

# DGE–CRED Practical Session 1: Model comparison

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



On behalf of:



of the Federal Republic of Germany

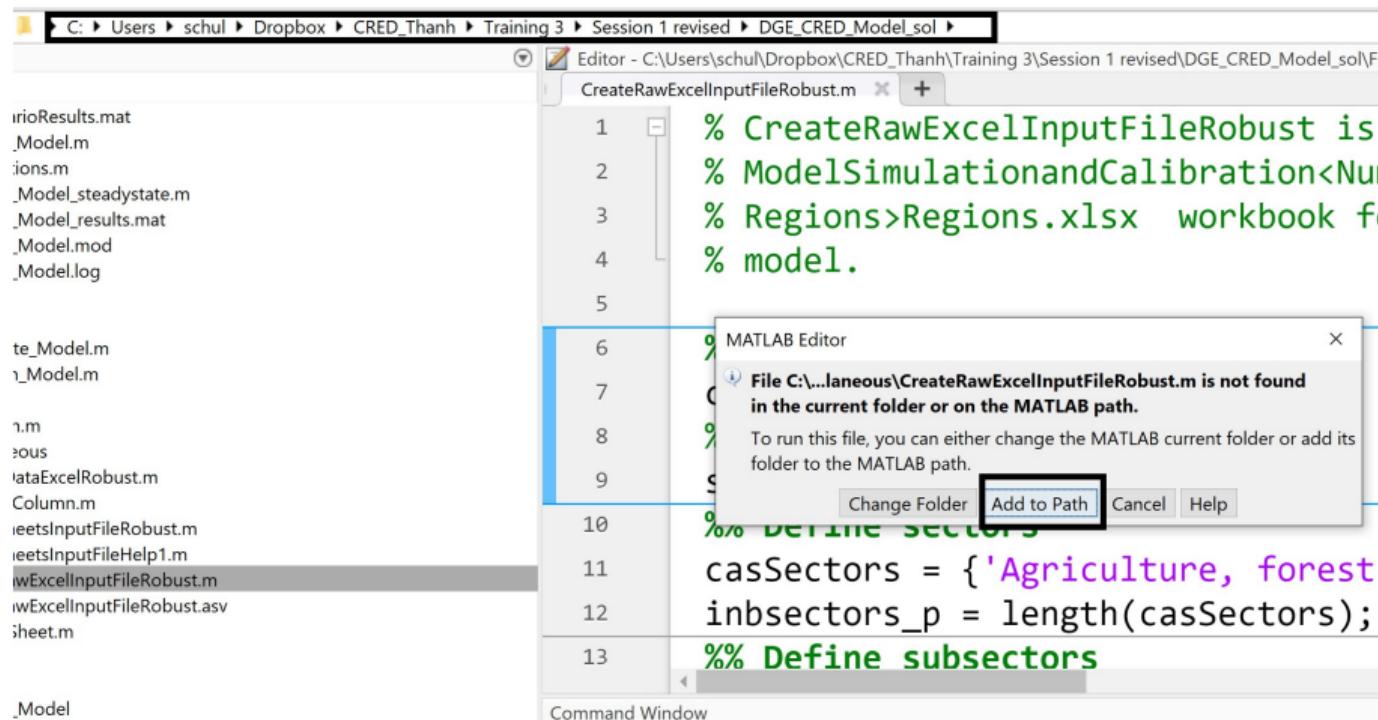
# Task 1: Create the ModelSimulationandCalibration3Sectorsand1Region.xlsx File

- Use the CreateRawExcelInputFileRobust.m in the function folder under Miscellaneous to create the Excel file
- Sectors and subsectors are: Agriculture, forestry and fishing; Industry; Services
- Region: Vietnam
- Climate variables regional: surface temperature (tas)
- Climate variables national: sea level (SL)
- Note: For MacOs user change all \ in path to /

# Task 1: Solution

```
CreateRawExcelInputFileRobust.m +  
8 % define working directory path  
9 sPathWD = pwd();  
10 % Define sectors  
11 casSectors = {'Agriculture, forestry and fishing'; 'Industry'; 'Services'};  
12 inbsectors_p = length(casSectors);  
13 % Define subsectors  
14 casSubSectors = {'Agriculture, forestry and fishing'; 'Industry'; 'Services'};  
15 inbsubsectors_p = length(casSubSectors);  
16 % Define regions  
17 casRegions = {'Vietnam'};  
18 inbregions_p = length(casRegions);  
19  
20 % Define regional climate variables  
21 casClimateVarsRegionalName = {'surface temperature (Celsius)'};  
22 casClimateVarsRegional = {'tas'};  
23  
24 % Define national climate variables  
25 casClimateVarsNationalName = {'Sea level'};  
26 casClimateVarsNational = {'SL'};  
27 casClimateVars = [casClimateVarsRegional casClimateVarsNational];  
28
```

# 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

The screenshot shows a Microsoft Excel interface. The formula bar at the top contains the following formula:

```
=SUM([VietnamIOTable.xlsx]Sheet1!$C$57:$D$57)/SUM([VietnamIOTable.xlsx]Sheet1!$C$57:$AU$57)
```

Below the formula bar is a table with three columns and four rows. The columns are labeled B, C, and D. The first row has a header "Region". The second row contains "Vietnam" in the Region column, "Initial Value Added Shares (phiY0)" in the C column, and "0.158321065" in the D column. The third and fourth rows also contain "Vietnam" in the Region column, and "enter value here" in both the C and D columns.

B	C	D
Region	Initial Value Added Shares (phiY0)	Initial Employment Shares (phiN0)
Vietnam	0.158321065	enter value here
Vietnam	0.422561374	enter value here
Vietnam	0.419117561	enter value here

To the right of the table is a vertical list of activity codes and their descriptions, starting from row 42 and ending at 57. The list includes:

- 42 TTL\_61: Telecommunications
- 43 TTL\_62T63: IT and other information services
- 44 TTL\_64T66: Financial and insurance activities
- 45 TTL\_68: Real estate activities
- 46 TTL\_69T75: Professional, scientific and technical services
- 47 TTL\_77T82: Administrative and support services
- 48 TTL\_84: Public administration and defence; compulsory social security
- 49 TTL\_85: Education
- 50 TTL\_86T88: Human health and social work and welfare activities
- 51 TTL\_90T93: Arts, entertainment and recreation; hotel and restaurants
- 52 TTL\_94T96: Other service activities
- 53 TTL\_97T98: Activities of households as employers and services-producing activities of households for own use
- 54 TXS\_IMP\_FNL: Taxes less subsidies on intermediate imports (paid in foreign countries)
- 55 TXS\_INT\_FNL: Taxes less subsidies on intermediate imports (paid in domestic agencies, includes duty on imports)
- 56 TTL\_INT\_FNL: Total intermediate consumption
- 57 VALU: Value added at basic prices
- 58 OUTPUT: Output at basic prices

# Task 2: Industry and construction

The image shows two side-by-side Microsoft Excel windows. Both windows have the same ribbon tabs: File, Home, Insert, Page Layout, Formulas, Data, Review, View, Developer, Add-ins, and Help.

**Left Window (Sector Data):**

- Formula Bar:** =SUM([VietnamIOTable.xlsx]Sheet1!\$E\$57:\$AA\$57)/SUM([VietnamIOTable.xlsx]Sheet1!\$C\$57:\$AU\$57)
- Table:** A table with columns: Sector, Region, Initial Value Added Shares (phiY0), Initial Employment Shares (phiN0), Labour.
- Data:**

Sector	Region	Initial Value Added Shares (phiY0)	Initial Employment Shares (phiN0)	Labour
Agriculture, forestry and fishing	Vietnam	0.158321065	enter value here	enter value here
Industry	Vietnam	0.476624471	enter value here	enter value here
Services	Vietnam	0.365054464	enter value here	enter value here

**Right Window (Industry Categories):**

- Formula Bar:** Z58: 2306.8
- Table:** A table with rows labeled from 42 to 58, listing industry categories and their descriptions.
- Data:**

	A
42	TTL_61: Telecommunications
43	TTL_62T63: IT and other information services
44	TTL_64T66: Financial and insurance activities
45	TTL_68: Real estate activities
46	TTL_69T75: Professional, scientific and technical activities
47	TTL_77T82: Administrative and support services
48	TTL_84: Public administration and defence; compulsory social security
49	TTL_85: Education
50	TTL_86T88: Human health and social work activities
51	TTL_90T93: Arts, entertainment and recreation
52	TTL_94T96: Other service activities
53	TTL_97T98: Activities of households as employers; undifferentiated goods- and services-producing activities of households for own use
54	TXS_IMP_FNL: Taxes less subsidies on intermediate and final products (paid in foreign countries)
55	TXS_INT_FNL: Taxes less subsidies on intermediate and final products (paid in domestic agencies, includes duty on imported products)
56	TTL_INT_FNL: Total intermediate consumption at purchasers' prices
57	VALU: Value added at basic prices
58	OUTPUT: Output at basic prices

# Task 2: Services

The screenshot shows two Microsoft Excel windows side-by-side.

**Left Window (ModelSimulation):**

- Formula Bar:** =SUM([VietnamIOTable.xlsx]Sheet1!\$AB\$57:\$AU\$57)/SUM([VietnamIOTable.xlsx]Sheet1!\$C\$57:\$AU\$57)
- Table:** A table with columns: Sector, Region, Initial Value Added Shares (phiY0), Initial Employment Shares (phiNO), Labour.
- Data:**

Sector	Region	Initial Value Added Shares (phiY0)	Initial Employment Shares (phiNO)	Labour
Agriculture, forestry and fishing	Vietnam	0.158321065	enter value here	enter value here
Industry	Vietnam	0.476624471	enter value here	enter value here
Services	Vietnam	0.365054464	enter value here	enter value here

**Right Window (VietnamIOTable.xlsx):**

- Table:** A table with columns: A, B, C, D, E, F, G, H, I, J, K, L, M, N, O, P, Q, R, S, T, U, V, W, X, Y, Z.
- Data:**

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z
TTL_61: Telecommunications																									
TTL_62T63: IT and other information																									
TTL_64T66: Financial and insurance act																									
TTL_68: Real estate activities																									
TTL_69T75: Professional, scientific and																									
TTL_77T82: Administrative and support																									
TTL_84: Public administration and defen																									
TTL_85: Education																									
TTL_86T88: Human health and social w																									
TTL_90T93: Arts, entertainment and re																									
TTL_94T96: Other service activities																									
TTL_97T98: Activities of households as																									
TXS_IMP_FNL: Taxes less subsidies on																									
(paid in foreign countries)																									
TXS_INT_FNL: Taxes less subsidies on																									
(paid in domestic agencies, includes du																									
TTL_INT_FNL: Total intermediate consu																									
VALU: Value added at basic prices																									
OUTPUT: Output at basic prices																									

## 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 all divided by total
- For services, use the remaining ones.
- Check whether the sum is one.

# Task 3: Agriculture, forestry and fishery

The screenshot shows two adjacent Microsoft Excel windows. The left window displays a table with three rows of data. The first row has columns for Region (shing), Initial Value Added Shares (phiY0) (0.158321065), and Initial Employment Shares (phiN0) (=\$3/[Employment.xlsx]Sheet1!\$B\$2). The second row has the same structure with values 0.476624471 and enter value here. The third row has the same structure with values 0.365054464 and enter value here. The right window shows a list of economic activities numbered 1 to 16, corresponding to the categories in the table.

Region	Initial Value Added Shares (phiY0)	Initial Employment Shares (phiN0)
Vietnam	0.158321065	=\$3/[Employment.xlsx]Sheet1!\$B\$2
Vietnam	0.476624471	enter value here
Vietnam	0.365054464	enter value here

1 Economic activity  
2 TOTAL  
3 Agriculture, forestry and fishing  
4 Mining and quarrying  
5 Manufacturing  
6 Electricity, gas, steam and air conditioning supply  
Water supply, sewerage, waste management  
and remediation activities  
7 Construction  
Wholesale and retail trade; repair of motor vehicles  
and motorcycles  
8 Transportation and storage  
9 Accommodation and food service activities  
10 Information and communication  
11 Financial, banking and insurance activities  
12 Real estate activities  
13 Professional, scientific and technical activities  
14 Administrative and support service activities

# Task 3: Industry

The screenshot shows a Microsoft Excel interface with two tables and a formula bar.

**Formula Bar:**

```
=SUM([Employment.xlsx]Sheet1!$B$4:$B$8)/  
[Employment.xlsx]Sheet1!$B$2
```

**Table 1 (Left):**

	B	C	D	Labour
Region	Initial Value Added Shares ( $\phi_{Y0}$ )	Initial Employment Shares ( $\phi_{N0}$ )		
hing	Vietnam	0.158321065	0.376176484	
	Vietnam	0.476624471	0.272378759	
	Vietnam	0.365054464	0.351444757	

**Table 2 (Right):**

B	Total (Thous. pers.) 2018
1	5428250
2	2041980
3	19870
4	999980
5	16710
6	
7	14660
8	427320
9	728560
10	176380

# Task 3: Services

The screenshot shows a Microsoft Excel interface. The formula bar at the top contains the formula: `=SUM([Employment.xlsx]Sheet1!$B$9:$B$23)/[Employment.xlsx]Sheet1!$B$2`. The cell E7 is selected, indicated by a blue circular selection tool. To the right of the formula bar is a status bar showing "E7" and other icons. Below the formula bar is a table with three columns: Region, Initial Value Added Shares ( $\phi_{V0}$ ), and Initial Employment Shares ( $\phi_{IN0}$ ). The table has three rows, all labeled "Vietnam". The third row is currently selected. To the right of the table is a vertical scroll bar. To the right of the scroll bar is a column of data labeled "Total (Thous. pers.) 2018" with values from 1 to 12.

B	C	D	B
Region	Initial Value Added Shares ( $\phi_{V0}$ )	Initial Employment Shares ( $\phi_{IN0}$ )	Total (Thous. pers.) 2018
Vietnam	0.158321065	0.376176484	5428250
Vietnam	0.476624471	0.272378759	2041980
Vietnam	0.365054464	0.351444757	19870
			999980
			16710
			14660
			427320
			728560
			176380
			270510
			30760

## 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.

$$\left[ \frac{va_{construction}}{va_{industry} + va_{construction}} \times Laborshare_{construction} \right] + \left[ \left[ 1 - \frac{va_{construction}}{va_{industry} + va_{construction}} \right] \times Laborshare_{construction} \right]$$

- For services, use row 75.
- Divide the values by 100.

## Task 4: Agriculture, forestry and fishery

(phiN0)	Labour Cost Shares (phiW)	Sector	export share (phiX)	imp
176484	0.6575	Agriculture, forestry and fishing	enter value here	enter
378759	0.509357682	Industry	enter value here	enter
.444757	0.509357682	Services	enter value here	enter

# Task 4: Industry

= [VietnamIOTable.xlsx]Sheet1!\$AA\$57/SUM( [VietnamIOTable.xlsx]Sheet1!\$E\$57:\$AA\$57)* '[LabourShare.xlsx.xls]OECD.Stat export'!\$H\$44/100+(1-[VietnamIOTable.xlsx]Sheet1!\$AA\$57/SUM( [VietnamIOTable.xlsx]Sheet1!\$E\$57:\$AA\$57))* '[LabourShare.xlsx.xls]OECD.Stat export'!\$H\$74/100				
ihiN0)	Labour Cost Shares (phiW)	Sector	export share (phiX)	imp
76484	0.6575	Agriculture, forestry and fishing	enter value here	enter value here
78759	0.509357682	Industry	enter value here	enter value here
44757	0.509357682	Services	enter value here	enter value here

D

2

3

4

5

6

7

8

9

10

11 restry

12

13

14 energy producing produ

## Task 4: Services

fx ='[LabourShare.xlsx.xls]OECD.Stat export'!\$H\$75/100 ▲

Insert Function

E	F	G
hNo)	Labour Cost Shares (phiW)	Sector
,376176484	0,6575	Agriculture, forestry and fishing
,272378759	0,509357682	Industry
,351444757	='[LabourShare.xlsx.xls]OECD.Stat export'!\$H\$75/100	Services
		0,130530763
		0,39929387
		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 sum of output in row 58.
- Sectors and subsectors are: Agriculture, forestry and fishing; Industry; Services.

# Task 5: Agriculture, forestry and fishery

					F	G	H
					205.100	76.900	316.700
					1.700	8.400	34.500
					3.000	0.100	38.300
					3.500	4.700	3.800
					0.400	0.000	6.300
					0.100	0.200	1.800
					1.100	0.100	6.600
					0.000	0.000	0.000
					0.000	0.000	0.000
					31.900	5.700	738.200
					1,777.100	243.000	86,275.300
					971.200	226.100	10,804.700
					2,748.400	469.100	97,080.100

# Task 5: Industry

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

G	H	I	J
export share (phiX)	import share (phiM)	intermediate products (phiI)	subsectors for
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
19,818.300	19,843.800	29,578.700	20,97

# Task 5: Services

f<sub>x</sub> =SUM([VietnamIOTable.xlsx]Sheet1!\$BC\$34:\$BC\$53)/SUM( ^  
[VietnamIOTable.xlsx]Sheet1!\$AB\$58:\$AU\$58)

	G	H	I	subsectors for	Q	R	S
shing	export share (phiX) 0.130530763 0.39929387 0.132592629	import share (phiM) enter value here enter value here enter value here	intermediate products (phiI) enter value here enter value here enter value here	enter value he enter value he enter value he	4.200 58.800 12.400 2.700 1.000 1.700 0.300 4.500 0.000 0.000 185.400 16,780.800 3,037.500 19,818.300	17.600 163.400 34.100 41.600 10.600 3.300 0.600 10.100 0.000 0.000 180.100 24.68 4,88 29.57	

| p.19 | Data Start Structural Parameters ... + ◀ ▶ |

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## 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.
- Sectors and subsectors are: Agriculture, forestry and fishing; Industry; Services.

# Task 6: Agriculture, forestry and fishery

The screenshot shows a Microsoft Excel interface with three tabs: 'Sheet1' (active), 'Sheet2', and 'Sheet3'. The formula bar contains the following formula:

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

Sheet1 (Active Sheet):

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

Sheet2:

A'	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	
	3,313.900	250.300	0.000	

Sheet3:

# Task 6: Industry and construction

Styles | Analysis | Money | Styles

```
=SUM([VietnamIOTable.xlsx]Sheet1!$BD$11:$BD$33)/SUM([VietnamIOTable.xlsx]Sheet1!$BD$9:$BD$53)
```

G	H	I	
ing	export share (phiX) 0.130530763 0.39929387 0.132592629	import share (phiM) 0.045583395 0.775479703 enter value here	intermediate products (phiQ) enter value here enter value here
			subsectors for enter value he enter value he enter value he

AT	AU	AV
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
1.800	0.000	5,149.600
12.200	0.000	2,804.300
19.300	0.000	2,096.700
0.000	0.000	250.300
0.000	0.000	0.000
113.700	0.000	7,206.000
1,964.800	0.000	161,520.300
1,349.100	250.300	0.000
3,313.900	250.300	0.000

# Task 6: Services

The screenshot shows a Microsoft Excel interface with two main sections: a formula bar at the top and two data tables below.

**Formula Bar:**

```
=SUM([VietnamIOTable.xlsx]Sheet1!$BD$34:$BD$53)/SUM(^  
[VietnamIOTable.xlsx]Sheet1!$BD$9:$BD$53)
```

**Table 1 (Left):**

	G	H	I	
ing	export share (phiX)	import share (phiM)	intermediate products (phiQI)	subsectors for
	0.130530763	0.045583395	enter value here	enter value he
	0.39929387	0.775479703	enter value here	enter value he
	0.132592629	0.178936902	enter value here	enter value he

**Table 2 (Right):**

AT	AU	AV
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
1.800	0.000	5,149.600
12.200	0.000	2,804.300
19.300	0.000	2,096.700
0.000	0.000	250.300
0.000	0.000	0.000
113.700	0.000	7,206.000
1,964.800	0.000	161,520.300
1,349.100	250.300	0.000
3,313.900	250.300	0.000

## 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.
- Sectors and subsectors are: Agriculture, forestry and fishing; Industry; Services.

# Task 7: Agriculture, forestry and fishery

```
=SUM([VietnamIOTable.xlsx]Sheet1!$C$56:$D$56)/SUM([VietnamIOTable.xlsx]Sheet1!$C$58:$D$58)
```

I	J	K
mediate products (phiQI)	subsectors for adaptation measures (iGA)	subsectors for private ad
0.658532569	enter value here	enter value here
0.791687203	enter value here	enter value here
0.554970574	enter value here	enter value here

Q	R	S
4.200	17.600	5.
58.800	163.400	139.
12.400	34.100	25.
2.700	41.600	13.
1.000	10.600	11.
1.700	3.300	2.
0.300	0.600	1.
4.500	10.100	27.
0.000	0.000	0.
0.000	0.000	0.
185.400	180.100	1,155.
16,780.800	16,577.800	24,693.
3,037.500	3,266.000	4,885.
19,818.300	19,843.800	29,578.

# Task 7: Industry and construction

I	J	K	L	M	N	O	P	Q	R	S
Intermediate products (phiQI)	subsectors for adaptation measures (iGA)	subsectors for private ad	enter value here	4.200	17.600	5.4				
0.658532569	enter value here	enter value here	enter value here	enter value here	enter value here	enter value here	enter value here	58.800	163.400	139.7
0.791687203	enter value here	enter value here	enter value here	enter value here	enter value here	enter value here	enter value here	12.400	34.100	25.6
0.554970574	enter value here	enter value here	enter value here	enter value here	enter value here	enter value here	enter value here	2.700	41.600	13.1
								1.000	10.600	11.2
								1.700	3.300	2.4
								0.300	0.600	1.2
								4.500	10.100	27.2
								0.000	0.000	0.0
								0.000	0.000	0.0
								185.400	180.100	1,155.7
								16,780.800	16,577.800	24,693.6
								3,037.500	3,266.000	4,885.1
								19,818.300	19,843.800	29,578.7

# Task 7: Services

The screenshot shows a Microsoft Excel spreadsheet titled "Task 7: Services". The formula bar at the top contains the formula: `=SUM([VietnamIOTable.xlsx]Sheet1!$AB$56:$AU$56)/SUM([VietnamIOTable.xlsx]Sheet1!$AB$58:$AU$58)`. The main area displays a table with three columns:

I	J	K
mediate products ( $\phi_{QI}$ )	subsectors for adaptation measures (iGA)	subsectors for private ad
0.658532569	enter value here	enter value here
0.791687203	enter value here	enter value here
0.554970574	enter value here	enter value here

The ribbon menu at the bottom includes tabs for "ata", "Start", "Structural Parameters", and "OECD.Stat export". The "ata" tab is selected. The status bar at the bottom right shows "Accessibility Issues".

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

- Enter value in Column Q.
- Set initial population to 0.937 which computed from  $\frac{97,340,000}{100,000,000}$ .
- Initial GDP or initial added value (Y0) is 1.
- Import share is the absolute value of the sum of the range BD9 to BD55 in VietnamIOTable.xlsx divided by total sum of output of each sector.
- Housing to population ratio is 23.
- Investments in residential buildings is 0.01.

# Task 8: Solution

f<sub>x</sub> =-SUM([VietnamIOTable.xlsx]Sheet1!\$BD\$9:\$BD\$53)/SUM([VietnamIOTable.xlsx]Sheet1!\$C\$58:\$AU\$58)

P	Q	R
ation (PoP)	Value 0.9734	
added (Y0)	1	
e (phiM)	0.299574569	
population ratio (H0)	23	
s in residential building relative to GDP (sH)	0.01	
or adaptation measures in the housing sector (iGAH)	enter value here	
or private adaptation measures in the housing sector (iAPH)	enter value here	
payment (N0)	enter value here	

F	G	H	I
1.200	0.300	14.100	41.500
205.100	76.900	316.700	122.000
1.700	8.400	34.500	144.500
3.000	0.100	38.300	53.000
3.500	4.700	3.800	8.800
0.400	0.000	6.300	19.900
0.100	0.200	1.800	2.700
1.100	0.100	6.600	23.900
0.000	0.000	0.000	0.000
0.000	0.000	0.000	0.000
31.900	5.700	738.200	1,439.600
1,777.100	243.000	86,275.300	54,477.600
971.200	226.100	10,804.700	16,671.500
2,748.400	469.100	97,080.100	71,149.100

## Task 9: Run UpdateDataExcelFileRobust.m

- Modify line with inbsubsectors\_p and inbregions\_p such that you have 3 sectors and 1 region.
- Please make sure that all cells with enter value at the beginning have a numeric value or “enter value here” as entry.
- Otherwise MATLAB will return error message “Error in UpdateDataExcelRobust (line 69) if ~isequal(caValueWrite, {'enter value here'}) && ~ismissing(caValueWrite{:}) ”

# Task 9: Solution

Editor - C:\Users\schul\Dropbox\CRED\_Thanh\Training 3\Session 1\DGECRED\_Model\_sol\Functions\Miscellaneous\UpdateDataExcelRobu

The screenshot shows a MATLAB Editor window with the title bar "Editor - C:\Users\schul\Dropbox\CRED\_Thanh\Training 3\Session 1\DGECRED\_Model\_sol\Functions\Miscellaneous\UpdateDataExcelRobu". The menu bar includes "EDITOR", "PUBLISH", and "VIEW". The toolbar contains icons for New, Open, Save, Print, Go To, Find, Refactor, Profiler, Analyze, Run, Section Break, Run and Advance, Run Section, and Run to End. The code editor displays the following MATLAB script:

```
1 % UpdateDataExcel is a Matlab script to update the
2 % ModelSimulationandCalibration<Number of Subsectors>Sector
3 % Regions>Regions.xlsx workbook for parameter and scenario
4 % model. It writes the information in the data sheet to the
5 % Structural parameters and Start.
6
7 %% User Input
8 clearvars;
9 % define working directory path
10 sPathWD = pwd();
11 % define number of total subsectors
12 inbsubsectors_p = 3;
13 % define number of regions
14 inbregions_p = 1;
15
16
17 %% Update the excel file
18 % define name of excel workbook for input of model
```

## Task 10: Create the Baseline scenario for simulation.

- In the Baseline worksheet, define growth paths ( $gY_1$ ) for value-added and employment for the different sectors ( $gN_1$ ).
- For agriculture, forestry and fishery use an annual growth rate of 2.8 percent for value-added and -5.2 percent 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 ( $x_t = 0.95 x_{t-1}$ )

# Task 10: Solution

The screenshot shows a Microsoft Excel interface. The formula bar at the top displays the cell reference C3 and the formula  $= (1 + (C2-1)*0.95)$ . The ribbon menu is visible, with the Home tab selected. The clipboard section of the ribbon shows recent actions: Undo, Paste, Copy, and Format Painter. The font section shows Calibri, size 11, and bold, italic, underline, and strikethrough options. The alignment section shows horizontal and vertical alignment, wrap text, and merge cells options. Below the ribbon, a table is displayed with columns labeled A through J. The first row contains labels: Time, exo\_PoP, gY\_1\_1, gY\_2\_1, gY\_3\_1, gN\_1\_1, gN\_2\_1, gN\_3\_1. The second row contains values: 2, 0, 1.028, 1.074, 1.083, 0.948, 1.057, 1.027. The third row, which is highlighted in green, contains values: 3, 0, 1.027, 1.07, 1.079, 0.951, 1.054, 1.026. The fourth row contains values: 4, 0, 1.025, 1.067, 1.075, 0.953, 1.051, 1.024. The fifth row contains values: 5, 0, 1.024, 1.063, 1.071, 0.955, 1.049, 1.023. The sixth row contains values: 6, 0, 1.023, 1.06, 1.068, 0.958, 1.046, 1.022. The seventh row contains values: 7, 0, 1.022, 1.057, 1.064, 0.96, 1.044, 1.021. The eighth row contains values: 8, 0, 1.021, 1.054, 1.061, 0.962, 1.042, 1.02.

	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.
- The solution will be save in ResultsScenarios3Sectorsand1Regions.xlsx

# Task 11: Solution

The screenshot shows the MATLAB IDE interface. The menu bar includes EDITOR, PUBLISH, and VIEW. The toolbar has icons for Find, Refactor, Analyze, Run, Run and Advance, Run Section, Run to End, Run, Step, and Stop. The current workspace shows variables like A\_1 through A\_N, alph, and bayi. The command window displays the output of the RunSimulations.m script, which finds a perfect foresight solution and provides computation time details.

Editor - C:\Users\schuh\Dropbox\CRED\_Thanh\Training 3\Session 1\RunSimulations.m

```
1 % RunSimulations is a Matlab script to run different scenarios stored in
2 % ModelSimulationandCalibration>Number of Subsectors>Sectorsand<Number of
3 % Regions>Regions.xlsx workbook. The DGE_CRED_Model.mod file is changed
4 % in the script.
5
6 addpath('C:\dynare\4.6.4\matlab')
7 %% Specify scenario names
8 casScenarioNames = {...;
9     'Baseline',...
10 };
11
12
13 %% Define sector structure
14 sSubsecstart = '[1, 2, 3]';
15 sSubsecend = '[1, 2, 3]';
16
17 %% Define number of regions
18 sRegions = '1';
19
20 %% Define additional specification of the version of the model for sensitivity analysis.
21 sSensitivity = '';
22
23
24 %% Execute dynare to run the model
```

Command Window

```
Perfect foresight solution found.

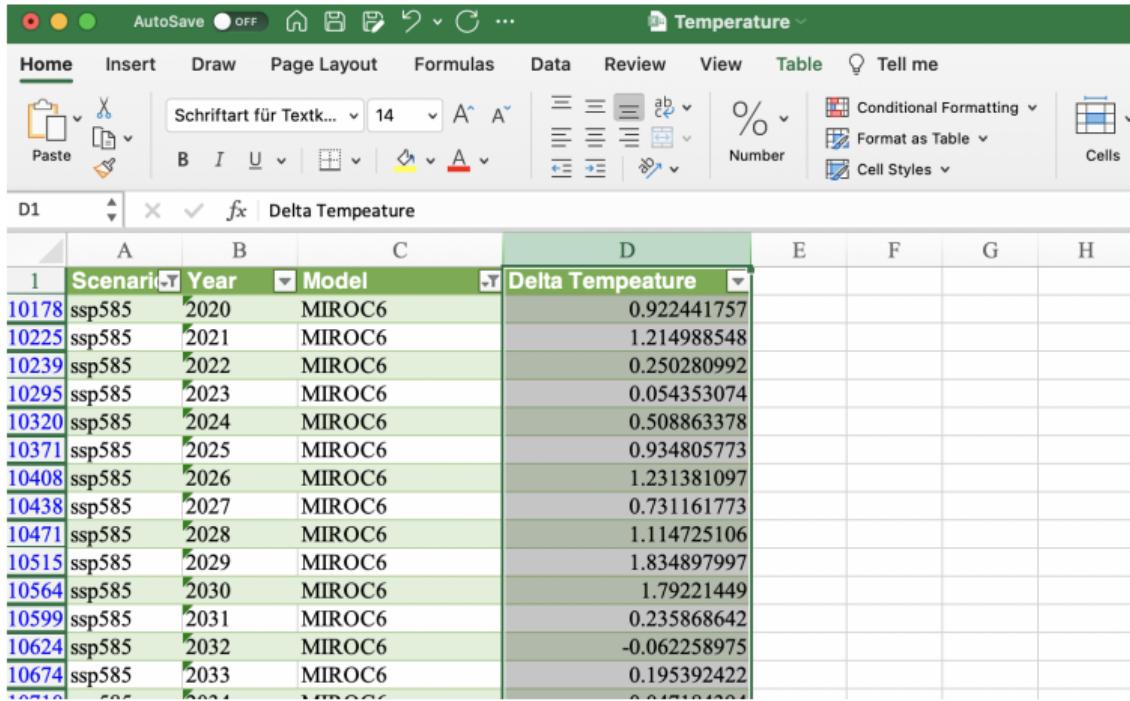
Total computing time : 0h00m39s
time for computation 0.66313 minutes
```

fx>>

## 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, copy the change in temperature and paste values in column C (exo\_tas\_1) in scenario sheet SSP585
- Delete all empty rows after row 81.
- Assume that a 1 °C leads to a decline in TFP by 3.6 percent, fill in damage on TFP (exo\_D\_k) all sectors in column K to M
- Run the SSP 585 scenario in RunSimulation.m file in Matlab

# Task 12: Select the right scenario and model



The screenshot shows a Microsoft Excel spreadsheet titled "Temperature". The ribbon menu is visible at the top, with the "Home" tab selected. The table below contains four columns: "Scenario", "Year", "Model", and "Delta Temperature". The "Delta Temperature" column is highlighted in green. The data shows various years from 2020 to 2033, all using the MIROC6 model, with delta temperatures ranging from -0.062258975 to 1.834897997.

Scenario	Year	Model	Delta Temperature
10178	ssp585	2020	MIROC6
10225	ssp585	2021	MIROC6
10239	ssp585	2022	MIROC6
10295	ssp585	2023	MIROC6
10320	ssp585	2024	MIROC6
10371	ssp585	2025	MIROC6
10408	ssp585	2026	MIROC6
10438	ssp585	2027	MIROC6
10471	ssp585	2028	MIROC6
10515	ssp585	2029	MIROC6
10564	ssp585	2030	MIROC6
10599	ssp585	2031	MIROC6
10624	ssp585	2032	MIROC6
10674	ssp585	2033	MIROC6

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

The screenshot shows a Microsoft Excel spreadsheet with the following details:

- File Ribbon:** Home, Insert, Page Layout, Formulas, Data, Review, View, Developer, Add-ins, Help.
- Clipboard:** Contains "Copy" and "Format Painter".
- Font, Alignment, Number, Styles, Cells, Editing:** Standard Excel toolbars.
- Cell Selection:** Range A66:S99 is selected.
- Cell Address:** The active cell is B82.
- Data:** A grid of numerical values from row 66 to 99. The first few rows show:

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S
66	66	0	2.4515231	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
67	67	0	3.0015231	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
68	68	0	3.3255231	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
69	69	0	3.0755231	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
70	70	0	3.0005231	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
- Delete Dialog:** A "Delete" dialog box is open at the bottom center, showing options:
  - Shift cells left
  - Shift cells up
  - Entire row
  - Entire column

Buttons: OK, Cancel.

## Task 12: Define damages on TFP for all sectors

=0.036\*\$C2

D	E	F	G	H	I	J	K	L	M
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
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

The screenshot shows the MATLAB IDE interface. The menu bar includes PUBLISH, VIEW, CODE, ANALYZE, SECTION, and RUN. The workspace browser on the right lists various variables and functions. The central editor window displays the `RunSimulations.m` script, which defines scenarios, sectors, regions, and runs the model using Dynare. The command window at the bottom shows the output: "Perfect foresight solution found." and "Total computing time : 0h00m16s".

```
% RunSimulations is a Matlab script to run different scenarios stored in
% ModelsimulationsandCalibrations>Number of Subsectors>Sectors and <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 = {...;
    'SSP585'...
};

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

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

%% Define additional specification of the version of the module for sensitivity analysis.
sSensitivity = '';

%% Execute dynare to run the model
```

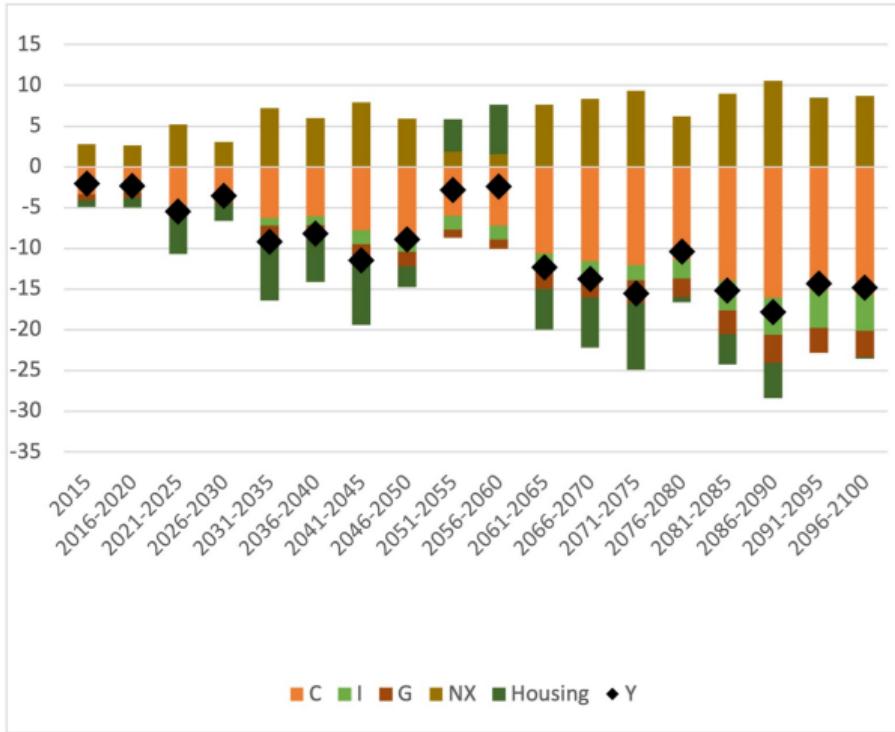
Perfect foresight solution found.

Total computing time : 0h00m16s

## 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 A4 in sheet Var to ResultsScenarios3Sectorsand1Regions.
- Further adapt the names of the variables you want to illustrate for GDP (Y), consumption (C), investment (I), government expenditure (G), 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 (I)

- Assume that labour productivity declines with 1 °C by 2.7 percent, fill in damage on labor productivity (exo\_D\_N\_k) all sectors in column N to P.
- Crop yields decline by 6.9 percent for 1 °C, fill in damage on Crop yields (exo\_D\_k) .  
**Note** that this damage is added in the same column as damage on TFP in sector 1.
- Assume that the mortality rate in Vietnam is 0.6 percent, and for each 1 °C increase, the mortality rate increases by 4 percent.

$$\eta_t^{Pop, SSP} = Pop_t^{SSP} - Pop_t^{Baseline} + Pop_t^{Baseline} - Pop_0$$

$$\eta_t^{Pop, SSP} = -0.006 * 0.04 * Temp_t^{SSP} + Pop_{t-1}^{SSP} - Pop_{t-1}^{Baseline} + \eta^{Pop, Baseline}$$

- ▶  $\eta_t^{Pop, SSP}$  is change in population in period t for the scenario SSP or Baseline scenario.
- ▶  $Pop_t^{SSP}$  is population in period t for scenario SSP or Baseline.
- ▶  $Temp_t^{SSP}$  is temperature in period t for scenario SSP or Baseline.

## Task 14: Add Damages to labour productivity, crop yields and mortality (II)

- Include the damages into the SSP 585 scenario and rerun the simulation.
- Take a look at the impact of climate change on GDP and its components and compare to the figure in Task 13.

# Task 14: Labour productivity

The screenshot shows a Microsoft Excel interface with the following details:

- Top Bar:** AutoSave (Off), ModelSimulationandCalibration3Sectorsand1Regions, Search (Alt+Q).
- Menu Bar:** File, Home, Insert, Page Layout, Formulas, Data, Review, View, Developer, Add-ins, Help.
- Toolbar:** Undo, Paste, Font, Alignment, Number, Conditional Formatting.
- Formula Bar:** SUM =0.027\*\$C2
- Table:** A grid of data with columns labeled N through V. Row 1 contains labels like exo\_D\_N\_1\_1, exo\_D\_N\_2\_1, etc. Row 2 contains the formula =0.027\*\$C2 and values 0.024692123, 0.024692123, 0, 0, 0, 0, 0, 0, 0, 0, 0. Subsequent rows (3-12) show various numerical values.

# Task 14: Crop yields

	K	L	M	N	O	P	Q
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	exo_D_K_1_1
2	0,0968564	0,0332079	0,0332079	0	0	0	(
3	0,1275738	0,0437396	0,0437396	0	0	0	(
4	0,0262795	0,0090101	0,0090101	0	0	0	(
5	0,0057071	0,0019567	0,0019567	0	0	0	(
6	0,0534307	0,0183191	0,0183191	0	0	0	(
7	0,0981546	0,033653	0,033653	0	0	0	(
8	0,129295	0,0443297	0,0443297	0	0	0	(
9	0,076772	0,0263218	0,0263218	0	0	0	(
10	0,1170461	0,0401301	0,0401301	0	0	0	(
11	0,1926643	0,0660563	0,0660563	0	0	0	(
12	0,1881825	0,0645197	0,0645197	0	0	0	(

# Task 14: Mortality (I)

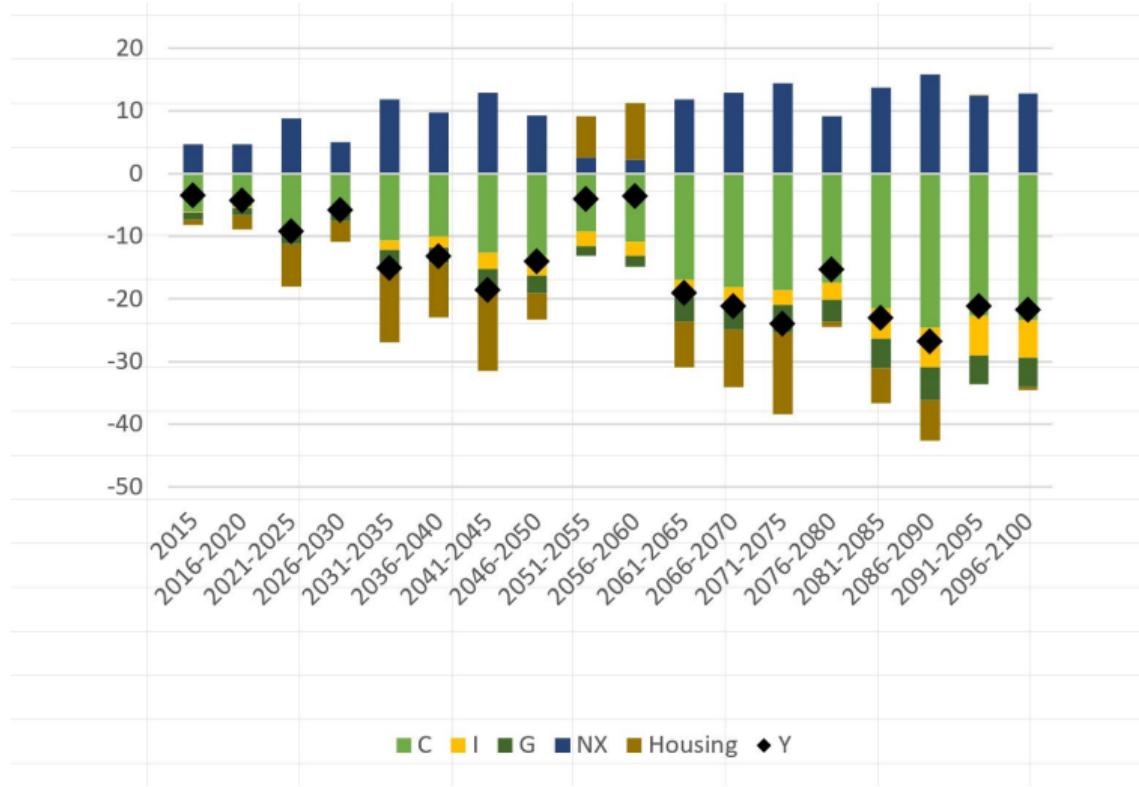
32 :  $\times \checkmark f_x$  =-0.006\*0.04\*C2\*Start!\$B\$3

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	-0.0002	0.922442	0	0	0	0	0
3	-0.0003	1.214989	0	0	0	0	0
4	-6E-05	0.250281	0	0	0	0	0
5	-1E-05	0.054353	0	0	0	0	0
6	-0.0001	0.508863	0	0	0	0	0
7	-0.0002	0.934806	0	0	0	0	0
8	-0.0003	1.231381	0	0	0	0	0
9	-0.0002	0.731162	0	0	0	0	0

## Task 14: Mortality (II)

B3	A	B	C	D	E	F
1	Time	exo_PoP	exo_tas_1	exo_SL	exo_GA_1_1	exo_GA_1_2
2	2	-0.000215497	0.9224418	0	0	
3	3	-0.000499275	1.2149885	0	0	
4	4	-0.000557715	0.250281	0	0	
5	5	-0.000570405	0.0543531	0	0	
6	6	-0.000689214	0.5088634	0	0	
7	7	-0.000907445	0.9348058	0	0	
8	8	-0.001194847	1.2313811	0	0	
9	9	-0.001365449	0.7311618	0	0	
10	10	-0.001625501	1.1147251	0	0	
11	11	-0.002053447	1.834898	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 (only fill in damage in column K to M, without damage on crops in column K).
- SSP585Lab only labour productivity shocks are turned on.
- SSP585Mort only mortality shocks are turned on.
- SSP585Crop only crop yield shocks are turned on (only fill in damage in column K, without damage on TFP).
- Run Runsimulation.m with 4 new scenarios.

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

0	0	0	0	0.1926249	0.0666
0	0	0	0	0.1874799	0.0642
0	0	0	0	0.0248349	0.0085
0	0	0	0	-0.006245	-0.002
0	0	0	0	0.0223149	0.0076
0	0	0	0	0.0036249	0.0012
0	0	0	0	0.1326699	0.0454
0	0	0	0	0.2070099	0.0709
0	0	0	0	0.1863249	0.0638
0	0	0	0	0.0710349	0.0243
0	0	0	0	0.1504149	0.0515
0	0	0	0	0.2852349	0.0977
0	0	0	0	0.1877949	0.0643
0	0	0	0	0.0566499	0.0194

SSP585Crop SSP585Mort SSP585Lab SSP585TFP **SSP585** 

# Task 15: SSP585TFP

M : =0.036\*\$C2

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	0.922442	0	0	0	0	0	0	0	0	0	0	0	0.024905927	0.024905927	0.024905927
3	0.1214989	0	0	0	0	0	0	0	0	0	0	0	0.032804691	0.032804691	0.032804691
4	0.250281	0	0	0	0	0	0	0	0	0	0	0	0.006757587	0.006757587	0.006757587
5	0.054353	0	0	0	0	0	0	0	0	0	0	0	0.001467533	0.001467533	0.001467533
6	0.508863	0	0	0	0	0	0	0	0	0	0	0	0.013739311	0.013739311	0.013739311
7	0.934806	0	0	0	0	0	0	0	0	0	0	0	0.025239756	0.025239756	0.025239756
8	0.1231381	0	0	0	0	0	0	0	0	0	0	0	0.03324729	0.03324729	0.03324729
9	0.731162	0	0	0	0	0	0	0	0	0	0	0	0.019741368	0.019741368	0.019741368
10	0.114725	0	0	0	0	0	0	0	0	0	0	0	0.030097578	0.030097578	0.030097578
11	0.1834898	0	0	0	0	0	0	0	0	0	0	0	0.049542246	0.049542246	0.049542246
12	0.1792214	0	0	0	0	0	0	0	0	0	0	0	0.048389791	0.048389791	0.048389791
13	0.235869	0	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	-0.00168099	-0.00168099	-0.00168099
15	0.195392	0	0	0	0	0	0	0	0	0	0	0	0.005275595	0.005275595	0.005275595
16	0.047184	0	0	0	0	0	0	0	0	0	0	0	0.01273979	0.01273979	0.01273979

# Task 15: SSP585Mort

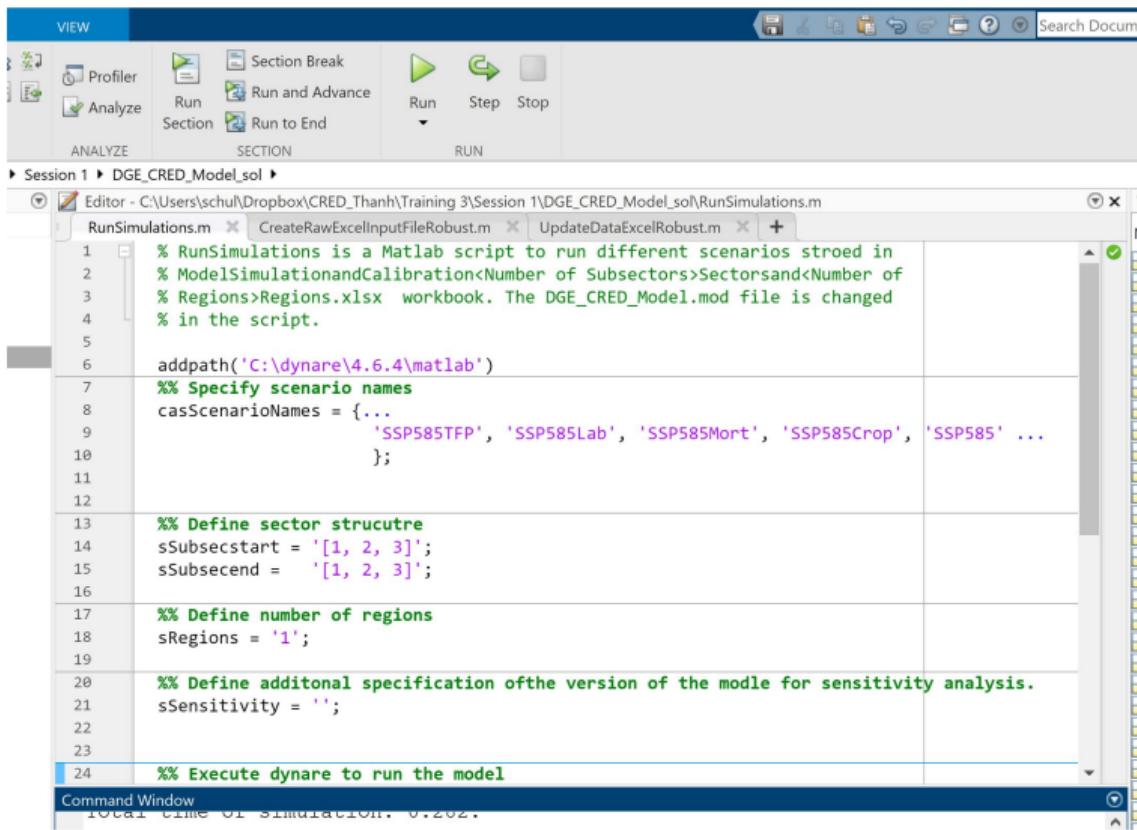
B3	A	B	C	D	E	F	G
1	Time	exo_PoP	exo_tas_1	exo_SL	exo_GA_1_1	exo_GA_2_1	exo_GA_3_1
2	2	-0.000215497	0.922442	0	0	0	0
3	3	-0.000499275	1.214989	0	0	0	0
4	4	-0.000557715	0.250281	0	0	0	0
5	5	-0.000570405	0.054353	0	0	0	0
6	6	-0.000689214	0.508863	0	0	0	0
7	7	-0.000907445	0.934806	0	0	0	0
8	8	-0.001194847	1.231381	0	0	0	0
9	9	-0.001365449	0.731162	0	0	0	0
10	10	-0.001625501	1.114725	0	0	0	0
11	11	-0.002053447	1.834898	0	0	0	0

# Task 15: SSP585Crop

The screenshot shows a Microsoft Excel interface with a formula bar at the top containing `=0.069*$C2`. Below the formula bar is a large empty gray rectangular area. The main content is a table with columns labeled B through K and rows labeled 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, and e. The first row contains numerical values: 0.922442, 0, 0, 0, 0, 0, 0, 0, 0, 0, and 0. The second row contains 0.1214989, 0, 0, 0, 0, 0, 0, 0, 0, 0, and 0.0838342. The third row contains 0.250281, 0, 0, 0, 0, 0, 0, 0, 0, 0, and 0.0172694. The fourth row contains 0.054353, 0, 0, 0, 0, 0, 0, 0, 0, 0, and 0.0037504. The fifth row contains 0.508863, 0, 0, 0, 0, 0, 0, 0, 0, 0, and 0.0351116. The sixth row contains 0.934806, 0, 0, 0, 0, 0, 0, 0, 0, 0, and 0.0645016. The seventh row contains 1.231381, 0, 0, 0, 0, 0, 0, 0, 0, 0, and 0.0849653. The eighth row contains 0.731162, 0, 0, 0, 0, 0, 0, 0, 0, 0, and 0.0504502. The ninth row contains 1.114725, 0, 0, 0, 0, 0, 0, 0, 0, 0, and 0.076916. The tenth row contains 1.834898, 0, 0, 0, 0, 0, 0, 0, 0, 0, and 0.126608. The eleventh row contains 1.792214, 0, 0, 0, 0, 0, 0, 0, 0, 0, and 0.1236628. The twelfth row contains 0.235869, 0, 0, 0, 0, 0, 0, 0, 0, 0, and 0.0162749. The thirteenth row contains -0.06226, 0, 0, 0, 0, 0, 0, 0, 0, 0, and -0.004296.

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	=0.069*\$C2
0	0.1214989	0	0	0	0	0	0	0	0	0.0838342
0	0.250281	0	0	0	0	0	0	0	0	0.0172694
0	0.054353	0	0	0	0	0	0	0	0	0.0037504
0	0.508863	0	0	0	0	0	0	0	0	0.0351116
0	0.934806	0	0	0	0	0	0	0	0	0.0645016
0	1.231381	0	0	0	0	0	0	0	0	0.0849653
0	0.731162	0	0	0	0	0	0	0	0	0.0504502
0	1.114725	0	0	0	0	0	0	0	0	0.076916
0	1.834898	0	0	0	0	0	0	0	0	0.126608
0	1.792214	0	0	0	0	0	0	0	0	0.1236628
0	0.235869	0	0	0	0	0	0	0	0	0.0162749
0	-0.06226	0	0	0	0	0	0	0	0	-0.004296

# Task 15: RunSimulation.m



The screenshot shows a MATLAB interface with the following details:

- Toolbar:** Includes buttons for View, Profiler, Analyze, Run Section, Run and Advance, Run to End, Run, Step, and Stop.
- Session:** Session 1 > DGE\_CRED\_Model\_sol
- Editor:** Editor - C:\Users\schul\Dropbox\CRED\_Thanh\Training 3\Session 1\GDE\_CRED\_Model\_sol\RunSimulations.m
- Script Content:**

```
1 % RunSimulations is a Matlab script to run different scenarios stored in
2 % ModelSimulationandCalibration>Number of Subsectors>Sectors and<Number of
3 % Regions>Regions.xlsx workbook. The GDE_CRED_Model.mod file is changed
4 % in the script.
5
6 addpath('C:\dynare\4.6.4\matlab')
7 %% Specify scenario names
8 casScenarioNames = ...
9     'SSP585TFP', 'SSP585Lab', 'SSP585Mort', 'SSP585Crop', 'SSP585' ...
10    };
11
12 %% Define sector structure
13 sSubsecstart = '[1, 2, 3]';
14 sSubsecend = '[1, 2, 3]';
15
16 %% Define number of regions
17 sRegions = '1';
18
19 %% Define additional specification of the version of the model for sensitivity analysis.
20 sSensitivity = '';
21
22
23 %% Execute dynare to run the model
```
- Command Window:** TOTAL time of simulation: 0.202.
- Page-Footer:** p.57 | giz Deutsche Gesellschaft für  
Internationale Zusammenarbeit (GIZ) GmbH

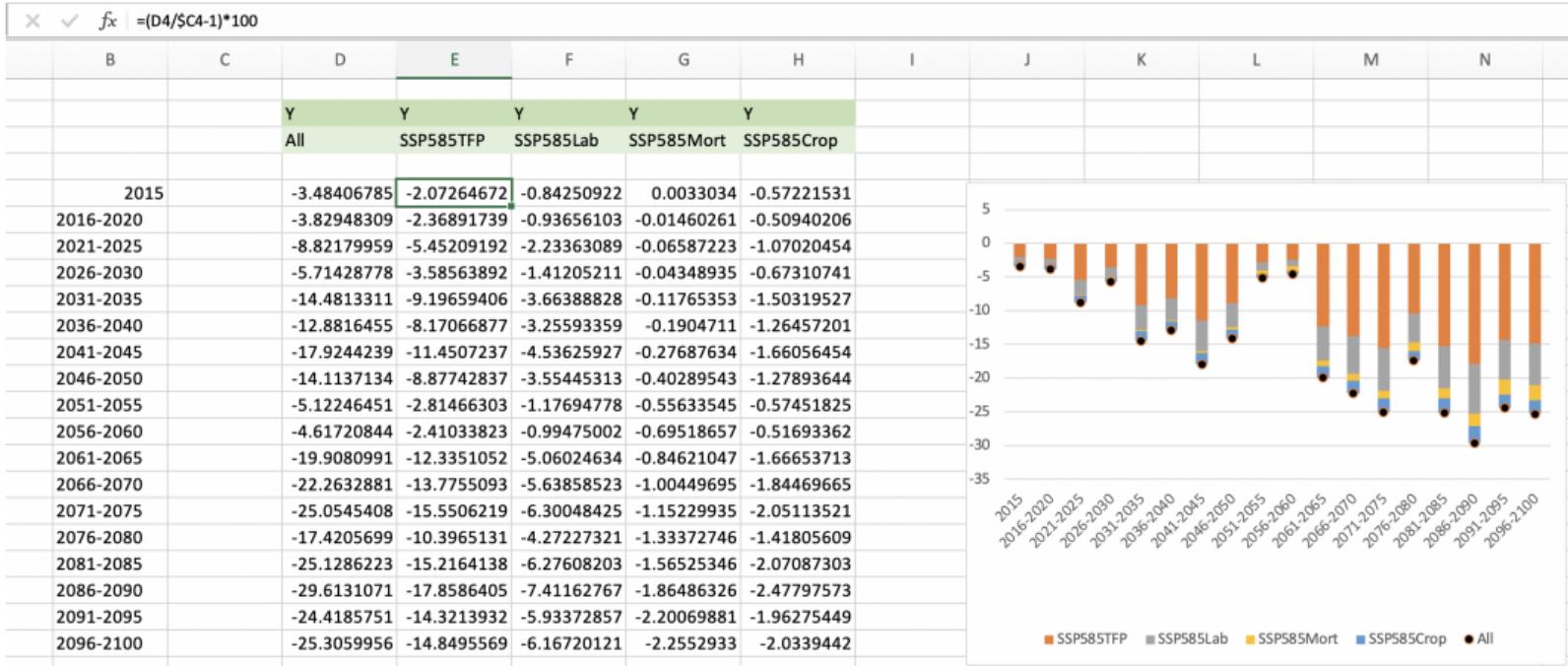
## Task 16: Create a figure to illustrate which impact channel matters the most for GDP.

- Use the figure for GDP components from Task 14 as a basis.
- Modify the figure, change the GDP components to the damage type such that you can see the GDP effect for SSP585TFP, SSP585Lab, SSP585Mort, SSP585Crop as a stacked bar and all damage types simultaneously as a point.
- What impact channel is the most severe one?

# Task 16: Figure (I)

C3	A	B	C	D	E	F	G	H	I	J	K
	Year	Y	Y	Y	Y	Y					
		Baseline	SSP585TFP	SSP585Lab	SSP585Mort	SSP585Crop					
3	2014	1.33311073	1.33311073	1.33311073	1.33311073	1.33311073					
4	ResultsScenar	2015	1.42643211	1.39686721	1.41441429	1.42647923	1.41826985				
5	2020	1.91705978	1.87164622	1.89910535	1.91677984	1.90729424					
6	2025	2.42214306	2.29008559	2.36804132	2.42054754	2.39622117					
7	2030	2.91106617	2.80668585	2.8699604	2.90980017	2.89147157					
8	2035	3.36176581	3.05259786	3.23859447	3.35781058	3.31123191					
9	2040	3.76151688	3.4541758	3.63904439	3.75435228	3.71394979					
10	2045	4.10551057	3.63539989	3.91927396	4.09414338	4.03733591					
11	2050	4.3946007	4.00447317	4.23839668	4.37689506	4.33839655					
12	2055	4.63310616	4.50269983	4.57857692	4.60733055	4.60648812					
13	2060	4.82707004	4.71072132	4.77905276	4.79351289	4.80211729					
14	2065	4.98305764	4.36839224	4.73090265	4.94089049	4.90001314					
15	2070	5.10742037	4.4038472	4.81943412	5.05611648	5.01320395					
16	2075	5.20590438	4.39635387	4.87790719	5.14591678	5.09912424					
17	2080	5.28348859	4.73419	5.05776352	5.21302125	5.20856575					
18	2085	5.34436136	4.53114123	5.00894486	5.26070856	5.23368643					
19	2090	5.39197277	4.42903974	4.99233983	5.29141985	5.258361					
20	2095	5.42912151	4.65159567	5.10697218	5.3096429	5.32256118					
21	2100	5.4580523	4.64755571	5.12144323	5.33495721	5.34703856					

# Task 16: Figure (II)



# 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.
- Run simulation on SSP119 and SSP 245.
- Plot the range of results for GDP effects compared to SSP585 for the different climate models (SSP119 and SSP245).

# Task 17: Create SSP119

	A	B	C	D
1	Scenario	Year	Model	Delta Temperature
4	ssp119	2020	MIROC6	1.119293559
14	ssp119	2021	MIROC6	1.561758108
25	ssp119	2022	MIROC6	0.224792368
37	ssp119	2023	MIROC6	0.936005259
47	ssp119	2024	MIROC6	1.072900956
59	ssp119	2025	MIROC6	0.914859124
76	ssp119	2026	MIROC6	-0.398459304
85	ssp119	2027	MIROC6	0.657461172
96	ssp119	2028	MIROC6	1.070904468
112	ssp119	2029	MIROC6	1.743187389
120	ssp119	2030	MIROC6	1.531961445
130	ssp119	2031	MIROC6	0.236157875
144	ssp119	2032	MIROC6	0.226331041
152	ssp119	2033	MIROC6	0.345888243
158	ssp119	2034	MIROC6	1.160134848
176	ssp119	2035	MIROC6	1.834662453
189	ssp119	2036	MIROC6	0.550209098

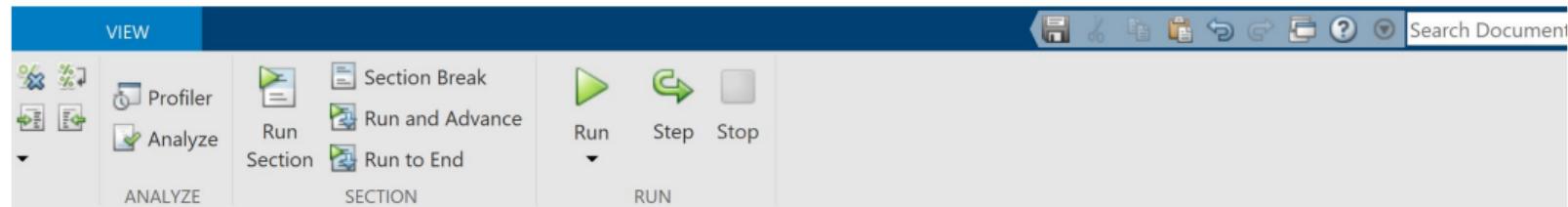
	A	B	C	D	
1	Time	exo_PoP	exo_tas_1	exo_SL	ex
2	2	-0.00026148	1.119294	0	
3	3	-0.00062624	1.561758	0	
4	4	-0.00067872	0.224792	0	
5	5	-0.00089723	0.936005	0	
6	6	-0.00114765	1.072901	0	
7	7	-0.00136112	0.914859	0	
8	8	-0.00126817	-0.39846	0	
9	9	-0.00142156	0.657461	0	
10	10	-0.00167137	1.070904	0	
11	11	-0.00207791	1.743187	0	
12	12	-0.00243504	1.531961	0	
13	13	-0.00249007	0.236158	0	
14	14	-0.00254281	0.226331	0	
15	15	-0.0026234	0.345888	0	
16	16	-0.0028937	1.160135	0	
17	17	-0.00332103	1.834662	0	
18	18	-0.00344913	0.550209	0	

# Task 17: Create SSP245

Scenarios	Year	Model	Delta Temperature
ssp245	2020	MIROC6	-0.041782461
ssp245	2021	MIROC6	0.024926064
ssp245	2022	MIROC6	-0.180079221
ssp245	2023	MIROC6	0.619759685
ssp245	2024	MIROC6	1.718795361
ssp245	2025	MIROC6	0.602541942
ssp245	2026	MIROC6	-0.107118271
ssp245	2027	MIROC6	-0.185280713
ssp245	2028	MIROC6	1.181646479
ssp245	2029	MIROC6	1.928125514
ssp245	2030	MIROC6	0.659097462
ssp245	2031	MIROC6	0.185226533
ssp245	2032	MIROC6	0.928039964
ssp245	2033	MIROC6	2.153103983
ssp245	2034	MIROC6	1.563615826
ssp245	2035	MIROC6	-0.410426763
ssp245	2036	MIROC6	0.002840726

	A	B	C	D
1	Time	exo_PoP	exo_tas_1	exo_S
2	2	9.76105E-06	-0.041782	
3	3	3.93787E-06	0.0249261	
4	4	4.60074E-05	-0.180079	
5	5	-9.87852E-05	0.6197597	
6	6	-0.000500283	1.7187954	
7	7	-0.000640974	0.6025419	
8	8	-0.000615966	-0.107118	
9	9	-0.000572708	-0.185281	
10	10	-0.000848598	1.1816465	
11	11	-0.001298646	1.9281255	
12	12	-0.001452416	0.6590975	
13	13	-0.001495623	0.1852265	
14	14	-0.001712095	0.92804	
15	15	-0.00221421	2.153104	
16	16	-0.002578665	1.5636158	

# Task 17: RunSimulation.m



| 3 ▶ Session 1 ▶ DGE\_CRED\_Model\_sol ▶

Editor - C:\Users\schul\Dropbox\CRED\_Thanh\Training 3\Session 1\DGE\_CRED\_Model\_sol\RunSimulations.m

RunSimulations.m CreateRawExcelInputRobust.m UpdateDataExcelRobust.m +

```
1 % RunSimulations is a Matlab script to run different scenarios stored in
2 % ModelSimulationandCalibration<Number of Subsectors>Sectorsand<Number of
3 % Regions>Regions.xlsx  workbook. The DGE_CRED_Model.mod file is changed
4 % in the script.
```

```
5
6 addpath('C:\dynare\4.6.4\matlab')
7 %% Specify scenario names
8 casScenarioNames = {...
9             'SSP119', 'SSP245' ...
10            };
```

```
13 %% Define sector structure
14 sSubsecstart = '[1, 2, 3]';
15 sSubsecend = '[1, 2, 3]';
```

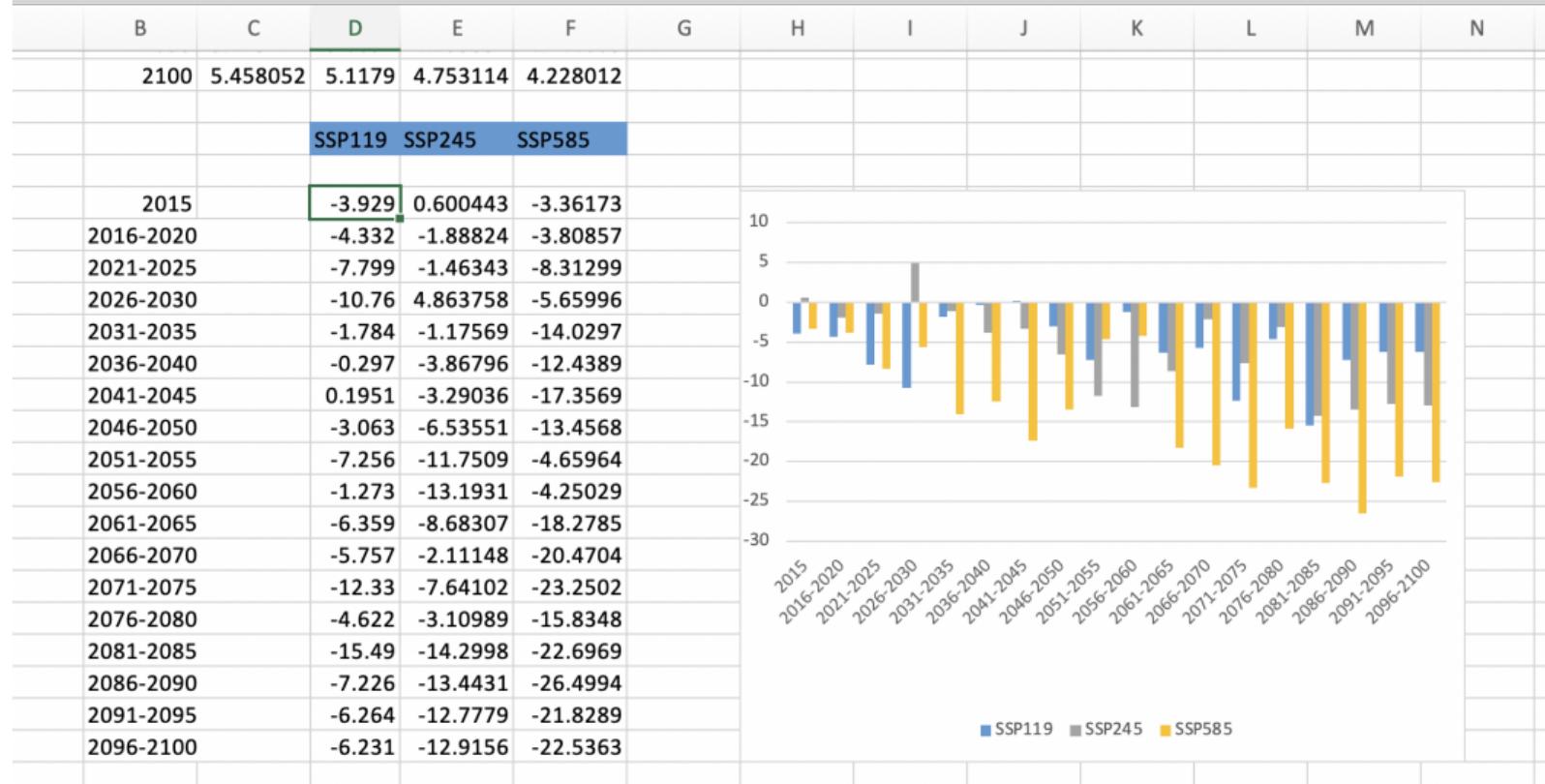
```
17 %% Define number of regions
18 sRegions = '1';
```

# Task 17: Figure (I)

A4	▼	X	✓	fx	'ResultsScenarios3Sectorsand1Regions	G	H	I	J
1		Y	Y	Y	Y				
2		Year	Baseline	SSP119	SSP245	SSP585			
3		2014	1.333111	1.3331	1.333111	1.333111			
4	ResultsScenarios3Sector	2015	1.426432	1.3704	1.434997	1.378479			
5		2020	1.91706	1.834	1.880861	1.844047			
6		2025	2.422143	2.2332	2.386697	2.22079			
7		2030	2.911066	2.5977	3.052653	2.746301			
8		2035	3.361766	3.3018	3.322242	2.890121			
9		2040	3.761517	3.7503	3.616023	3.293625			
10		2045	4.105511	4.1135	3.970424	3.392921			
11		2050	4.394601	4.26	4.107391	3.803226			
12		2055	4.633106	4.2969	4.088674	4.41722			
13		2060	4.82707	4.7656	4.190228	4.621906			
14		2065	4.983058	4.6662	4.550375	4.072227			
15		2070	5.10742	4.8134	4.999578	4.061911			
16		2075	5.205904	4.5643	4.80812	3.995521			
17		2080	5.283489	5.0393	5.119178	4.446861			
18		2085	5.344361	4.5163	4.580129	4.131356			
19		2090	5.391973	5.0023	4.667127	3.963131			
20		2095	5.429122	5.0891	4.735392	4.244005			
21		2100	5.458052	5.1179	4.753114	4.228012			

# Task 17: Figure (II)

✓ fx | =(D4/\$C4-1)\*100



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

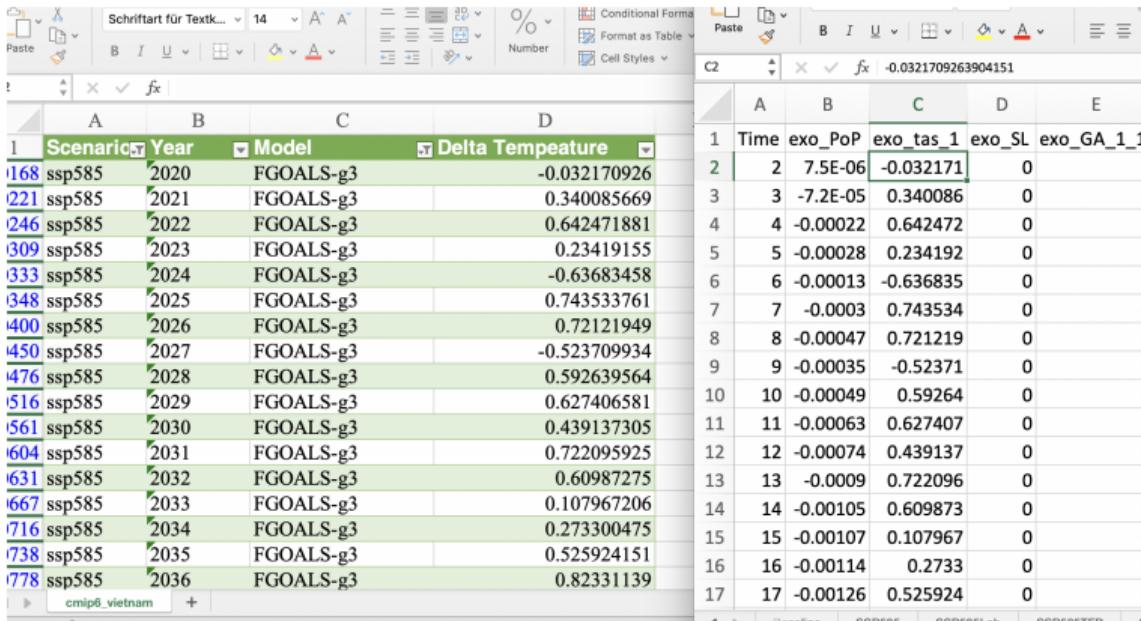
- Create the following scenarios: SSP585FGOALSg3, SSP585CanESM5, SSP585MIROCES2L
- Each scenario is the SSP 585 scenario from a different climate model (FGOALS-g3, CanESM5, MIROC-ES2L).
- Note: Delete special characters from the scenario names when type in Runsimulation.m.
- Plot the range of results for GDP effects compared to SSP585 for three different climate models.

# Task 18: Create SSP585CanESM5

Scenario	Year	Model	Delta Temperature
ssp585	2020	CanESM5	0.399132983
ssp585	2021	CanESM5	0.086262553
ssp585	2022	CanESM5	0.239850281
ssp585	2023	CanESM5	0.173997777
ssp585	2024	CanESM5	0.417298183
ssp585	2025	CanESM5	-0.268171198
ssp585	2026	CanESM5	0.292465713
ssp585	2027	CanESM5	0.590855541
ssp585	2028	CanESM5	0.010009531
ssp585	2029	CanESM5	0.678274592
ssp585	2030	CanESM5	0.453082523
ssp585	2031	CanESM5	0.668177832
ssp585	2032	CanESM5	0.219133739
ssp585	2033	CanESM5	1.303837581
ssp585	2034	CanESM5	0.659592632
ssp585	2035	CanESM5	0.236358546
ssp585	2036	CanESM5	0.657501065

Time	exo_PoP	exo_tas_1	exo_SL	exo_GA
2	-9.32439E-05	0.399133	0	
3	-0.000113394	0.0862626	0	
4	-0.000169421	0.2398503	0	
5	-0.000210062	0.1739978	0	
6	-0.000307529	0.4172982	0	
7	-0.000244899	-0.268171	0	
8	-0.000313207	0.2924657	0	
9	-0.000451196	0.5908555	0	
10	-0.000453533	0.0100095	0	
11	-0.000611915	0.6782746	0	
12	-0.000717696	0.4530825	0	
13	-0.000873678	0.6681778	0	
14	-0.000924825	0.2191337	0	
15	-0.001229133	1.3038376	0	
16	-0.00138303	0.6595926	0	
17	-0.001438168	0.2363585	0	

# Task 18: Create SSP585FGOALSG3

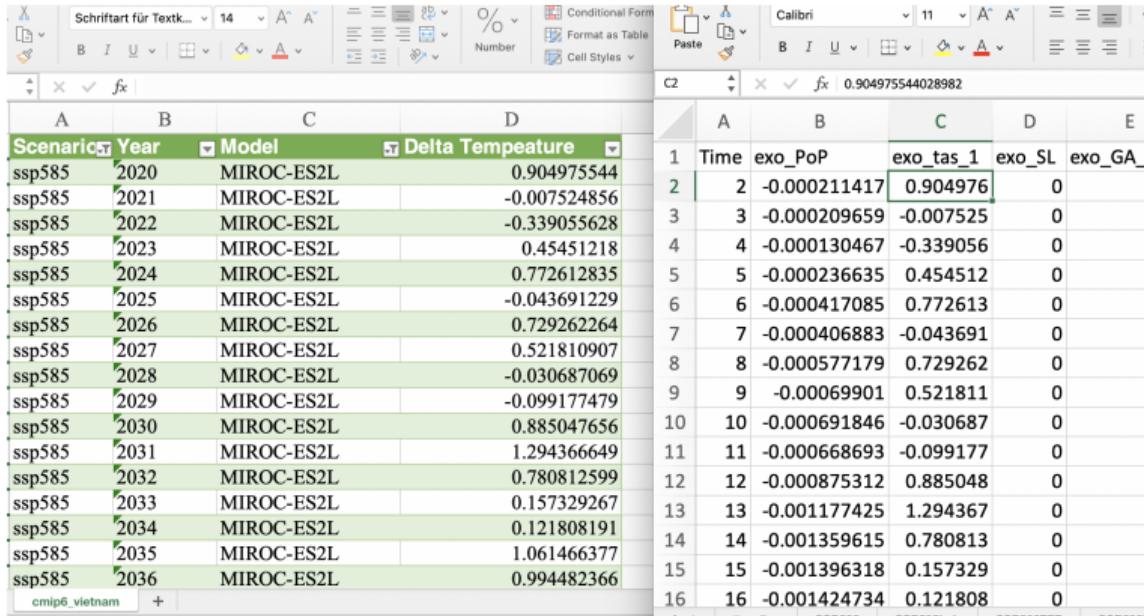


	A	B	C	D
1	Scenario	Year	Model	Delta Temperature
168	ssp585	2020	FGOALS-g3	-0.032170926
221	ssp585	2021	FGOALS-g3	0.340085669
246	ssp585	2022	FGOALS-g3	0.642471881
309	ssp585	2023	FGOALS-g3	0.23419155
333	ssp585	2024	FGOALS-g3	-0.63683458
348	ssp585	2025	FGOALS-g3	0.743533761
400	ssp585	2026	FGOALS-g3	0.72121949
450	ssp585	2027	FGOALS-g3	-0.523709934
476	ssp585	2028	FGOALS-g3	0.592639564
516	ssp585	2029	FGOALS-g3	0.627406581
561	ssp585	2030	FGOALS-g3	0.439137305
604	ssp585	2031	FGOALS-g3	0.722095925
631	ssp585	2032	FGOALS-g3	0.60987275
667	ssp585	2033	FGOALS-g3	0.107967206
716	ssp585	2034	FGOALS-g3	0.273300475
738	ssp585	2035	FGOALS-g3	0.525924151
778	ssp585	2036	FGOALS-g3	0.82331139

	A	B	C	D	E
1	Time	exo_PoP	exo_tas_1	exo_SL	exo_GA_1_1
2	2	7.5E-06	-0.032171	0	(
3	3	-7.2E-05	0.340086	0	(
4	4	-0.00022	0.642472	0	(
5	5	-0.00028	0.234192	0	(
6	6	-0.00013	-0.636835	0	(
7	7	-0.0003	0.743534	0	(
8	8	-0.00047	0.721219	0	(
9	9	-0.00035	-0.52371	0	(
10	10	-0.00049	0.59264	0	(
11	11	-0.00063	0.627407	0	(
12	12	-0.00074	0.439137	0	(
13	13	-0.0009	0.722096	0	(
14	14	-0.00105	0.609873	0	(
15	15	-0.00107	0.107967	0	(
16	16	-0.00114	0.2733	0	(
17	17	-0.00126	0.525924	0	(

# Task 18: Create SSP585MIROCES2L

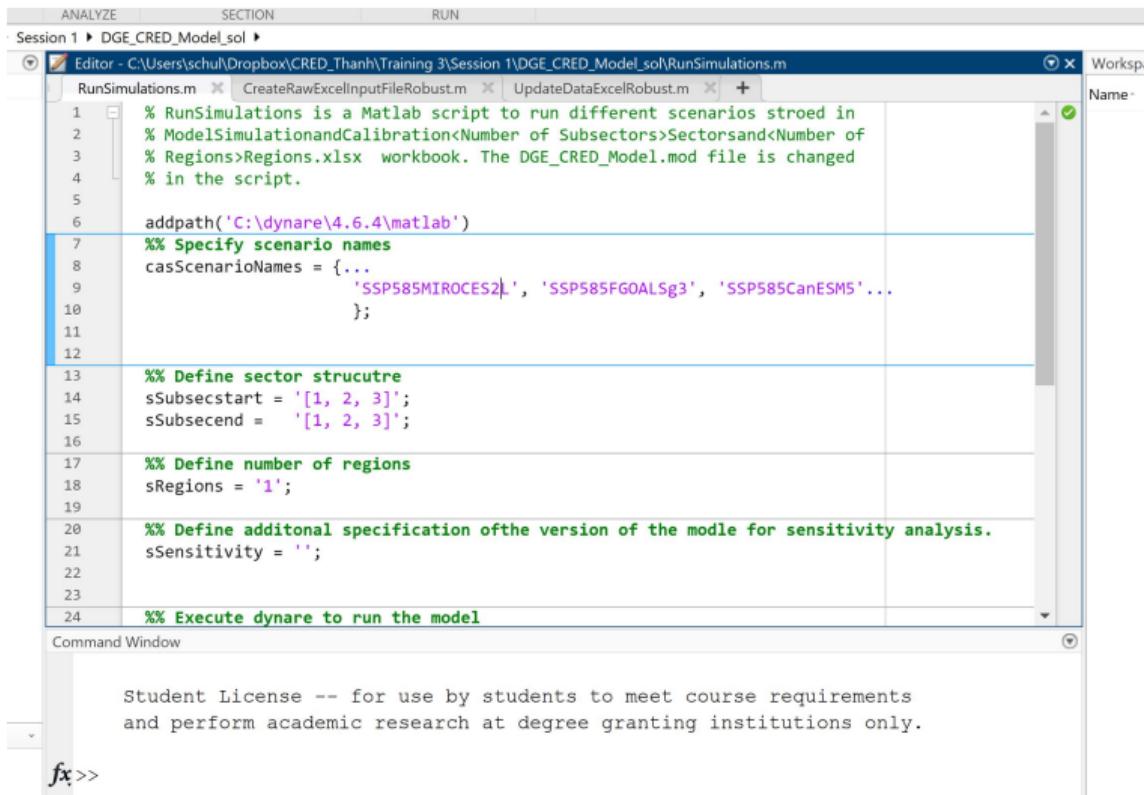


Scenario	Year	Model	Delta Temperature
ssp585	2020	MIROC-ES2L	0.904975544
ssp585	2021	MIROC-ES2L	-0.007524856
ssp585	2022	MIROC-ES2L	-0.339055628
ssp585	2023	MIROC-ES2L	0.45451218
ssp585	2024	MIROC-ES2L	0.772612835
ssp585	2025	MIROC-ES2L	-0.043691229
ssp585	2026	MIROC-ES2L	0.729262264
ssp585	2027	MIROC-ES2L	0.521810907
ssp585	2028	MIROC-ES2L	-0.030687069
ssp585	2029	MIROC-ES2L	-0.099177479
ssp585	2030	MIROC-ES2L	0.885047656
ssp585	2031	MIROC-ES2L	1.294366649
ssp585	2032	MIROC-ES2L	0.780812599
ssp585	2033	MIROC-ES2L	0.157329267
ssp585	2034	MIROC-ES2L	0.121808191
ssp585	2035	MIROC-ES2L	1.061466377
ssp585	2036	MIROC-ES2L	0.994482366

	A	B	C	D	E
1	Time	exo_PoP	exo_tas_1	exo_SL	exo_GA_
2	2	-0.000211417	0.904976	0	
3	3	-0.000209659	-0.007525	0	
4	4	-0.000130467	-0.339056	0	
5	5	-0.000236635	0.454512	0	
6	6	-0.000417085	0.772613	0	
7	7	-0.000406883	-0.043691	0	
8	8	-0.000577179	0.729262	0	
9	9	-0.00069901	0.521811	0	
10	10	-0.000691846	-0.030687	0	
11	11	-0.000668693	-0.099177	0	
12	12	-0.000875312	0.885048	0	
13	13	-0.001177425	1.294367	0	
14	14	-0.001359615	0.780813	0	
15	15	-0.001396318	0.157329	0	
16	16	-0.001424734	0.121808	0	

# Task 18: RunSimulation.m



The screenshot shows the MATLAB Editor window with the file `RunSimulations.m` open. The code defines a script to run different scenarios stored in a specified Excel workbook. It includes sections for specifying scenario names, defining sector structure, defining regions, and executing Dynare. The MATLAB Command Window at the bottom displays a student license message.

```
ANALYZE SECTION RUN
Session 1 ▶ DGE_CRED_Model_sol ▶
Editor - C:\Users\schul\Dropbox\CRED_Thanh\Training 3\Session 1\...
RunSimulations.m CreateRawExcelInputFileRobust.m UpdateDataExcelRobust.m +
1 % RunSimulations is a Matlab script to run different scenarios stroed in
2 % ModelSimulationandCalibration<Number of Subsectors>Sectorsand<Number of
3 % Regions>Regions.xlsx  workbook. The DGE_CRED_Model.mod file is changed
4 % in the script.
5
6 addpath('C:\dynare\4.6.4\matlab')
7 %% Specify scenario names
8 casScenarioNames = ...
9     'SSP585MIROCES2L', 'SSP585FGOALsg3', 'SSP585CanESM5',...
10    ...
11
12 %% Define sector strucutre
13 sSubsecstart = '[1, 2, 3]';
14 sSubsecend = '[1, 2, 3]';
15
16 %% Define number of regions
17 sRegions = '1';
18
19 %% Define additonal specification ofthe version of the mode for sensitivity analysis.
20 sSensitivity = '';
21
22
23 %% Execute dynare to run the model
24 %% Execute dynare to run the model
Command Window
Student License -- for use by students to meet course requirements
and perform academic research at degree granting institutions only.

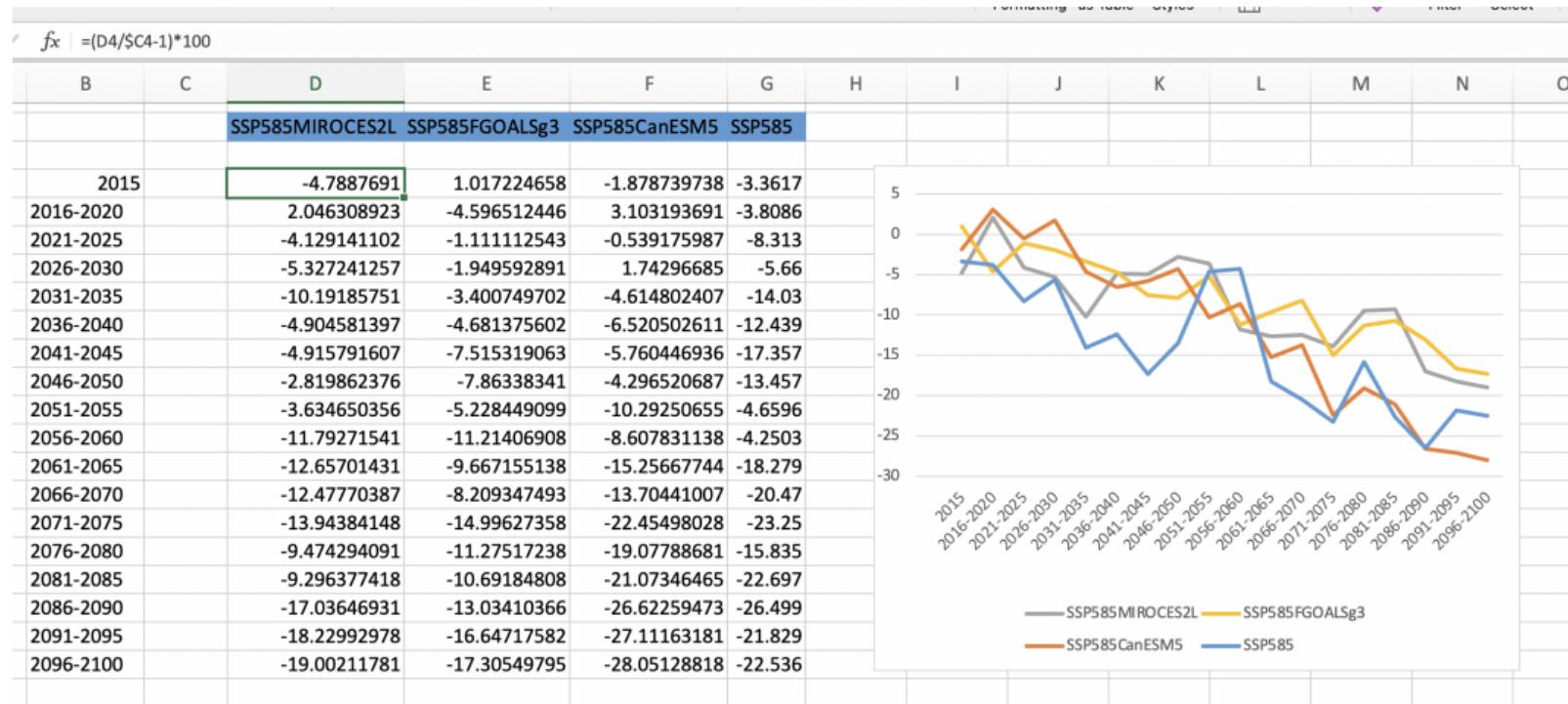
fx>>
```

## Task 18: Figure (I)

- 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.

G3	A	B	C	D	E	F	G	H	I	J	K
1	Year	Baseline	SSP585MIRECES2L	SSP585GOALS3	SSP585CanESM5	SSP585					
2											
3	ResultsScenarios3Secto	2014	1.33311	1.333110734	1.333110734	1.333110734	1.333110734				
4		2015	1.42643	1.358123573	1.440942133	1.399633166	1.3785				
5		2020	1.91706	1.95628875	1.828941893	1.976549863	1.844				
6		2025	2.42214	2.322129354	2.395230324	2.409083445	2.2208				
7		2030	2.91107	2.755986656	2.854312235	2.961805093	2.7463				
8		2035	3.36177	3.01913943	3.24744057	3.206626962	2.8901				
9		2040	3.76152	3.577030225	3.585426148	3.516247075	3.2936				
10		2045	4.10551	3.903692222	3.796968348	3.869014809	3.3929				
11		2050	4.3946	4.270679009	4.049036399	4.205785773	3.8032				
12		2055	4.63311	4.46470895	4.390866562	4.156243405	4.4172				
13		2060	4.82707	4.257827405	4.2857595068	4.411563999	4.6219				
14		2065	4.98306	4.352351322	4.501337729	4.22280861	4.0722				
15		2070	5.10742	4.470131577	4.68813448	4.407478535	4.0619				
16		2075	5.2059	4.480001324	4.425212716	4.036919577	3.9955				
17		2080	5.28349	4.782915339	4.68776614	4.275510614	4.4469				
18		2085	5.34436	4.847529361	4.772950366	4.218119261	4.1314				
19		2090	5.39197	4.473370986	4.689177451	3.956489713	3.9631				
20		2095	5.42912	4.433396471	4.525326107	3.957198076	4.244				
21		2100	5.45805	4.42090677	4.51350917	3.926998319	4.228				
22											

# Task 18: Figure (II)

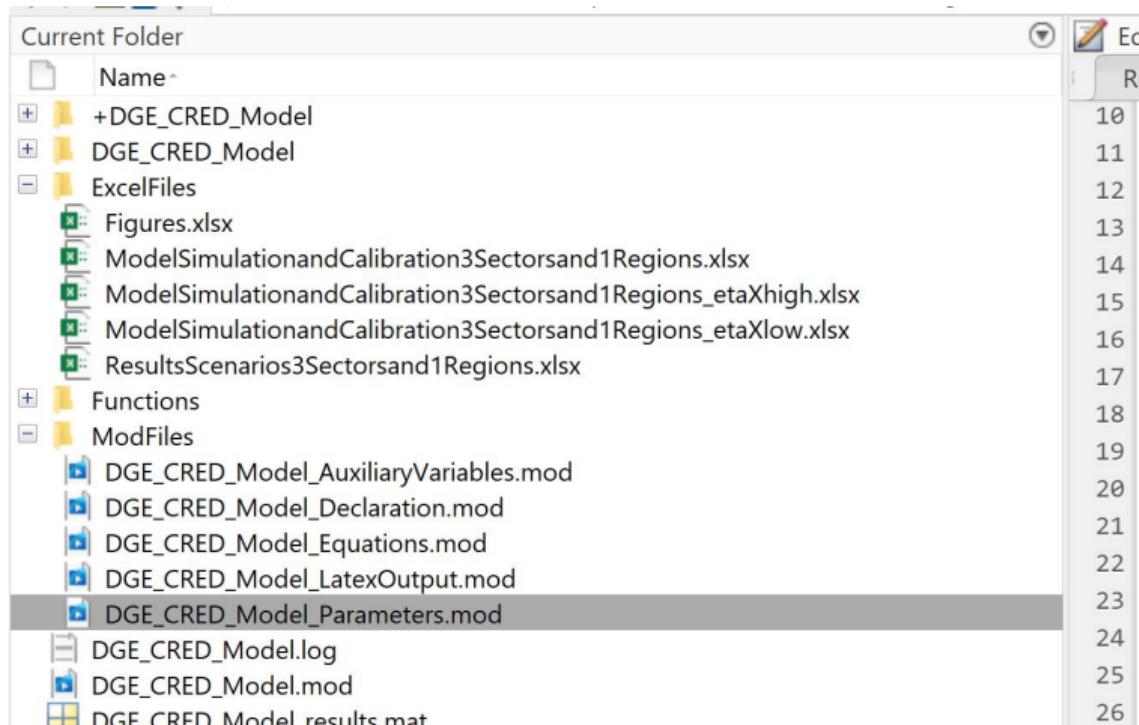


## Task 19: Sensitivity Analysis SSP 585 effect for export price elasticity.

- Analyse the role of  $\eta^X$  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  $\eta^X$  or decrease in  $\eta^X$ ?
- 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 (row 11 column B).
- 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  $\eta_{X_p}$  in the sheet Structural Parameters in cell B11 to 1.5 and 0.3, respectively.

	A	B
		Value Description
1	Parameter	
2	beta_p	0.9606 discount factor
3	delta_p	0.045 depreciation rate
4	sH_p	0.01 share of investments in residential b
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 irr
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 domi

# 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.m | CreateAndWriteInputFileToDGE.m | UpdateDataForDGE.m | DGE_CRED_Model_Parameters.mod
% RunSimulations is a Matlab script to run different scenarios stored 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 structure
sSubsecstart = '[1, 2, 3]';
sSubsecend = '[1, 2, 3]';

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

%% Define additional specification of the version of the model 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 $\eta_{X_p}$ .

- Illustrate the differences between GDP, consumption, investment and net exports in the Baseline and the SSP 585 scenario with high and low supply price elasticity of exports ( $\eta_{X_p}$ ).
- Are net exports higher or lower with an increase in  $\eta_{X_p}$ ?

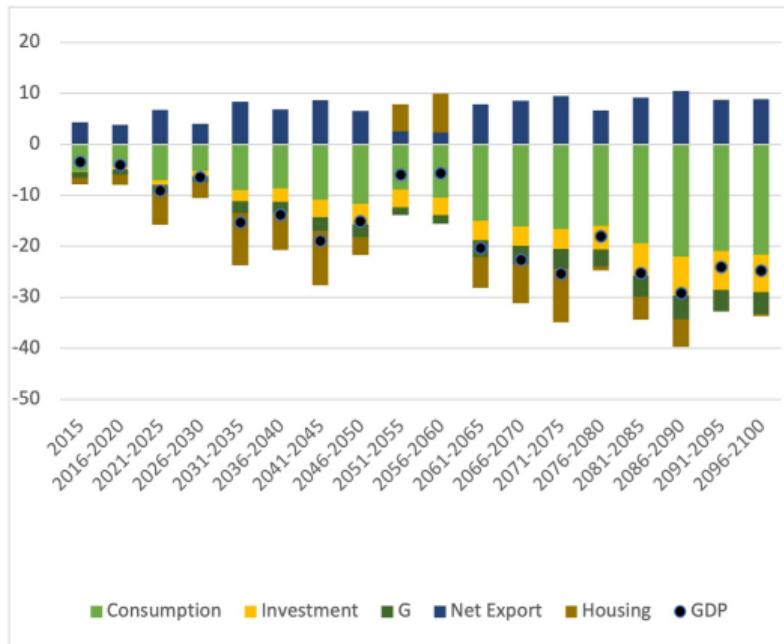
# Task 20: Copy the sheet GDP in Figures.xlsx.

- Rename the file you refer to in A4 plots to  
ResultsScenarios3Sectorsand1Regions\_etaXhigh and  
ResultsScenarios3Sectorsand1Regions\_etaXlow.

A4	Y	Y	C	C	I	I	
1	Year	Baseline	SSP585	Baseline	SSP585	Baseline	SSP5
2	2014	1.3331107	1.33311	0.8140614	0.8140614	0.3258301	0.32
3	2015	1.4264321	1.37909	0.871166	0.7923505	0.3484956	0.34
4	ResultsScen	2020	1.9170598	1.84668	1.1252595	1.0340848	0.5237655
5	2025	2.4221431	2.23104	1.3532433	1.1690195	0.7450652	0.73
6	2030	2.9110662	2.75977	1.5821275	1.4231276	0.9493164	0.94
7	2035	3.3617658	2.92032	1.8197215	1.5002452	1.1052395	1.06
8	2040	3.7615169	3.33283	2.0554835	1.712835	1.2130949	1.16
9	2045	4.1055106	3.44879	2.2756935	1.8072084	1.2848242	1.19
10	2050	4.3946007	3.86807	2.4717178	1.9370508	1.3317722	1.20
11	2055	4.6331062	4.4814	2.6404085	2.2264556	1.3620313	1.26
12	2060	4.82707	4.69728	2.7821878	2.2748253	1.3810537	1.28
13	2065	4.9830576	4.18102	2.8993326	2.1153194	1.3925511	1.27
14							

## Task 20: ResultsScenarios3Sectorsand1Regions\_etaXlow

- For a low value of  $\eta_X = 0.3$ , 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  $\eta_{\text{aX}} = 1.5$ , we observe a decline in GDP by 19 percent.
- Net exports only increased by 14 percent at the end of the century.

