**GTAP-SIMPLE-G Modeling Framework: User’s Guide**

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# Summary

This document provides detailed instructions on the GTAP-SIMPLE-G framework. This model is benchmarked with 2017 base year, with Brazil as the disaggregated region. It is designed as the supplementary material of the manuscript “GTAP-SIMPLE-G: Integrating Gridded Land Use, Crop Production and Environment Impacts into Global General Equilibrium Model of Trade”. Please refer to this manuscript for additional information about GTAP-SIMPLE-G and its database. For additional questions, please contact the author via [zhanwang@purdue.edu](mailto:zhanwang@purdue.edu) .

# Software and Working Environment

GTAP-SIMPLE-G is developed and simulated with the General Equilibrium Modelling PACKage (GEMPACK) (Horridge et al. 2018). Before simulating SIMPLE-G-Brazil, it is necessary to install the GEMPACK software on your computer first. For users without a paid license of GEMPACK, A free-trail version of GEMPACK is available at <https://www.copsmodels.com/gpeidl.htm>, which works with a limited size of model.

The default environment of GEMPACK is Windows platform (the model has been tested with Windows 10/11 operation systems). In order to install GEMPACK and run this model on MacOS, users may need to use a virtual machine with several third-party options:

- CrossOver (https://www.codeweavers.com/crossover)

- Virtual Box (https://www.virtualbox.org/wiki/Downloads)

- Parallels Desktop (http://www.parallels.com/products/desktop)

- VMWare Fusion (http://www.vmware.com/products/fusion.html)

# Files and Folders

## Model

GTAPSIMPLEG.tab is the TABLO code of GTAP-SIMPLE-G model. This file contains the alternative version of model, in which all quantity-preserving CET and CES functions are replaced by the regular CET and CES functions for more accurate welfare evaluation.

## Command file

Sim.cmf is the command file for an illustrative simulation: the increase in China's import tariff on soybeans exported from the US, and its impacts on the local crop production and land use in Brazil.

## Folder “in”

The folder contains a mini version of the global and gridded database that can be simulated with the Limited Executable-Image Version of GEMPACK with free-trial license. This database contains 4 regions (USA, Brazil, China, rest of world), 18 commodities including eight GTAP crops, 11 activities (all crop producing activities are aggregated to the "cultivation" activity), and 27 grid cells (for each state, all grid cells are aggregated to a single grid cell).

## Folder “out”

After simulation, this folder will contain simulation outputs.

## Folder “Homogeneity tests”

The folder contains command files and simulation results for price homogeneity (PH) and quantity homogeneity (QH) tests, respectively. To replicate these tests, please copy the bat file and command file (do\_XX.bat and Sim\_XX.cmf, XX is PH or QH) to the model's folder and double click the bat file (see “Simulations” section below).

## Other files

GridCellMapping.csv provides the mapping between grid cells to Brazilian states for this mini database. Other files are auxiliary files, users do not need to change them.

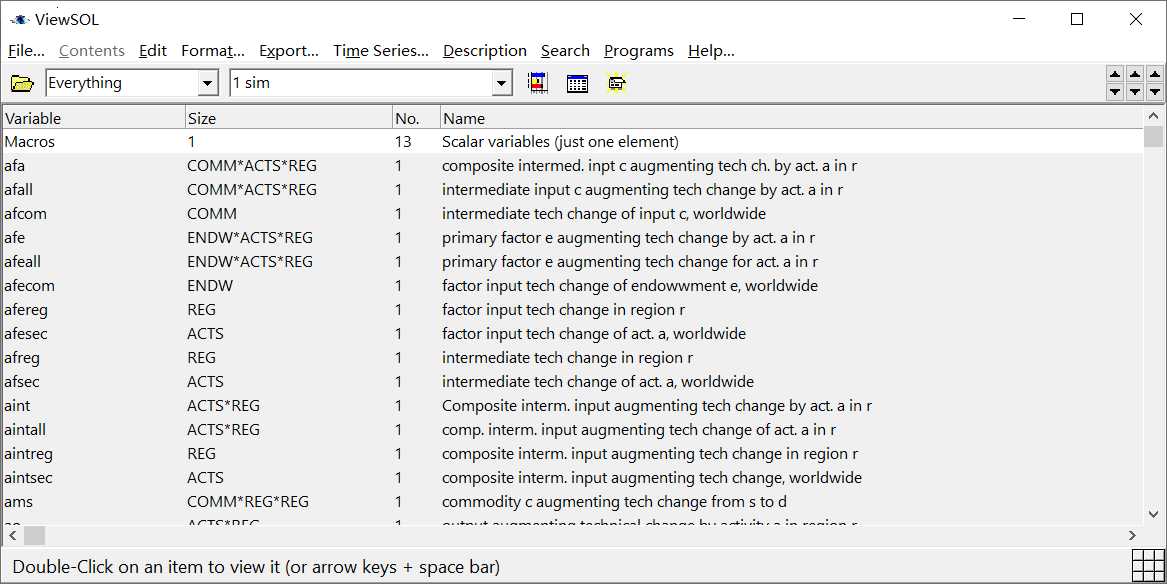
# Simulations

To conduct simulations with GTAP-SIMPLE-G, please install the GEMPACK software on your computer, and then run the model following either of the two options below:

- Option 1: double click the "do.bat" file, which will run a pre-compiled version of GTAP-SIMPLE-G with the command file.

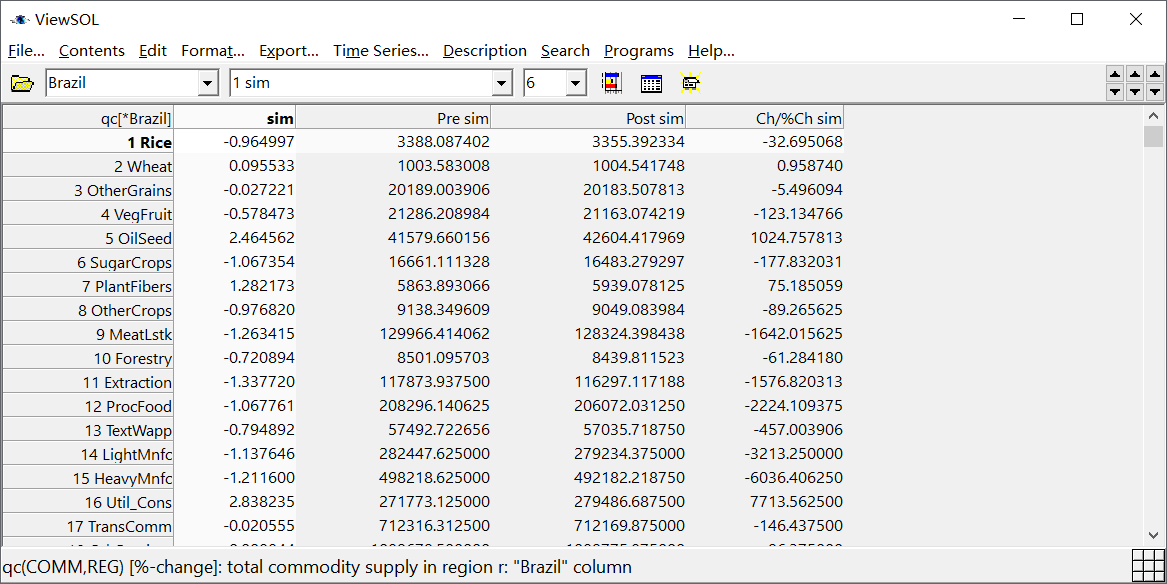
- Option 2: open "GTAPSIMPLEG.tab" file with the TABmate software (installed together with GEMPACK), click "TABLO Code" first if you make any changes on the model, and then click "RUN CMF". In the "Run CMF file" window, click the "Browse" button before "CMF files to run", select "Sim.cmf" file, and then click "OK".

Once the simulation is finished successfully, users should be able to find the solution file (\*.sl4) with the same name under the folder “out”. Double-click to open the solution file with ViewSOL (the software installed together with GEMPACK), which will list variables and their descriptions for further check (Fig. 1).



**Fig.1. The screenshot of a solution file**

For the results of each variable, the resolution file will report the percentage of that variable in the first column (here 10 means 10% increase). If the variable also contains the level form (the quantity at base), the solution file will also report its value before the shock (the second column), after shock (the third column), and the difference in net values, not percentage change (the fourth column) (Fig. 2).



**Fig.2. The screenshot of results**

Note: Numbers shown in this figure are for illustrative purposes only.

The easiest way of exporting simulation results is to “Export – Copy” in ViewSOL, which will copy all results of the current variable to clipboard and can be pasted to Excel. Still, a less straightforward but more recommended approach is to access solution file in R using the “HARr” package (Ivanic 2023), which allow users to save simulation results as data frames with scripts for saving or further analysis.

# Reference

Horridge, J. M., Michael Jerie, Dean Mustakinov, and Florian Schiffmann. 2018. *GEMPACK Manual*. Victoria University, Centre of Policy Studies/IMPACT Centre.

Ivanic, Maros. 2023. “GEMPACK Simulations in R: A Demonstration of Running the GTAP Modeland Processing Its Results Entirely in R Using Packages HARr and tabloToR.” *Journal of Global Economic Analysis* 8 (1): 1–20. https://doi.org/10.21642/JGEA.080101AF.

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