CanESM5 | SSP585MIROCES2L

Task 18: RunSimulation.m



Task 18: Figure

- Copy the previous sheet in the Figure.xlsx file.
- Change the names of scenarios in row 2 and create a line plot.
- It is clear that quantitative results are susceptible to the respective climate scenario.

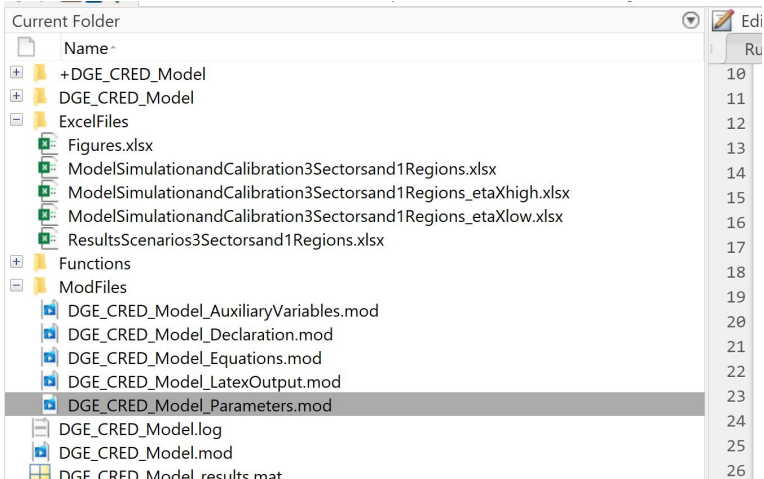


Task 19: Sensitivity Analysis SSP 585 effect for export price elasticity.

- Analyse the role of η^X for the simulation results. $X_{s,t} = D_s^X \left(\frac{P_{s,t}^D}{P_{s,t}^M} \right)^{-\eta^X}$
- What do you think will be the impact of an increase in η^X or decrease in η^X?
- Copy the ModelSimulationandCalibration3Sectorsand1Regions.xlsx file two times.
- Rename the copies into ModelSimulationandCalibration3Sectorsand1Regions_etaXhigh.xlsx and ModelSimulationandCalibration3Sectorsand1Regions_etaXlow.xlsx
- Change the value of etaX_p to 1.5 and 0.3 for high and low, respectively. The parameter is listed in the StructuralParameters sheet.
- Execute the RunSimulation.m file. You need to change the sSensitivity in line 21 to _etaXhigh and _etaXlow. Further, you need to first run the Baseline scenario.

Task 19: Sensitivity Analysis SSP 585 effect for export price elasticity.

- Make sure the newly created files are in the right subfolder.



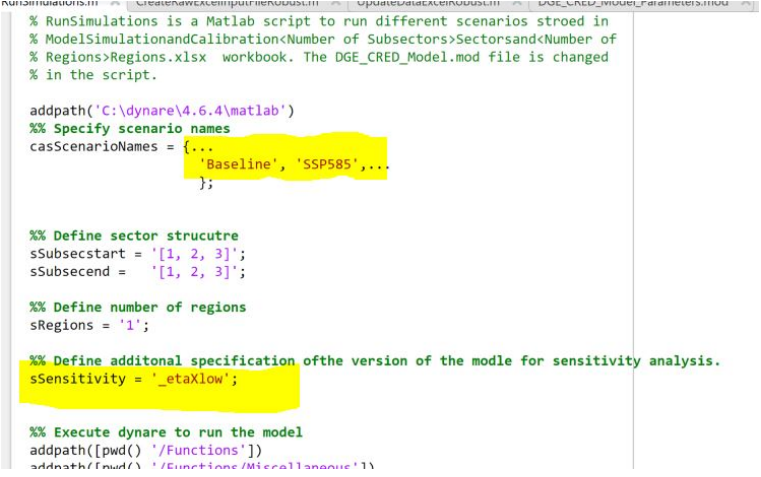
Task 19: Sensitivity Analysis SSP 585 effect for export price elasticity.

- set the value for etaX_p in the sheet Structural Parameters in cell B11 to 1.5 and 0.3, respectively.

	A	B	
1	Parameter	Value	Description
2	beta_p	0.9606	discount factor
3	delta_p	0.045	depreciation rate
4	sH_p	0.01	share of investments in residential h
5	phiB_p	10	foreign bond adjustment cost
6	phiK_p	10	investment adjustment cost
7	sigmaL_p	0.5	inverse Frisch elasticity
8	sigmaC_p	1	intertemporal elasticity of substituti
9	etaQ_p	0.01	elasticity of substitution between se
10	etaF_p	1.83	elasticity of substitution between im
11	etaX_p	1.5	supply price elasticity of exports
12	tauC_p	0.2	consumption tax rate
13	tauNH_p	0	tax rate on labour income
14	tauKH_p	0	tax rate on capital income
15	phiM_p	0.3	share of imports on total used dome

Task 19: RunSimulation.m

- Set the value for sSensitivity to _etaXlow and _etaXhigh.
- Make sure to always run Baseline and the SSP 585 scenario.



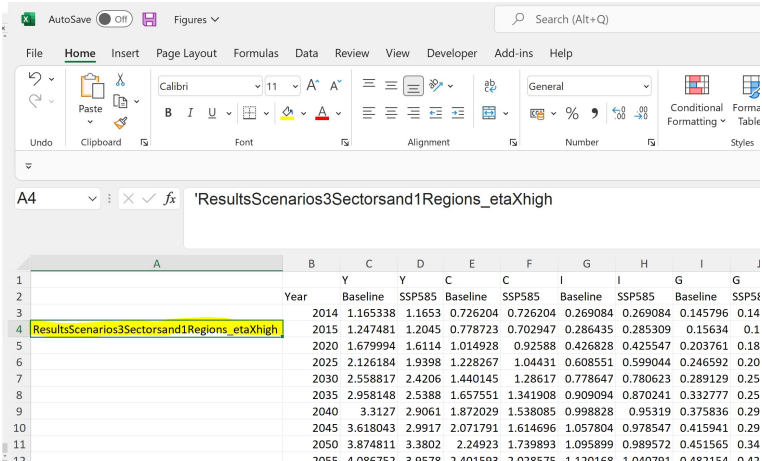
```
% RunSimulations is a Matlab script to run different scenarios stroed in
% ModelSimulationandCalibration<Number of Subsectors>Sectorsand<Number of
% Regions>Regions.xlsx  workbook. The DGE_CRED_Model.mod file is changed
% in the script.

addpath('C:\dynare\4.6.4\matlab')
%% Specify scenario names
casScenarioNames = {...
                    'Baseline', 'SSP585',...
                    };


%% Define sector strucutre
sSubsecstart = '[1, 2, 3]';
sSubsecend =   '[1, 2, 3]';

%% Define number of regions
sRegions = '1';

%% Define additonal specification ofthe version of the modle for sensitivity analysis.
sSensitivity = '_etaXlow';


%% Execute dynare to run the model
addpath([pwd() '/Functions'])
addpath([pwd() '/Functions/Miscellaneous'])
```

Task 20: Create GDP component plots to identify the sensitivity of GDP effects on etaX_p.

- Are net exports higher or lower with an increase in etaX_p?

Task 20: Copy the sheet GDP in Figures.xlsx.

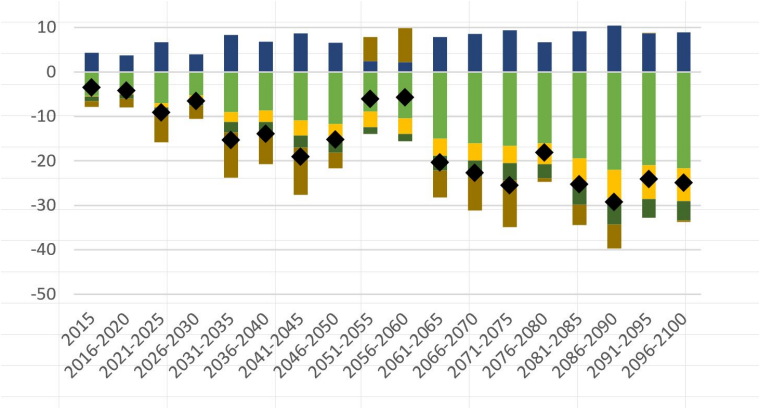
- Rename the file you refer to in A4 plots to ResultsScenarios3Sectorsand1Regions_etaXhigh and ResultsScenarios3Sectorsand1Regions_etaXlow.



Year	Y Baseline	Y SSP585	C Baseline	C SSP585	I Baseline	I SSP585	G Baseline	G SSP5
2014	1.165338	1.1653	0.726204	0.726204	0.269084	0.269084	0.145796	0.14
2015	1.247481	1.2045	0.778723	0.702947	0.286435	0.285309	0.15634	0.1
2020	1.679994	1.6114	1.014928	0.92588	0.426828	0.425547	0.203761	0.18
2025	2.126184	1.9398	1.228267	1.04431	0.608551	0.599044	0.246592	0.20
2030	2.558817	2.4206	1.440145	1.28617	0.778647	0.780623	0.289129	0.25
2035	2.958148	2.5388	1.657551	1.341908	0.909094	0.870241	0.332777	0.25
2040	3.3127	2.9061	1.872029	1.538085	0.998828	0.95319	0.375836	0.29
2045	3.618043	2.9917	2.071791	1.614696	1.057804	0.978547	0.415941	0.29
2050	3.874811	3.3802	2.24923	1.739893	1.095899	0.989572	0.451565	0.34
2055	4.086752	3.9578	2.401593	2.028575	1.120168	1.040791	0.482154	0.42

Task 20: ResultsScenarios3Sectorsand1Regions_etaXlow

- For a high lowue of etaX_p = 0.3, we observe a decline in GDP by 25 percent.
- Net exports only increased by 9 percent at the end of the century.



Task 20: ResultsScenarios3Sectorsand1Regions_etaXhigh

- For a high value of etaX_p = 1.5, we observe a decline in GDP by 19 percent.
- Net exports only increased by 14 percent at the end of the century.