

Training Session on the supply model
Slides prepared for the TS in Braunschweig

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Get Prepared and install
CAPRI

Please get prepared before you do the course

- Remind yourself of the topics learnt in in Seville ... (JR: ask Maria, upload add copy link)
- Basic knowledge in GAMS, sets (static, dynamic), parameters (domain check), variable (marginal, level, up and lo), equations (marginal), model definition (minimizing, maximizing)
- Understand the logic and the code of the provided examples see Annex (just copy to GAMS) and answer the question given at the top of the GAMS code
 - PMP calibration
 - Estimation of a production function
- Please ensure that you have understood:
 - What is a baseline in CAPRI (we will not touch this topic but is important to understand)
 - What is an mathematical programming approach
 - What is positive mathematical programming (see example)
 - What is the difference between a linear programming and a quadratic models
 - What is the difference between variables and parameters in GAMS

Please get prepared before you do the course cnt.

- Be prepared and install on your laptop the following software (or the version from Seville)
 - CAPRI model; Code: CAPRI Trunk r7309 ; <https://svn1.agp.uni-bonn.de/svn/capri/trunk>
 - Results: CAPRI Results r24; https://svn1.agp.uni-bonn.de/svn/capri_out_after2016/results
 - Software needed at your own computer
 - Java Version 8
 - GAMS Version 24.9
- Editors:
 - Notepad++ Version 7.5.6 (free available)
 - Kedit (download link <http://www.kedit.com/kedit.downup.installer.html>)
 - GAMSIDE (in GAMS included)
 - Ultraedit (trial version)
 - Microsoft Excel, Powerpoint
- Please ensure that you have a keyboard language-setting familiar to you and that you have administrator rights on your machine.

1. Introduction to the GUI

- Right mouse click:
console output
1. Open GAMS file with defined editor in settings
 2. Open listing file
 3. Open include File
 4. Break of printout to console

• Scenario file is now available

- Compile Scenario
- First line is the command line generated by the GUI

- Open GMS Script
- Open gams listing file ..
- Open include file ..
- Scroll lock

• Mouse over reveals the gams file executed and the include file with the options

The screenshot displays the CAPRI GUI interface. The main window is titled 'CAPRI General settings' and contains several configuration options. On the left, there are two panels: 'CAPRI worksteps' and 'CAPRI tasks'. The 'CAPRI worksteps' panel has radio buttons for 'Installation', 'Build database', 'Generate baseline', 'Run scenario', and 'Tests'. The 'CAPRI tasks' panel has radio buttons for 'Define scenario', 'Run scenario with market model', 'Run scenario without market model', 'Test alternative market model', and 'Run scenario only with market model'. The main settings area includes a 'Scenario description' field, a 'Dir' dropdown set to 'userScens', and a 'Files' dropdown set to 'ts1'. Below these are checkboxes for 'Generate GAMS child processes on different threads' and 'Generate CMD per Thread'. There are also dropdowns for 'EU regional composition' (set to 'EU28') and 'GHG abatement technology' (set to 'off'). A 'Years' section shows a 'Base year' of 2012 and a list of 'Simulation years' from 2004 to 2030. A 'Regions' section has a dropdown for 'Regional breakdown' set to 'NUTS2'. A 'Countries' list includes Denmark, Germany, Greece, Spain, France, Ireland, Italy, The Netherlands, Austria, and Portugal. At the bottom of the settings window are buttons for 'Compile GAMS', 'Start GAMS', 'Stop GAMS', 'Hide/Unhide controls', and 'Exploit results'. Below the settings window is a console window showing the command line and the output of the GAMS execution. The command line is: 'D:\gams\win64\24.9\gams.exe "D:\public\g...". The output shows the GAMS version (24.9.1), license information, and the execution of the 'capmod.gms' file. A tooltip is visible over the command line, showing the file to start ('capmod.gms'), the include file ('fortran'), and the output files ('capmodres_0-9', '0-9{4}', '{1}gdxs').

Run scenario with market model

Base year: As the trends for 2030 depend on the ex-post values the base year matters. See results\capreg\res_XX.gdx

With market module all countries in the EU needs to be selected

File Utilities GUI Settings Help

CAPRI worksteps

- Installation

CAPRI tasks

- Define scenario
- Run scenario with market model**
- Run scenario without market model
- Run scenario only with market model

General settings Modules and algorithm Reporting Methodological switches CGE

CAPRI General settings

Scenario description Dir: .. Files: userScens\ts5

Base year 2012

Simulation years

2004	2005	2006	2007	2008
2009	2010	2011	2012	2013
2014	2015	2020	2025	2030
2035	2040	2045	2050	2055
2060	2065	2070		

Generate GAMS child processes on different threads

Generate CMD per Thread

EU regional composition EU28

GHG abatement technology off

Regions

- EL000000 "Belgium and Luxembourg"
- DK000000 "Denmark"
- DE000000 "Germany"
- EL000000 "Greece"
- ES000000 "Spain"
- FR000000 "France"
- IR000000 "Ireland"
- IT000000 "Italy"
- NL000000 "The Netherlands"
- AT000000 "Austria"

Countries

Regional breakdown NUTS2

Non-default reference scenario for carbon accounting

Non-default FAO trade matrix vintage

Compile GAMS Start GAMS Stop GAMS

Runs the supply model in parallel mode as independent GAMS threads. Do not select for debugging

Generates for each thread a command line batch file for debugging

Simulation year: Depend on the result files for Calibration (see baseline and simini folder)

Nuts2 standard, currently no farm types, country level runs but not tested

CAPRI Modules and algorithm

Endogenous bio-fuel markets in global market model Alternative GAMS license file for GHG emission estimation

Policy blocks (additional geographical layer)

Endogenous margins between trade block and country prices

Advanced tariff aggregation module

Endogenous young animal markets

Regional CGEs

Good question

Tariff exists in high detail; different aggregation scheme

More market model regions

Will be removed

Biofuel and Biodiesel

Standard: Young animal trade module

CAPRI Reporting

Aggregates for activities and commodities

Environmental Indicators

Life-cycle assessment for energy

Multi-functionality indicators

Iteration tracking

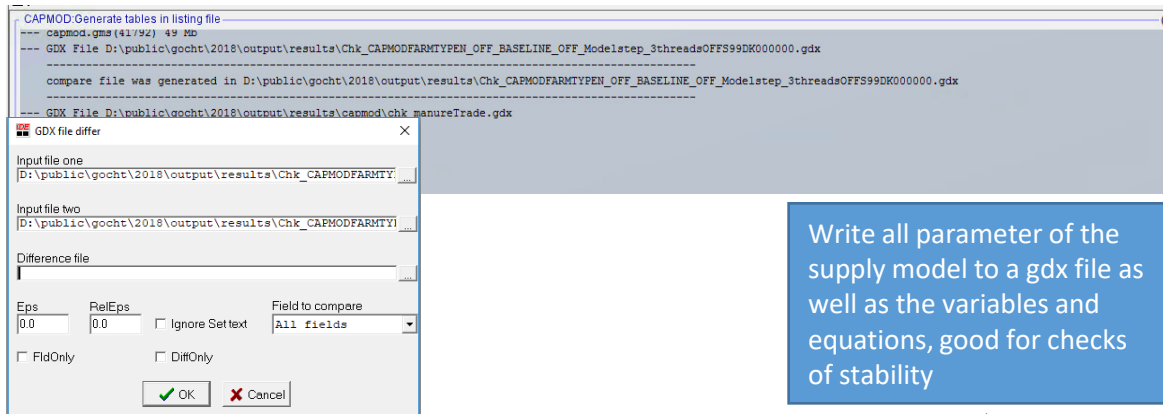
Sensitivity experiments with features in supply model

aggregation soft wheat and barley to cereals

GHG and more, as it takes time I would uncheck for debugging

Reports between iteration the current prices and more

Calculates point elasticities using price simulation experimence



Switch listing of code in listing file on/off

Write all parameter of the supply model to a gdx file as well as the variables and equations, good for checks of stability

Steers the listing for the solver report

General settings | Modules and algorithm | Reporting | Methodological switches CGE | Debug options

CAPRI Debug options

Load meta information from older task

Additional input data identifier

Additional result type identifier

Override results_in:

Override results_out:

Override restart_in:

Override restart_out:

Number of rows and columns to be displayed in the listing file

Supply model	Market model
Solution printing <input type="text" value="Suppress"/>	Maximum number of pre-steps market model <input type="text" value="15"/>
Determine point price elasticities <input type="checkbox"/>	Solution print at preparatory solve <input type="checkbox"/>
generate gdx file with Values of Supply model <input type="checkbox"/>	Abort after preparatory solve <input type="checkbox"/>
Print gams code to listing <input type="text" value="offListing"/>	Solution print for pre-steps in 1st iteration with abort <input type="checkbox"/>
Solprint <input type="text" value="On"/>	Plus iterlim to zero for 1st pre-steps in 1st iteration <input type="checkbox"/>
Limrow <input type="text" value="0.0"/>	Number of presteps before abort <input type="text" value="1"/>
Limcol <input type="text" value="0.0"/>	Kill simini file <input type="checkbox"/>

Compile GAMS | Start GAMS | Stop GAMS | Hide/Unhide controls | Exploit results

Stop an executed GAMS process

Kill by hand

The screenshot shows the CAPRI software interface. The main window is titled 'CAPRI General settings' and contains various configuration options for scenario description, years, and regions. The bottom toolbar includes buttons for 'Compile GAMS', 'Start GAMS', 'Stop GAMS', 'Hide/Unhide controls', and 'Exploit results'. The 'Stop GAMS' button is highlighted with a yellow border. A blue arrow points from the 'Kill by hand' text box to this button. Below the main window, a console window displays the following output:

```
CAPMOD: Policy Definition of MTRSTD policy
--- capmod.gms (19260) 136 Mb
--- capmod.gms (19363) 136 Mb
--- capmod.gms (19651) 136 Mb
--- GDX11=D:\public\gpc\2018\work_ex_ante\dsc\policy\rd_spend_2007_2013_se.gdx
--- capmod.gms (19849) 136 Mb
--- SWR file D:\public\gpc\2018\output\temp\data_call.gdx
--- Generating GNS model XDDMXX(LST:49598)
--- capmod.gms (19905) 138 Mb
--- LCOES STIM = 2030
--- 0 rows 0 columns 0 non-zeroes
--- 0 n1-code 0 n1-non-zeroes
--- capmod.gms (19905) 136 Mb
GAMS RC 1--- Executing CONOPT: e1apsed 0:00:06.341(LST:49586)
```

Sends stop signal to GAMS
GAMS process stops when a
model is called, that can take
time

The screenshot shows the Windows Task Manager window. The 'gams.exe' process is selected, and a context menu is open over it. The menu options include 'Ereuzigen', 'Taak beëindigen', 'Ressourcewaarde', 'Debug', 'Abbilddata erstellen', 'Host für Kon...', 'Detailliefd openen', 'WMI Provide...', 'Online zoeken', 'Eigenschappen', and 'Eigenschappen'. The 'gams.exe' process is listed with 0% CPU usage and 0.9 MB of working set.

Exploitation of results

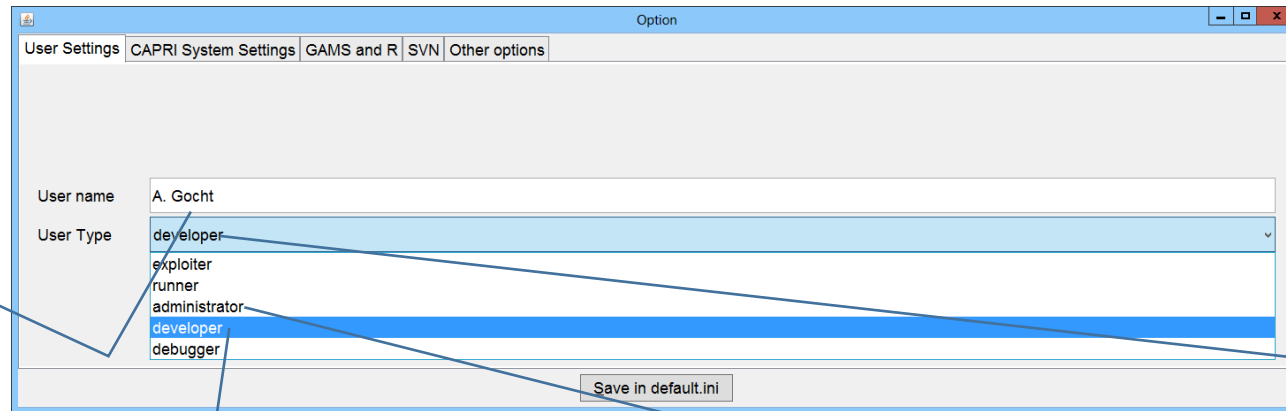
The screenshot displays the CAPRI software interface, which is used for scenario exploitation. The interface is divided into several sections:

- Settings:** A menu with options: Edit settings, Load settings from ini file, Save current settings to ini file, Remove task specific settings, and Remove view specific settings. A callout points to this menu with the text "Reset user views in exploitation viewer".
- Country selection:** A list of countries including DK "Denmark", FR "France", AT "Austria", UK "United Kingdom", SI "Slovenia", LV "Latvia", RO "Romania", MK "Macedonia", and BA "Bosnia and Herzegovina". A callout points to this list with the text "Filter regions".
- Regional level:** A dropdown menu currently set to 09. A callout points to this menu with the text "Alternative Scenario Name".
- Base year selection:** A dropdown menu currently set to 04 08 10 12. A callout points to this menu with the text "Alternative Scenario Name".
- Simulation year selection:** A list of simulation years from 00 01 02 03 04 05 06 07 to 64 65 66 67 68 69 70. A callout points to this list with the text "Alternative Scenario Name".
- Scenario selection:** A list of 15 scenarios, each with a dropdown menu. A callout points to this list with the text "Load in GDX Viewer of GGIG".
- Buttons:** At the bottom, there are buttons for "Show meta", "Show results", "Load content of files into GDX viewer", and "Return". A callout points to the "Load content of files into GDX viewer" button with the text "Load into scenario result exploiter".

The interface also includes a sidebar with "CAPRI worksteps" (Installation, Build database, Generate baseline, Run scenario, Tests) and "CAPRI tasks" (Define scenario, Run scenario with market model, Run scenario without market model, Test alternative market model, Run scenario only with market model). A logo for GGIG (GAMS Graphical User Interface Generator) is visible in the bottom left corner.

Advanced Settings in the GUI

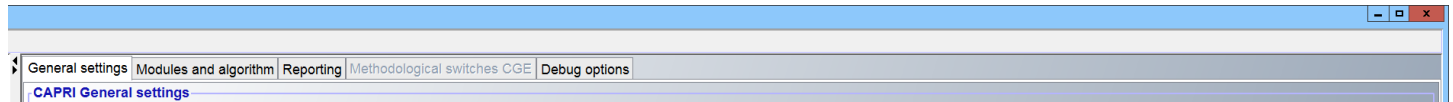
- User Name: Ends up in the meta information

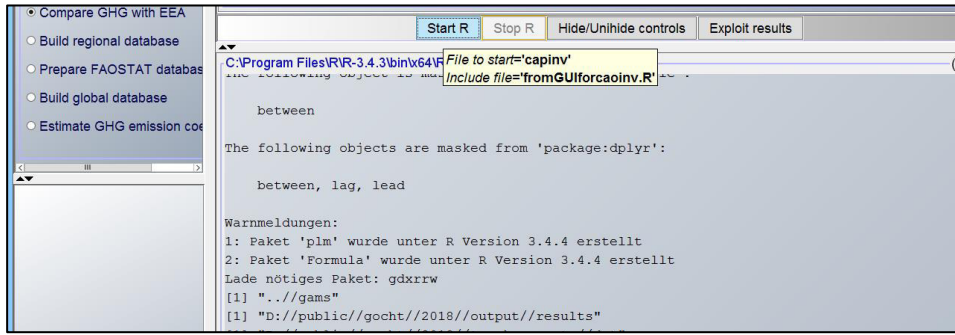


- User type: allows different views and controls

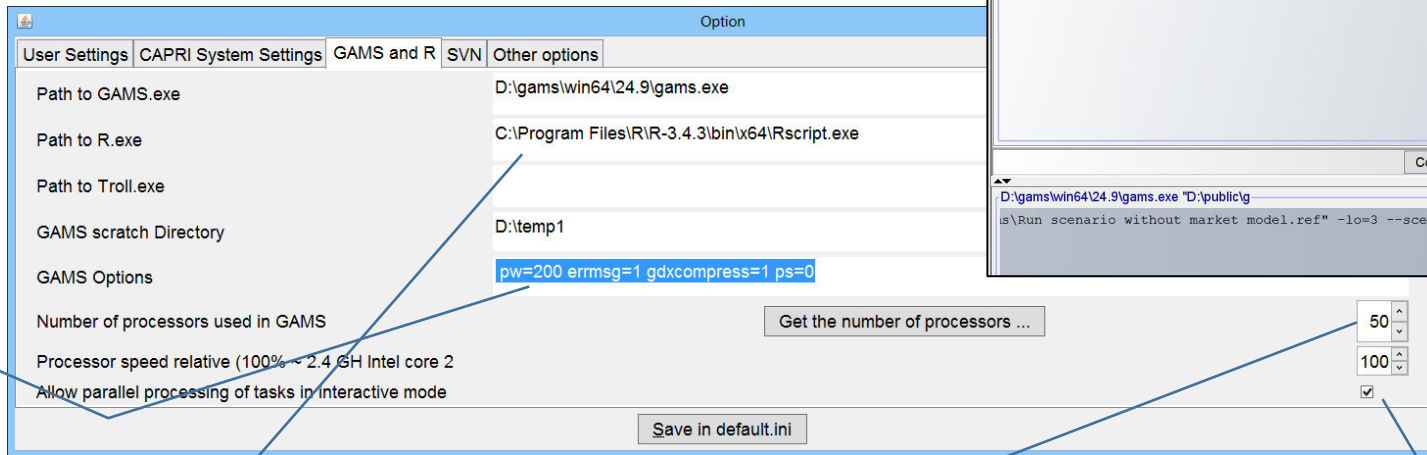
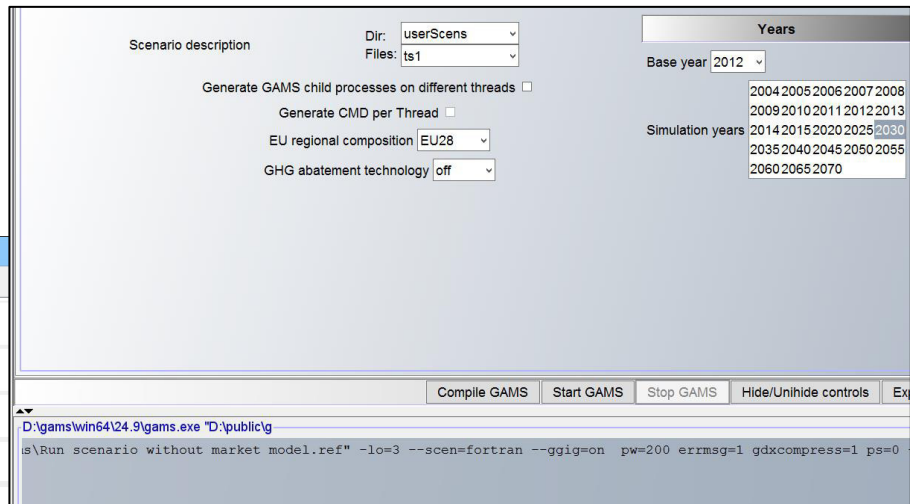
- Admin in policy editor allows to modify and save snippets

- Debugger and Developer gives tab for debugging





in the GUI



- Pass arguments to the cmd statement
- Used mainly for `--r` and `--s` or global settings `--XX`

- Defines R executable

- Defines how many parallel executions can be done at once
- Also ends in the include file

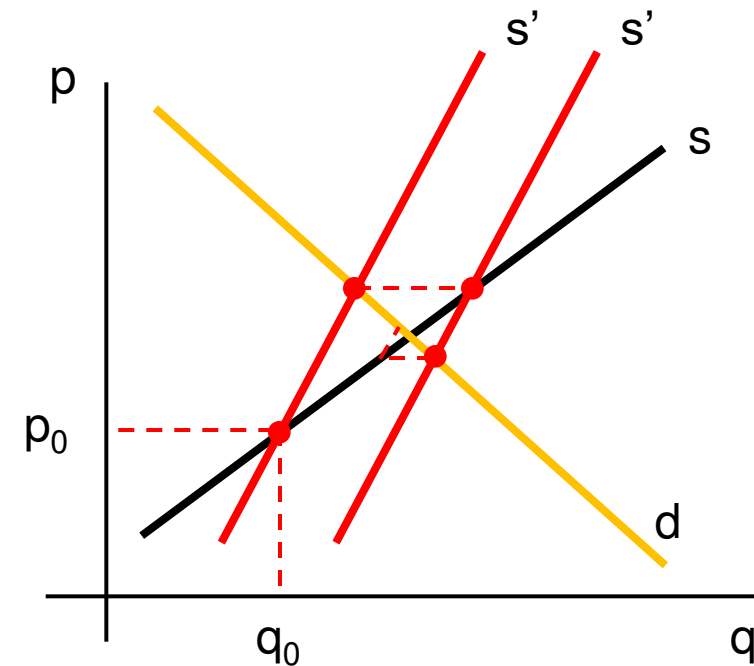
- Allows to run task in parallel over instances

Test if the system is ready for simulation

- Check the region, the base year, simulation year ... other setting are correct -> No compile time error
- Ensure the listing setting is okay in debug
- Test calibration no change (calibrated policy file) within <3 iteration
- Convergence means no price change from the market model for a given supply from the market model
- When the scenario introduce a shock then the adjust happens like:

Comparative Static Equilibrium

- Sequential iteration between the supply and the market model:
- Supply function of FT models is **unknown** (black)
- **Assume** any supply function (red)
- Starting with some **price**, simulate **supply with models**
- Calibrate the assumed supply function to that point
- Solve supply + demand in market model simultaneously for **new price**
- **Iterate until convergence...**



Exercise 1a: Running with policy editor

- Policy editor is a code snippet based way to explore and define simple scenarios
- It has dynamic tag editor
- Powerful search over all predefined scenarios
- Approach to define your scenario
 - Do not run as user role “administrator”
 - Select main policy file (cap_after2014 or MTR_RD) **and** combination of code snippets
 - Modify the code snippet or the main policy file and save the changes in a new in your userScen folder
- @All Exercise 1: Create a policy scenario (yields ...) and run with GUI