



How to Run the UNI-CGE Model

Learn how to (1) prepare to run a CGE model by following a checklist, and (2) run the UNI-CGE model.

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1. A CHECKLIST BEFORE RUNNING A CGE MODEL

As you prepare to carry out an analysis, you might make changes to the model, such as changing elasticity parameter values, or changing a macro closure. You will then define experiments, run the model, and examine results. It is easy to forget what changes you have made or experiments you have run, before running more experiments. This (common) oversight can lead to experiment results that incorporate assumptions or shocks you had not intended to include.

To avoid this, make it a practice to follow this checklist before running your model.

Checklist Before Running the Model

- ✓ Check the country database that you are calling
- ✓ Check the model closure
- ✓ Check the elasticity parameter values
- ✓ Check for unwanted experiments

A. CHECKLIST: CHECK THAT YOU ARE USING THE CORRECT COUNTRY DATABASE

In this course, the database for each country is held in an Excel file, with a title that includes the name of the country. You need to specify in the UNI-CGE model which Excel country file to call and use in the model. The modeling exercises in our course

mostly use a database for the United States, held in an Excel file named SAM-USA333.xlsx.

To check that the model is using the country database that you are interested in, search for the command in the model that calls in the Excel data file. Hit **CTRL + F** and search for the term “Read SAM Data.”

In the example in Figure 1, we are checking that the UNI-CGE model is calling in the US data file. The GAMS code command GDXXRW requests a conversion of the input file *i* (the Excel file SAM-USA333.xlsx) into the output file, *o*, which is a GDX file that is readable by the model.

Figure 1. Selecting the county data file

```
*Read SAM data, all Sets and all elasticities from an Excel file  
$CALL 'GDXXRW i=SAM-USA333.xlsx o=model-data.gdx INDEX=Index!A4'
```

B. CHECKLIST: CHECK THE MODEL CLOSURE

Model closure is an important decision that will to some extent predetermine the results of your experiments. You may need to change closures to selections that best represent the economy you are studying and that are appropriate for your research questions.

To avoid forgetting that you have changed a closure, review your choices of model closure before running the model (Figure 2). Ensure that the selections are the ones that you want to use for that experiment.

To check your closure choices, hit **CTRL + F** and search for the term “Select the Closure Settings.” Check that the closure selections are correct. Note that the default closures used in this course are:

SICLOS savings-investment closure (fixed savings rate) /1/

GOVCLOS government expenditure closure (fixed budget balance) /2/

ROWCLOS foreign exchange market closure (fixed trade balance) /1/

Figure 2. Closure options in the UNI-CGE model

```
Savings-Investment Closure options
if SICLOS = 1, savings rates fixed, investment adjust
if SICLOS = 2, investment fixed, savings rates adjust

Government Closure options
if GOVCLOS = 1, government demand for commodities is fixed
if GOVCLOS = 2, government demand for commodities adjusts
if GOVCLOS = 3, government demand for commodities and government savings are fixed;
direct income taxes on the single household adjusts

Foreign Exchange Market Closure options
if ROWCLOS = 1, FSAV fixed, exchange rate is flexible
if ROWCLOS = 2, Exchange rate is fixed, foreign savings (FSAV) is flexible
```

C. CHECKLIST: CHECK THE ELASTICITY PARAMETER VALUES

The country databases in this course include default values for elasticities. The values are mid-range estimates based on commonly used parameter values. You may change the elasticities if you have better information on them, or if you want to explore how sensitive your results are to various parameter values. Some modeling exercises ask you to change elasticities as part of an experiment.

Before running your model, check the elasticity parameter values in your country data file. Ensure they are the appropriate selection for your experiment. Elasticities are defined in the Excel country data file. Look at the worksheets for LES and ELAST

(Figure 3).

Figure 3. Elasticity worksheets in the country data file

	A	B	C	D	E	F	G	H
1	Elasticities							
2		ESUBQ						
3	c-AGR	0.7						
4	c-MFG	0.7						
5	c-SER	0.7						
6								
7		ETRAX						
8	c-AGR	2						
9	c-MFG	2						
10	c-SER	2						
11								
12		ESUBVA						
13	a-AGR	20						
14	a-MFG	20						
15	a-SER	20						
16								
17		EDE						
18	c-AGR	0						
19	c-MFG	3						
20	c-SER	0						
21								
22								
23								
24								

D. CHECKLIST: SEARCH FOR EXTRANEIOUS EXPERIMENTS

The initial solve statement in your model calculates and calibrates parameters and then solves the model equations. The results of the initial solve statement replicate the data in the SAM and serve as the baseline for your experiments. The model code that

defines your experiment is placed after the initial solve statement, and followed by a second solve statement. The results from the second solve statement describe the economy following the shock. You compare results from your experiment solution to the base values, to define the effects of the shock. (These values are reported as percent changes from the base in the results files.)

You are likely to define many experiments in your research project. Avoid having old experiments still running in the model by checking the model code between the first and second solve statements. Check that experiments that you do not intend to include are turned off (by placing a star in front of that line of code) and that the experiment you want to run is turned on (remove the star).

The model code in Figure 4 shows that the experiment that redefines the capital account balance (FSAV) is turned off. The experiment that redefines the tariff rate (TM) is turned on.

Figure 4. Turning Experiments On and Off

```
SOLVE UNI USING MCP ;

*Do a simulation
* FSAV.FX = 0.4*SUM(CE, pwe(CE)*QE0(CE)) ;
  TM.FX(C) = TM0(C) + 0.2 ;

SOLVE UNI USING MCP ;
```

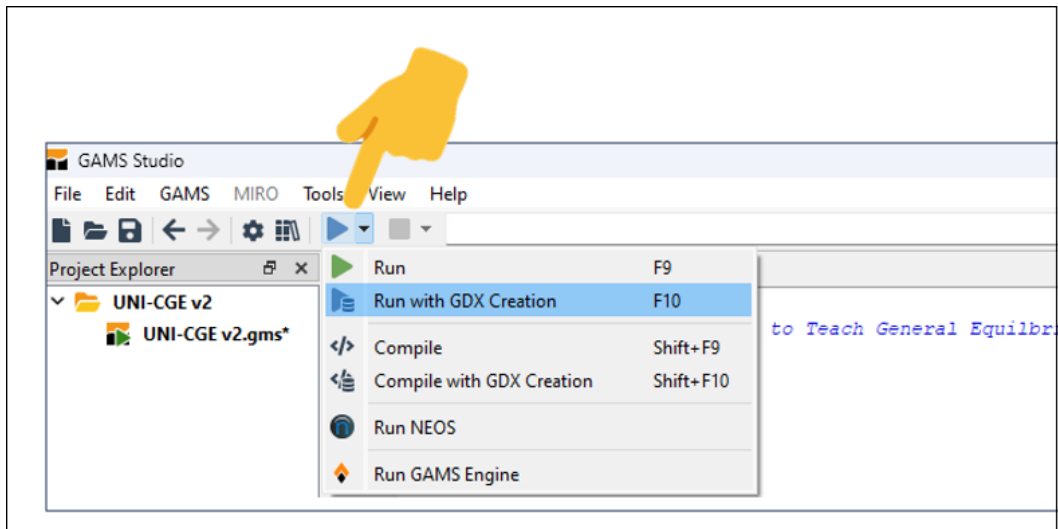
2. RUN THE UNI-CGE MODEL

A. RUN THE MODEL WITH GDX CREATION

In a Getting-Ready exercise, you downloaded and opened the UNI-CGE model in

GAMS. The first time you run the model, click on the green arrow, and scroll down the submenu to select “Run with GDX creation” (Figure 5) This option creates GDX files with model results. You can thereafter run the model by simply clicking on the green arrow and the GDX results file will be automatically repopulated. As your skills develop further, you will learn how to use GDX to read and export model output.

Figure 5: Run the model with GDX creation



B. MODEL SOLUTION AND ERRORS

As the model runs, a *Process Log* window will open on the right side of the screen. You can observe the progression as GAMS searches for a model solution. After the run is completed, the process log reports that either a solution has been found (Figure 6 – shown in yellow), or that there are errors in the model that prevent a successful solution. If the model run is successful, the process log will identify where the output files have been placed on your computer (Figure 6 – shown in blue).

If there are errors, the process log will list them. Your skills in interpreting and correcting errors in GAMS will develop over time. The GAMS manual available on the GAMS website is helpful, and you can also do an internet search to learn about errors.

Figure 6: Process Log reports results of model run

```

** EXIT - solution found.

Major Iterations. . . . 0
Minor Iterations. . . . 0
Restarts. . . . . 0
Crash Iterations. . . . 0
Gradient Steps. . . . 0
Function Evaluations. . 1
Gradient Evaluations. . 1
Basis Time. . . . . 0.000000
Total Time. . . . . 0.000000
Residual. . . . . 5.577980e-12

--- Reading solution for model UNI[LST:3148]
--- Executing after solve: elapsed 0:00:01.996[LST:3204]
--- UNI-CGE v11.gms(2166) 4 Mb[FIL:" UNI-CGE v11.gms",2166,0]
--- GDX File (execute_unload) C:\xxxx. UNI-RESULTS.gdx
--- UNI-CGE v11.gms(2185) 4 Mb[FIL:"C: UNI-CGE v11.gms",2185,0]

GDXXRW      45.5.0 8d95ac18 Dec 14, 2023      WEI x86 64bit/MS Window
Input file : C:\xxxx \UNI-RESULTS.gdx
Output file: C:\xxxx\ UNI-RESULTS.xlsx
Substituting Index
Total time = 1157 Ms
--- UNI-CGE v11.gms(2188) 4 Mb[FIL:"C:\xxx\UNI-CGE v11.gms",2188,0]
--- GDX File C:\xxx\UNI-CGE v11.gdx
*** Status: Normal completion
    
```

C. MODEL OUTPUT

GAMS generates three output files after the model run is completed (Figure 7).

- [The listing \(.lst\) file](#)

The .lst file reports the full model and model results. Because you chose a GAMS setting that opens the .lst file after running the model (see “Getting Ready; Download GAMS and the UNI-CGE Model), the .lst file will pop open in the main display window in GAMS. The .lst also displays any data for which the model has a display command.

Try it:

At the bottom of the UNI-CGEvXXX.gams file, type:

Display qa.l;

Variable qa is the initial quantity of output. After you run the model, go to the bottom of the list file. Is this variable displayed?

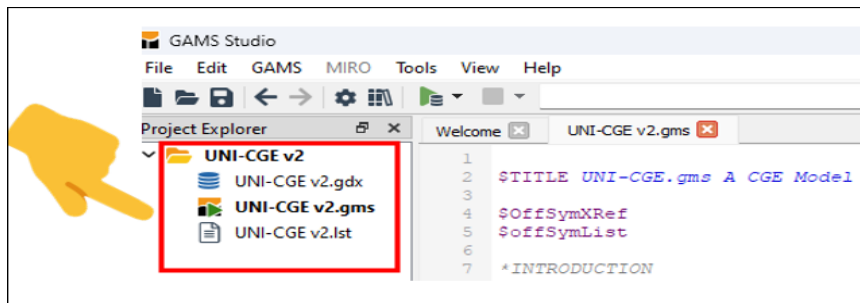
- [GDx output file](#)

Because you specified that the model run with GDx creation, a GDx results file will be populated when the model solves.

- [UNI-RESULTS.xlsx file](#)

This file is updated with your model results. Close the file after you view it. GAMS cannot overwrite with new model results unless the .xlsx file is closed.

Figure 7. GAMS creates .LST and .GDx output files



You can learn more about how to locate and view relevant results in the “How To” exercises on reading model results