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DSS and Gemse Analyst: A consistent and flexible framework from primary data towards scenario analysis

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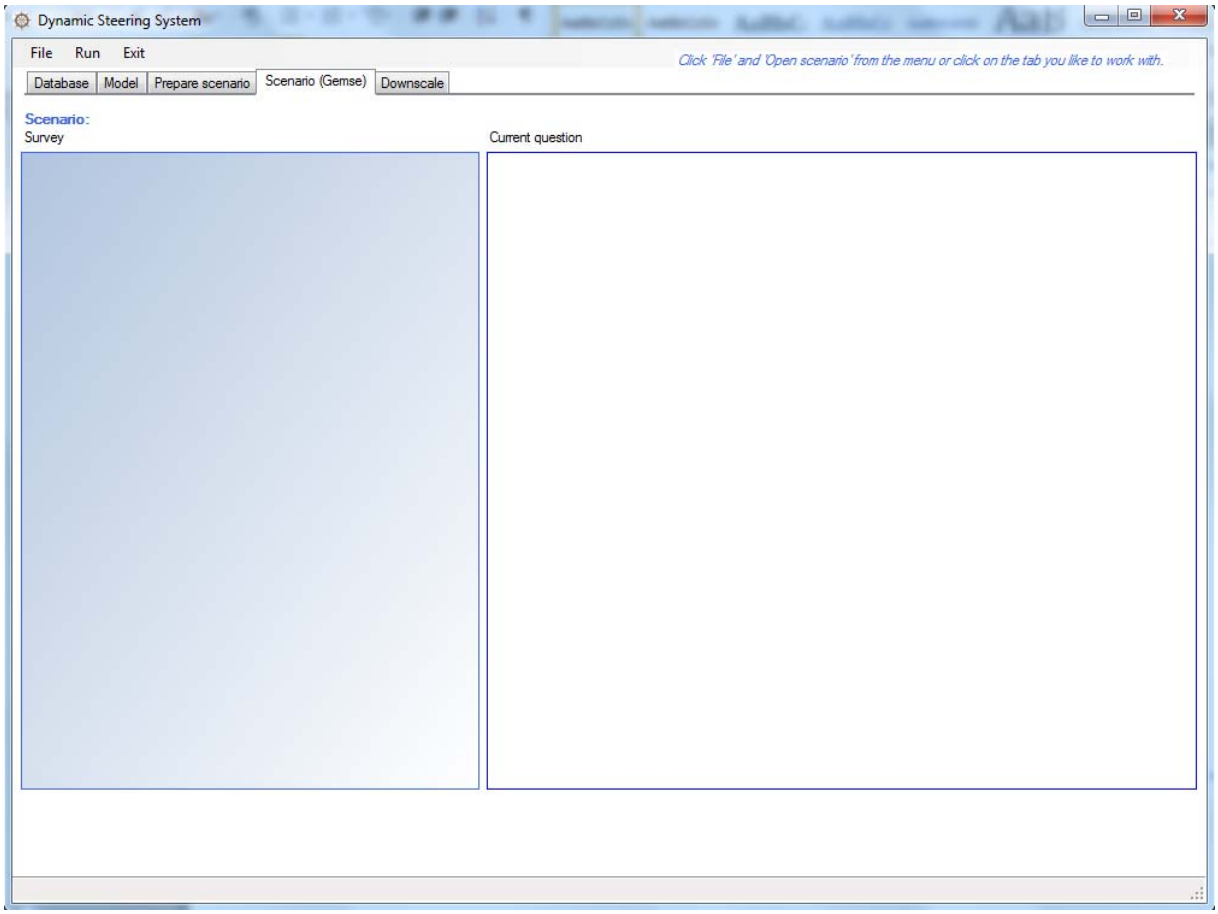
1. Introduction

The flexibility of MAGNET is based on a full separation of model code and data files. This allows us to use the same code for different databases (different releases of the GTAP database or different aggregations for specific applications) and different model structures. This flexibility comes at the cost of requiring the user to make a large number of choices before being able to run the model. To ease the use of MAGNET, LEI has developed a dedicated software package called DSS (Dynamic Steering System). In essence DSS 'asks questions' on which files to use and then creates appropriate command files for running GEMPACK code. Depending on the purpose, the questions will differ. Specifically, DSS is used to create the MAGNET database, to create the MAGNET model, to construct comparative static and dynamic scenarios, and to downscale results. This part of the manual describes how to create scenarios for running simulations with the MAGNET model in DSS (and so assumes that the database creation step and model creation step have taken place).

LEI has also developed a dedicated software package called GEMSE_Analyst to analyse results of simulations run with the MAGNET model. GEMSE refers to the specific simulation tool, GEMPACK Simulation Environment that operates in the background when running simulations with MAGNET, analyst refers to the main purpose of the tool which is to analyse results. The software reads in the base data, and update files in har format and via a user-friendly interface allows the user to create tables, graphs and maps to display the results by period. The user has the option to display results in absolute, absolute change, percentage change, annual percentage change and share format. The user can also display results relative to income or population (per capita). In addition, it is possible to select countries and/or regions, and product categories and to flexibly aggregate these by creating new aggregates. Finally, scenario results can be presented on their own, and in absolute, relative or percentage difference from another scenario (such as the baseline). Settings for displaying results can be saved and reused in other projects. This manual describes each of these features that enables the user to present the results of the MAGNET model in a visually attractive storyline. Since the program is under development the manual focuses on the most important functionalities.

2 Getting started with DSS

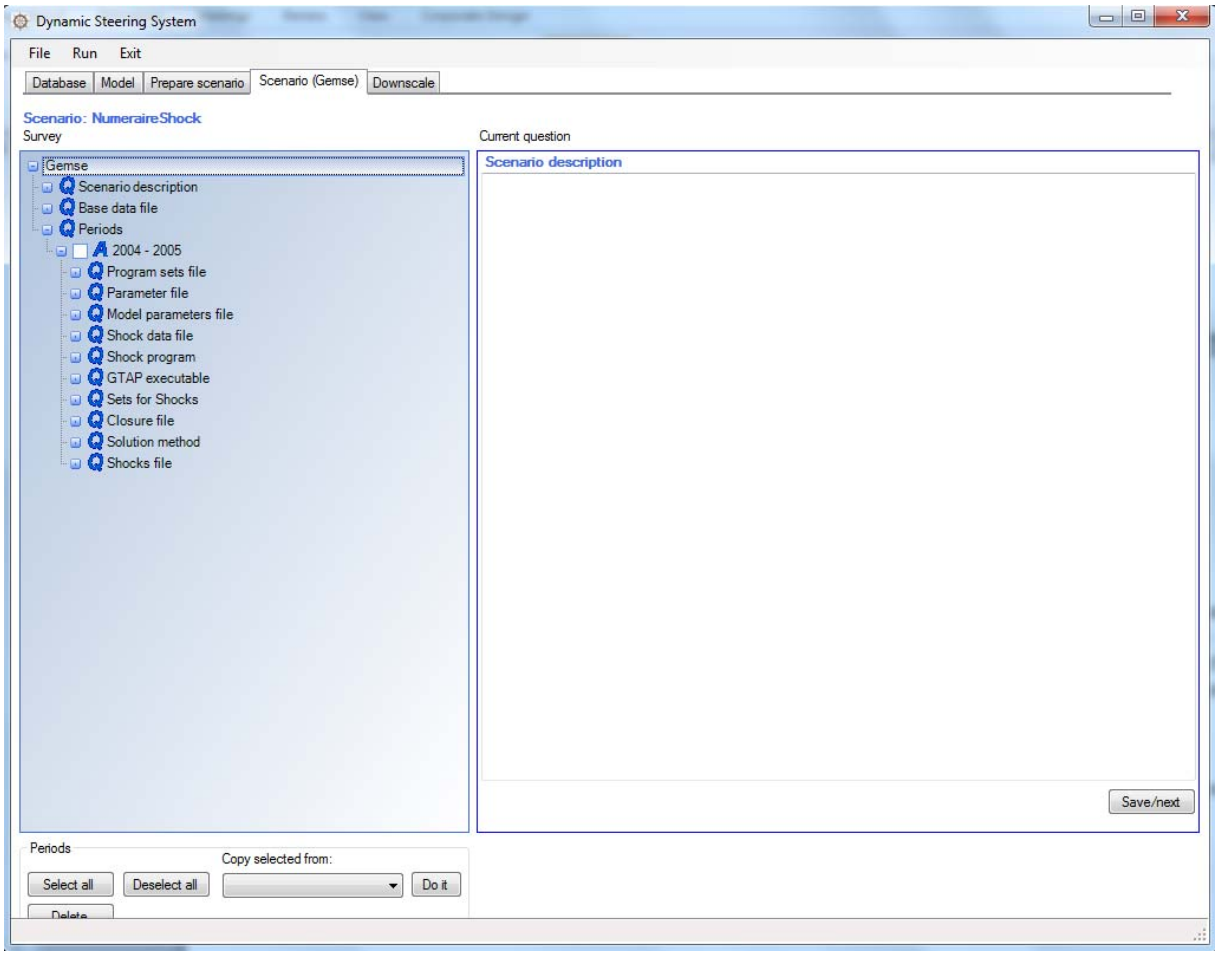
DSS is run via the batch file Run_DSS.bat in the main directory. When the program is started, a window appears with various tabs. The standard tab which is opened is the Scenario (Gemse) used for creating a scenario to run with MAGNET. GEMSE refers to the specific simulation tool, GEMPACK Simulation Environment, which operates in the background.



If you click on File, Open scenario, you can open an existing scenario, or create a new scenario that may be derived from an existing scenario. The scenarios are stored in answer files in the subdirectory Scenarios of the MAGNET model (...4_MAGNET\Scenarios). DSS automatically puts “GEMSE_” in front of the name chosen by the user and it creates a folder with the name chosen for the scenario. In order for the user to trace back which answer file contains exactly which assumptions, it is important to choose a name that appropriately reflects the scenario in question.

2.1 The structure of the scenario tab

An existing scenario is the numéraire shock (called Gemse_NumeraireShock.answer in ...4_MAGNET\Scenarios). We will discuss all features of the scenario tab using this scenario as an example. Once you open an existing or new scenario, DSS opens up a screen with various elements that need to be filled in before a scenario can be run. In case you are using an existing scenario (or created a new one from an existing scenario) all steps will be filled in, including the periods. If you create a new scenario from scratch, the period(s) will not be specified yet and you will need to fill in all steps. Below follows a discussion of each of the steps.



After each step you need to press Save/next so as to save any changes you've made.

Step 1: Scenario description

The first step involves giving an appropriate scenario description. This information helps you in a later stage to identify exactly what you've done in this scenario (e.g. when you want to re-use it, or adapt it to a new situation), so it is quite crucial to fill this in appropriately. For the numéraire shock you may for example write 'we shock the numéraire pfactwld by 1%'.

Step 2: Base data file

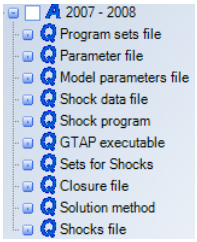
The second step involves choosing the base data that have been used for your model. By pressing browse you automatically enter the BaseData subdirectory, which contains the base data file, BaseData_b.har. With View/Edit you can view the file and edit it (changing existing data). In case you edit the file, it is advisable to save it under a new name so as not to lose the old data. The system also allows you to select an update.har file in the subdirectory Updates (this is an updated version of the base data file, i.e. a base data file after a scenario has run). The last option is useful if a lot of scenarios have the first period(s) in common, but differ in terms of the later periods.

Step 3: Periods

The third step involves choosing the periods for which you want to run your scenario. Assuming that you are using the latest GTAP database V8, you start from 2007. When carrying out comparative static scenarios (one-off policies and/or shocks with no time dimension, i.e. representative of what would happen in the 'long term' however long this may be), you make one period of length one (one year). Since there is no time dimension it doesn't really matter how long this period is or when it

starts as it is assumed that the model instantaneously arrives at a new equilibrium after the policy and/or shock is applied. When carrying out policies and/or shocks over time, and the time dimension becomes important, there's a procedure that automatically creates the periods you want and some additional files that you need per period. This will be discussed below under When to use The Prepare Scenario Tab. It is possible to create periods of different length.

After saving, a set of choices appear that will have to be filled in by period. This allows you to implement different shocks in different periods. You can select the appropriate periods for which you want to implement the same scenario by checking the tick box in front of them. In case you have many periods this will save you a lot of work!



Step 4: Program sets file

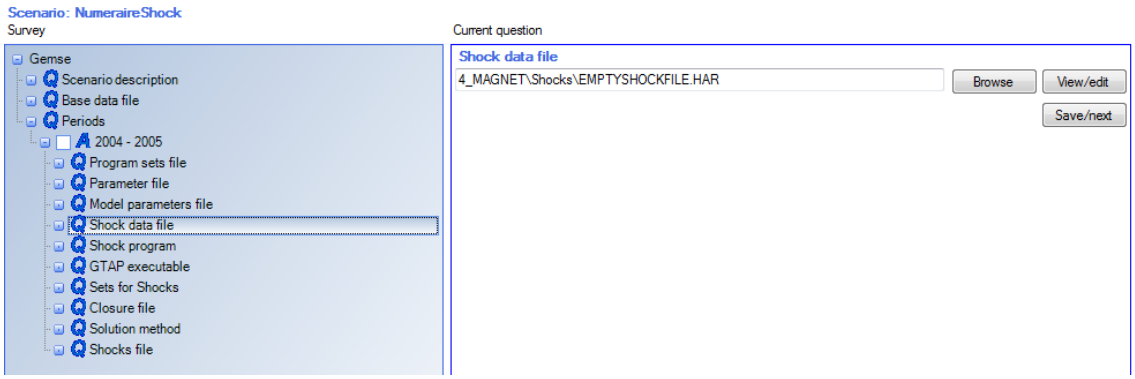
Here you select the aggregation you've made which has been saved by the system in the file Sets.har in the BaseData\Sets subdirectory of your model. When pressing Browse this file (and its location) automatically appears. Again you can view the file if you want to recall the choices you've made, like for example the precise name of the regions in your model. You cannot change the names of regions, commodities or sectors in this file since these names are used in other files related to your model as well. Changing any of them will create inconsistencies between the various files. You can change the descriptions of regions, commodities or sectors since these are not used anywhere else in the code, they are only there for extra information for the user.

Step 5: Parameter file

The fifth step selects the parameter file of the MAGNET model. Clicking Browse shows that this is Parameters.prm stored in BaseData\Par. Again you can view or edit the file (in case of the latter, rename it so as to save the old settings).

Step 6: Model parameters file

Step 6 involves selecting the model parameters file of the MAGNET model, which stores all the settings you've created (i.e. model choices you've made). Clicking Browse shows you where you can find this file (modelsettings.prm in the subdirectory BaseData\ModPar). In contrast with the previous steps, you need to press Add to List and then press Save/next to save this step. Working with a list facilitates combining different files that have been created already in the past for different scenarios. As before, you can view the file to recall what these settings exactly were and you can change them (and rename the file).

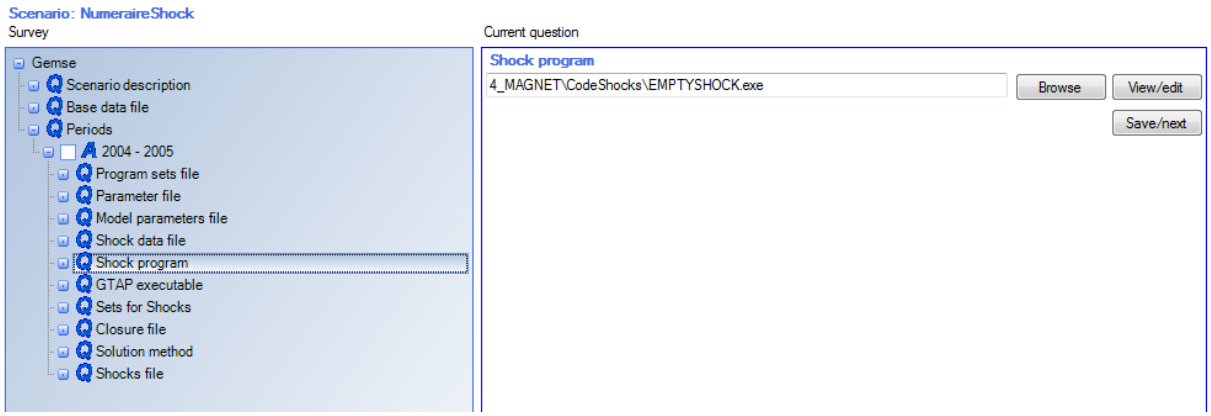


Step 7: Shock data file

Step 7 allows you to select a data file to be use by the shock program (next step). If you do not want to use a shock program you can leave this box empty (see screenshot).

Step 8: Shock program

Step 8 concerns the choice of a shock program. A shock program is program code to manipulate shock data further or to compute shocks from these data. A shock program is stored in the subdirectory CodeShocks (see screenshot). If you do not want to use a shock program you can leave the box empty.



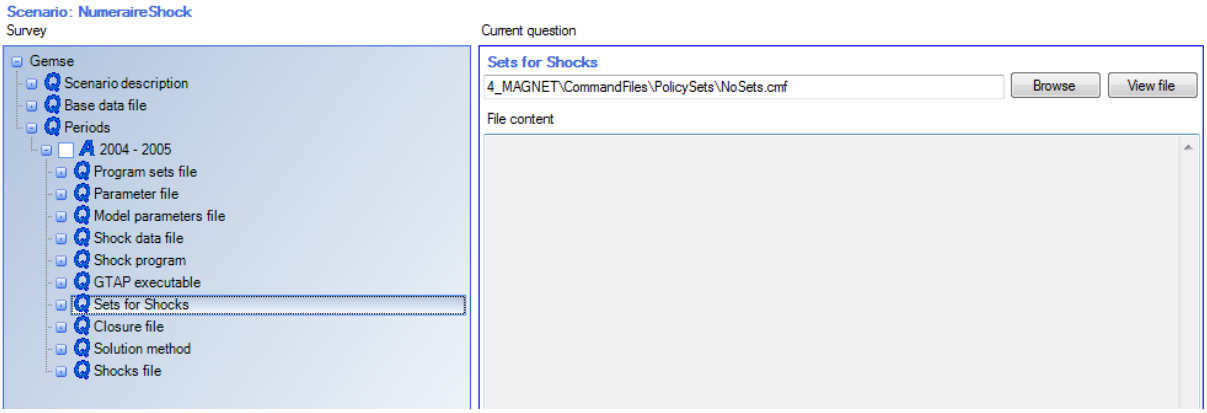
Step 9: GTAP executable

Step 9 involves selecting the program containing the model, i.e. the MAGNET executable (which contains GTAP plus any additions/modifications opted for). You have the option of viewing (and editing) the underlying tab file (editing and renaming is only advisable for advanced users of MAGNET).

Steps 10 to 13 create the command file of your scenario (stored in the Scenarios subdirectory of the MAGNET model in a subdirectory with its name) in a systematic way. They refer to files contained in the subdirectory CommandFiles of the MAGNET model (containing the folders Closures, PolicySets, Shocks and SolutionMethods).

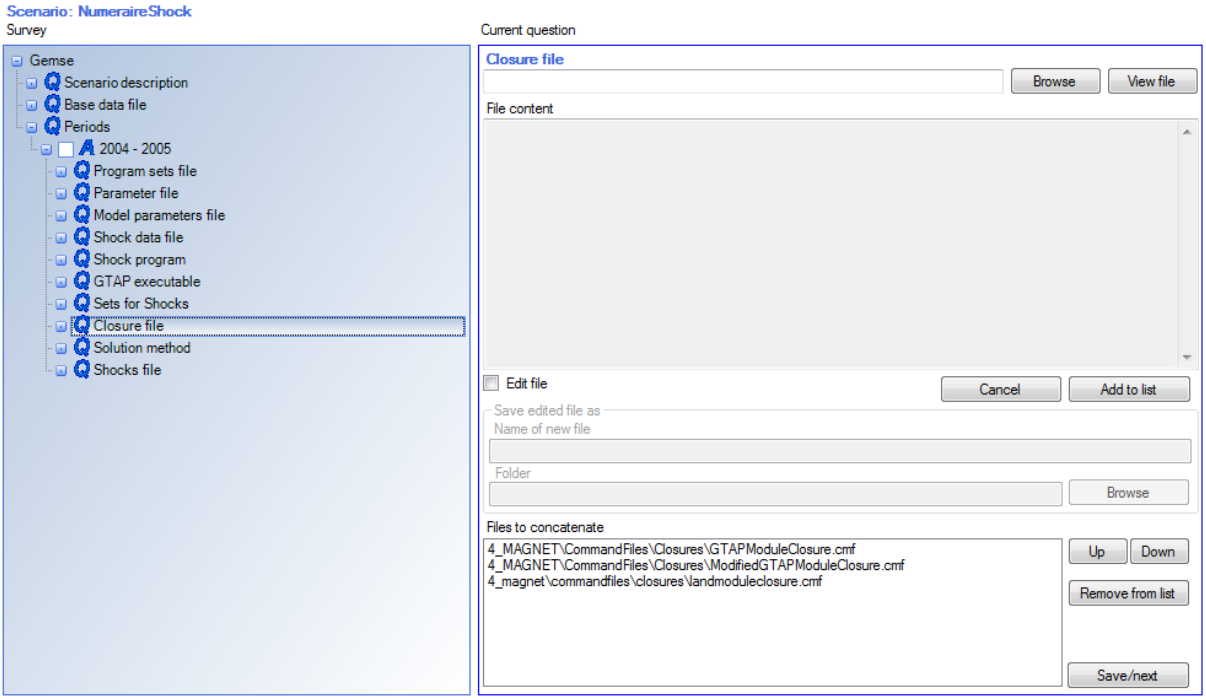
Step 10: Sets for Shocks

This option can be used to create shocks or a closure over a specific set that is not defined in the model yet (but by definition uses the existing aggregation of your model). If you're not using it, you need to select NoSets.cmf as shown in the screenshot.



Step 11: Closure file

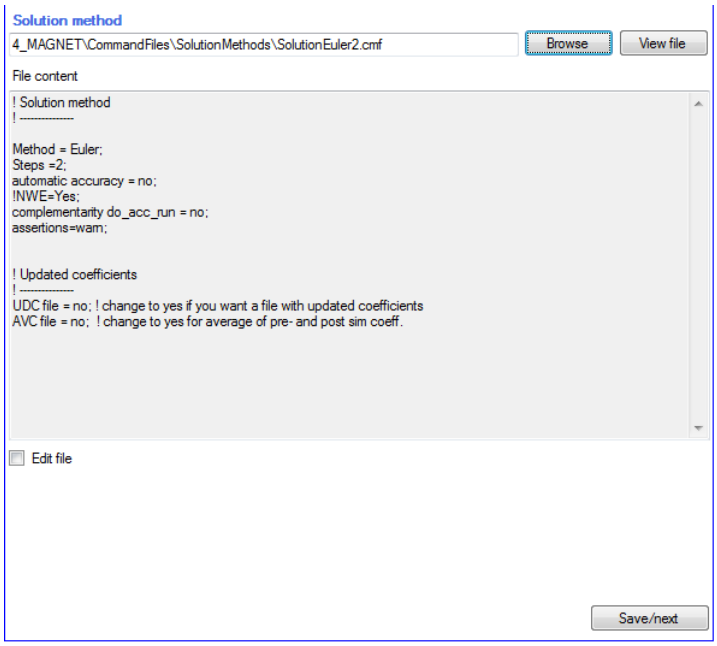
Step 11 involves choosing the closure of the model (exogenous and endogenous variables). MAGNET has pre-specified closure files readily available. They are stored in the subdirectory CommandFiles\Closures. In the example below we select the standard ones for GTAP and Modified GTAP (see first two command files in the screenshot). We also select the land module closure in the example below, but this depends on your model choices (in this case the land module was operational and so the accompanying closure was needed). As with model parameters, you have to select the closures you want and add them to a list, after which you can save your choice regarding the closures and go to the next step. You are allowed to change and rename the closure files, but be careful that you know what you are doing and that the changes are reflected in the renaming of the files!



Step 12: Solution method

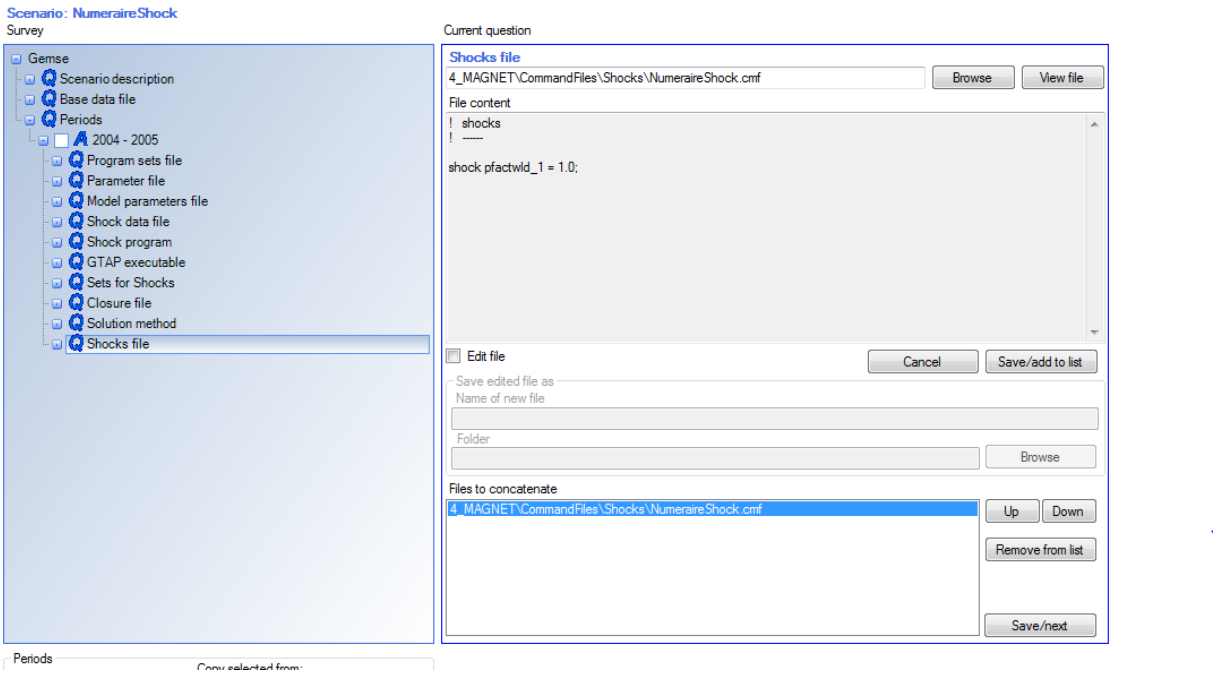
In step 12 you pick the solution method used in solving the MAGNET model. They are stored in the subdirectory CommandFiles\SolutionMethods. The choice is generally between Gragg and Euler. The standard setting is Euler. Depending on the steps needed to come to a solution you may vary the number of steps. For a numéraire shock (see screenshot) two is sufficient, but generally 16 or 32

steps are needed). Adjusting the steps to an even higher number (has to be twice the current number) is possible by adjusting, renaming and saving the file accordingly. All you do is change the number, all other code remains the same.



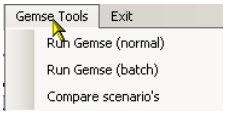
Step 13: Shocks file

The next step is the selection of the (policy) shocks you want to implement in your scenario. Here you tell the model directly by how much a policy or other policy variable should change. If you are running a lot of scenarios that are combinations of different macro shocks and policies, you may create different files for each shock and/or policy separately. For this reason, we work with a list. There are a lot of pre-specified files to choose from, which become visible by pressing Browse. You can view any file you like and if you want to implement it you click on add to list. As before, editing (and renaming) is possible (but be careful!). The screenshot below shows the numéraire shock that is implemented.



2.2 Running one or more scenarios

If you are finished with your scenario and everything has been saved, you are ready to run the scenario. You have to click Run in the main menu and then Run Gemse (normal) if you like to run the selected scenario, or Run Remse (batch) if you like to run more than one scenario (including scenarios that you've created before). Finally you can also compare the DSS answer files of two scenarios to check where scenarios differ from each other.



Once you've chosen to run a scenario, you can select the periods you like to run (in case of multiple periods). If you like, you also have the option of making a backup and to be emailed when the run has been completed.

2.3 What happens when MAGNET is run

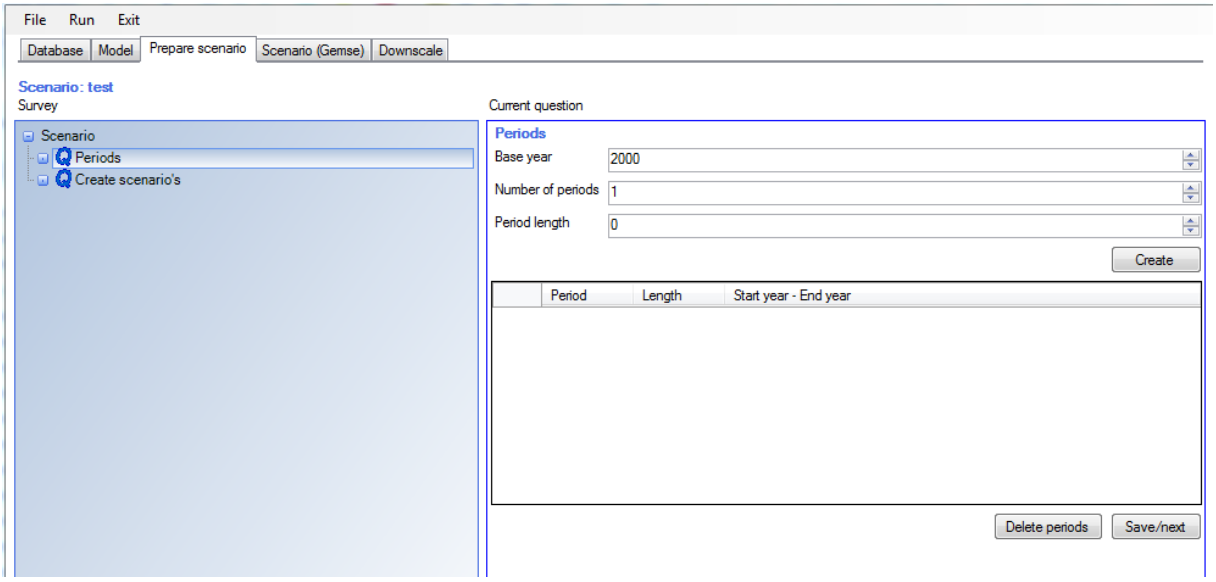
When you run a scenario, DSS creates a directory with the scenario name in the subdirectory Scenarios of the MAGNET model. In this subdirectory it creates a batch file with its name (file with extension .bat). This runs batch files with names that include also the period names, and command files that are created by combining the information you have given to the program. It also creates condensation (.sti) files for the shocks and the conversion of the solution files (.sl4) to sol files (which are in a standard .har format). Finally, in the batch file there is a program which is used to check the log files of the programs for important information, such as if the scenario ran without error, and if there are percentage changes of less than -100%, or if the Walrasslack is very different from zero. All this information is stored in a so-called warning file (extension .warn) which will open automatically if anything is detected. This makes it easy to check if something went wrong.

2.4 Using the Prepare Scenario Tab: Baseline and other dynamic scenarios

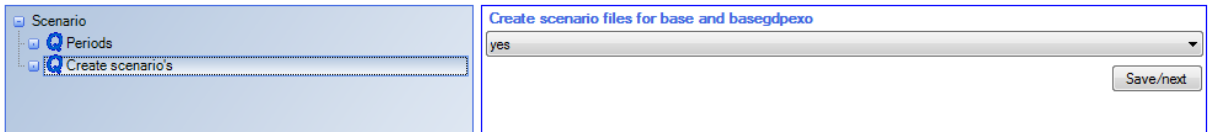
An economy grows over time via changes in its endowments (in MAGNET these are capital, skilled and unskilled labour, land and natural resources), or changes in the productivity of these endowments, most notably that of land (yield). MAGNET is made dynamic by telling it by how much each of these drivers need to change. DSS facilitates this process by first creating the periods you want and the shocks in the drivers that are in line with the periods specified and fit the aggregation of your model. In a subsequent step you can then create and run a baseline scenario as a starting point for further policy simulations on the basis of pre-specified answer files.

Step 1: Preparing a scenario

You open the Prepare Scenario tab in DSS and click on New (from scratch) and give it an appropriate name. The following start up screen appears:



If you are using GTAP v8 data, you fill in the Base year 2007. You then continue with specifying the number of periods and for each period the period length. If you are creating periods of equal length you simply specify the number of periods you want and their length and press Create. If you are creating periods of different length, you start with the first period, specify its length, press Create and then continue with the second period (always keep the Base year as it was!), and so on. Once you've created them all you press Save/next to save your choices and continue with the next step. The next question that pops up is whether you would like to create scenario files for base and basegdpexo, for which you fill in the answer yes and continue with Save/next. Then you are ready to create the scenario files by pressing Run in the menu of DSS and then Run Magnet scenario.



Running the Magnet scenario creates a file that contains the changes in the various drivers that have been made available to LEI from various sources for the periods and aggregation of the MAGNET model. This file is ScenarioData.har in the subdirectory 3_ScenarioSetUp\2_CreateMacroScenarios\Results. At the same time the scenario data are transferred into shock data files that can be used by the MAGNET model. So, for example if you've created two periods, 2007-2012 and 2012-20, the shocks directory will contain two new shock files, shocks2007-2012.har and shocks2012-2020.har.

Header	Type	Dimension	Coeff	Total	Name
GDP	RE	REG	QGDP	187	QGDP(REG)
POP	RE	REG	POP	82.3	POP(REG)
QO	RE	NSAV_COMM*REG	QO	398	QO(NSAV_COMM:REG)
ALAN	RE	PROD_SECT*REG	aland	613	Land augmenting technical change in sector j of r
AKNR	RE	REG	AKNREG	0	Region specific technological change
PFAC	RE	1	PFACTWLD	0	World factor price index
PGDP	RE	1	PGDP	0	World GDP inflation

Each of these shock data files contains a header with data on GDP growth, population growth (POP), growth in labour, capital and natural resources (Q0), growth in yields (ALAN) and regional specific

technological change (AKNR) for the specific period in question (see screenshot). The latter (PGDP) is empty at first as will be explained below. At the moment, standard sources for the shock data are USDA/ERS for GDP and population, PBL (IMAGE model) for yields, and it is assumed that the labour force grows in line with population and capital endowments in line with GDP. Growth of natural resources is linked to growth of capital with a factor of 0.25, i.e. natural resources grow at a quarter of the rate of capital. If a different size of the link between natural resources and capital growth is desired open the file .\3_ScenarioSetUp\2_CreateMacroScenarios\ExtraData\PeriodData.HAR and change the value in the header SNAT.

Other assumptions and/or other data sources can be used, and additional economic drivers can be included. MAGNET is completely flexible in this sense. Apart from the default macro drivers used in DSS alternative sources of drivers are already made available in the file ..\3_ScenarioSetUp\2_CreateMacroScenarios\ Results\ScenarioData.har. These are aggregated to your model aggregation and period definition so can be used to create shock files. To facilitate the comparison of drivers from different sources there are two summary coefficients included in this file. Header MDAT contains all available macro drivers, header SDAT all sector specific drivers.

Finally, the headers for the world factor price index (PFACTWLD) and world GDP inflation (PGDP) are included to allow for a numéraire swap. In MAGNET the standard numéraire is PFACTWLD and all prices are relative to this numéraire. However, for dynamic analyses the numéraire is swapped by PGDP.

Step 2: Creating and running a baseline scenario

DSS makes it relatively easy for users to create and run a baseline as in the process of creating the shock data files (previous step) it also creates the pre-specified answer files Gemse_basegdpexo.answer and Gemse_base.answer (see subdirectory Scenarios), which you can use in the same order to arrive at a baseline. The steps you need to undertake are explained below.

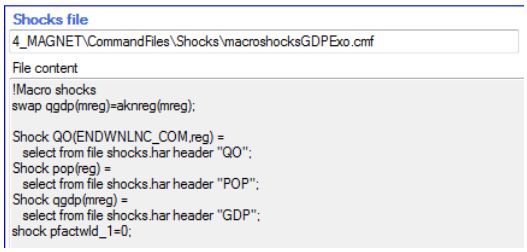
Generating region-specific technological change that replicates GDP growth projections (basegdpexo)

When we are carrying out analyses over time we ideally would like the economy to follow widely accepted GDP growth projections (MAGNET currently uses USDA/ERS data). Since GDP is a result of the model, when fixing GDP to a specific growth path we need to endogenise something else. For this purpose, MAGNET has introduced a parameter for regional specific technological change (aknreg, its data being contained in the header AKNR discussed before), which in the first step of coming to a baseline is filled up with data by imposing the GDP growth path onto the economy. This is done in the scenario formulated in the Gemse_basegdpexo.answer file.

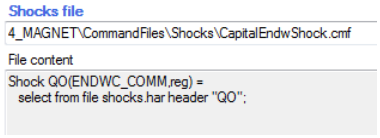
In order to run the basegdpexo scenario you are advised to create a new scenario from this scenario as in the process you may make some changes. As you will see, all steps have been filled in. Important differences with a standard comparative static scenario are the inclusion of a shock data file per period (discussed before), a shock program (macroshock.exe) which transfers the computed

values for regional specific technical change for each period and the inclusion of so-called shock files which tell MAGNET which variables should change and by how much.

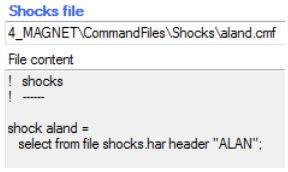
The first shock file included is called macroshocksGDPexo.cmf (see screenshot). It tells MAGNET to swap GDP growth with aknreg, and to shock labour and natural resource endowments, and GDP with the accompanying data in the shock data file.



The second shock file included is called CapitalEndwShock.cmf (see screenshot). It tells MAGNET to shock capital endowments with the data on capital growth in the shock data file.



The third shock file included is called aland.cmf (see screenshot). It tells MAGNET to shock land productivity (yields) with the data on yield growth in the shock data file.



After running the scenario a warning file pops up which notifies you of two swaps that have taken place in each of the periods, first the numéraire swap and second the GDP-tech change swap. This file is stored in the Scenarios subdirectory of the MAGNET model, in a folder with the name of the scenario.

Running a baseline

Running the baseline is now relatively easy by undoing the GDP-tech change swap, incorporating the shock data for technical change and removing the shock data for GDP as GDP growth now becomes an outcome of the model. This scenario is specified in the Gemse_base.answer file.

In order to run the base scenario you are advised to create a new scenario from this scenario as in the process you may make some changes. Again all steps have been filled in. Notable difference with the basegdpexo scenario is that the macroshocksgdpexo.cmf file has been replaced by the file macroshocks.cmf (see screenshot) which contains the changes discussed above.

Shocks file

4_MAGNET\CommandFiles\Shocks\macroshocks.cmf

File content

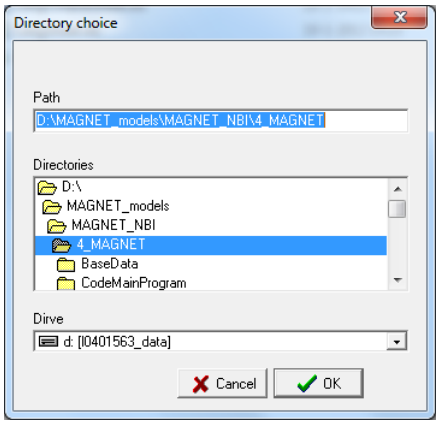
```
!Macro shocks

Shock QO(ENDWNLNC_COM,reg) =
  select from file shocks.har header "QO";
Shock pop(reg) =
  select from file shocks.har header "POP";
Shock aknreg(mreg) =
  select from file shocks.har header "AKNR";
shock pfactwld_1=
  select from file shocks.har header "PFAC";
```

Once you've run the baseline, you're ready to implement counterfactual policy and shock scenarios, the outcomes of which you may compare with the baseline outcomes.

3. Getting started with the GEMSE_Analyst

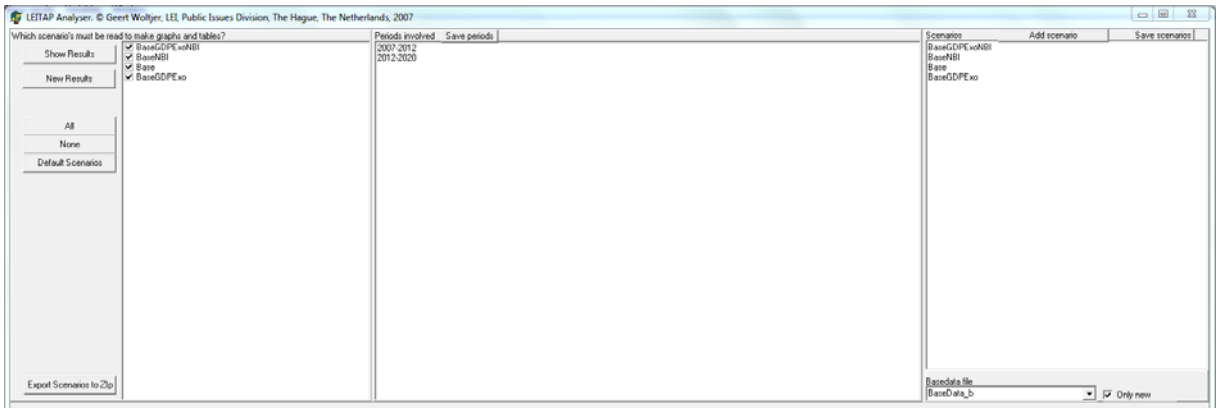
GEMSE_Analyst is run by clicking the GEMSE_Analyst executable that can be found in the GEMSE_Analyst subdirectory of the MAGNET model. A window appears with a suggested path, which should refer to the subdirectory of the MAGNET model in the MAGNET system, called 4_MAGNET (see screen shot).



Press OK.

3.1 Selecting scenarios and reading in the results

This stage involves selecting scenarios (and periods) for which you want to view and analyse the results.

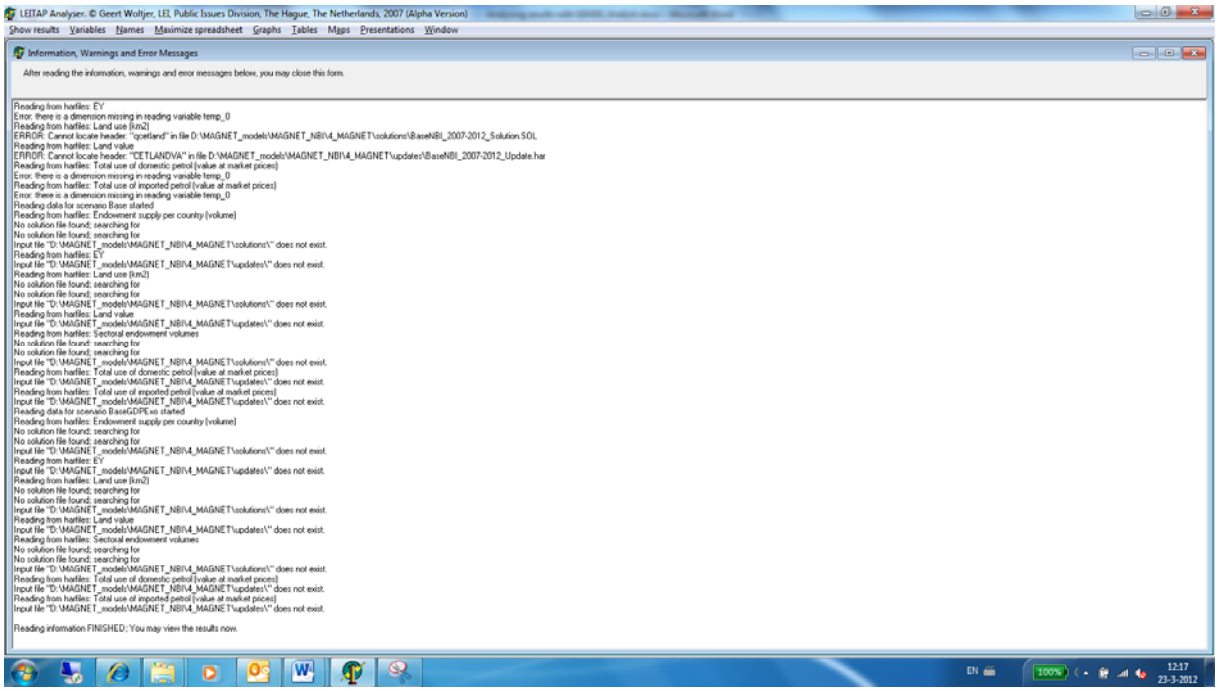


In the upper right corner the scenarios are displayed for which GEMSE_Analyst can find solutions. If scenarios are missing here you can add them by right-clicking the mouse button, or by pressing Add

scenario in the menu. If you remember the name of the scenario by heart you can also just type it in by hand (the box operates as simple text box). Note that each scenario appears on a new line. If a scenario is based on the updates of another scenario, you just type a comma after the scenario name and type the scenario name on which it is based. Once all your desired scenarios are included you need to press save scenarios, otherwise your changes are not saved. Subsequently, in the upper left column of the screen you can select for which of the scenarios you want to display results by checking the tick boxes. The middle column reveals for which periods the scenarios have been run. (These periods are created in the 'prepare scenario' tab of DSS). You can delete periods here that you are not interested in but you can also make that selection later so there is no real need to do this here. Again this box operates as a text box.

In the bottom right corner you need to fill in the benchmark data which form the starting point of any of the simulations, traditionally called BaseData_b.har (if you have renamed this file, you need to put in the new name). All scenarios must have the same base data file.

The first time you run GEMSE_Analyst you have to press Show Results to read in the results of the selected scenarios in GEMSE_Analyst. This may take up a lot of time. The program shows which variables it is reading. If it has finished, a new Results window will appear and a window with the message "reading information FINISHED; you may view the results now" (see screenshot). If you've rerun any of the scenarios you need to press New Results, to make sure that the new results are actually read in and not the old ones.

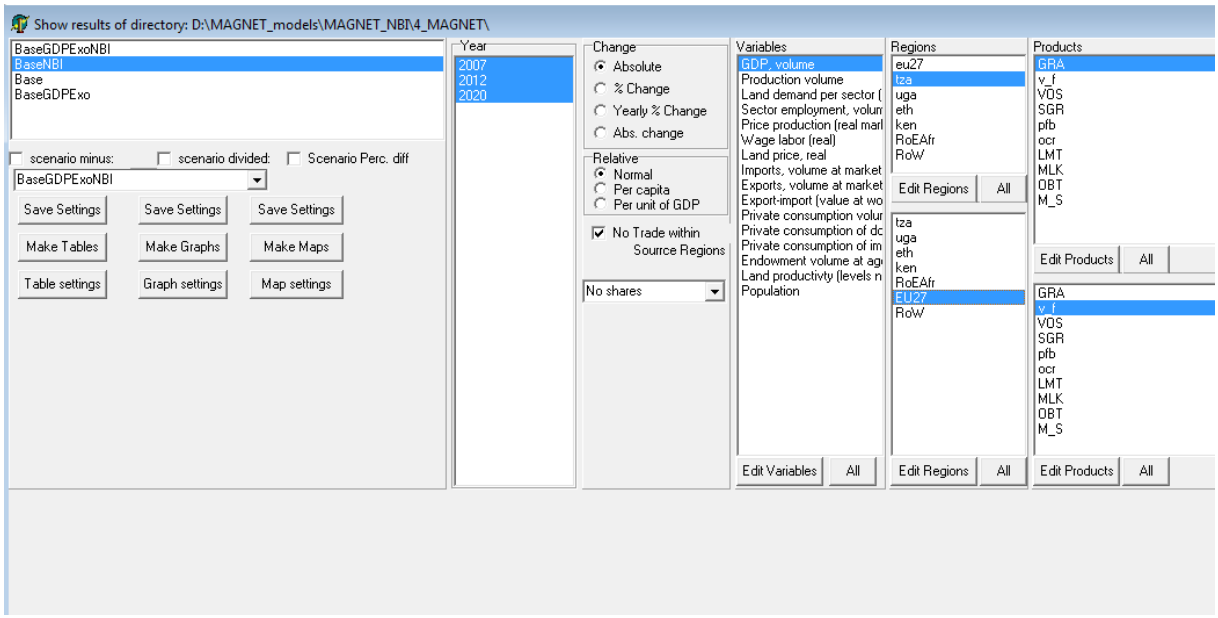


Close the information, warnings and error messages window to continue with showing (and analysing) the results. In the main menu you can always choose "Show Results" to go back to the screen where you decide which scenarios to read in.

3.2 Showing the results

In this stage you can view the results of the scenarios you've selected according to your preferences. In this manual we assume that a default set of indicators (variables) are available for display. These can be defined in the Variables tab of the main menu.

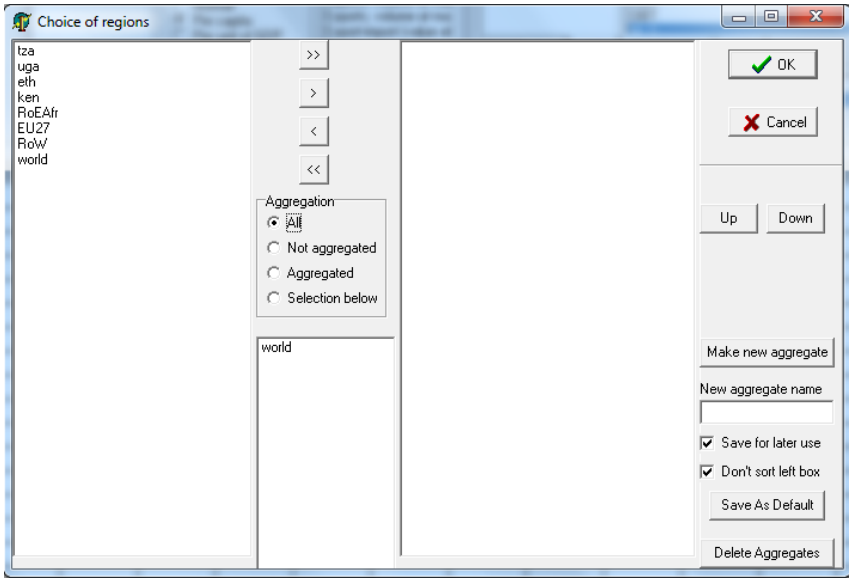
The Show results window



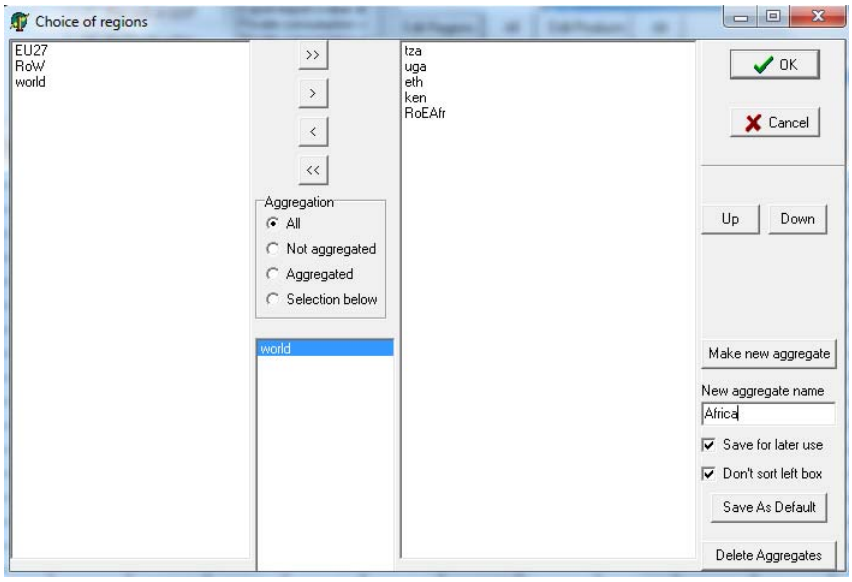
In the upper left corner you can select the scenario(s) for which you want to view the results. You can make selections by clicking on the desired option. By holding in the CTRL button you can select more than one option. In the example, we are only interested in the BaseNBI scenario, which therefore has been selected. In the column to the right of this, the years have been selected. Here the choice is to look at the results for 2007, 2012 and 2020. We know from this that the scenarios have been run for two periods; 2007-2012 and 2012-2020. We have chosen the option to show absolute changes (this option has been ticked) and have selected all variables available (by right clicking on any variable you see how it has been defined which may be useful to understand what it is). If you choose % change or Yearly % change or Abs. change, aforementioned periods will appear. One can then add for example the two periods together by right-clicking and choosing Insert item and then adding the period commencing with the base year (2007 in the example) and ending with the last year of the last period (2020 in the example). One could also opt to display shares for the selections made (source product or source destination shares and source region or destination region shares). One should not do this in case results are displayed in changes! The (source) regions are shown in the column next to that of the Variables and include African countries and/or regions, EU27 and the Rest of the World. In the example we are interested in results for Tanzania (TZA). In the column on the right hand side we have (source) products. In the example we selected the product GRA (grains) so if a variable is defined over regions and products, the results will be shown for Tanzania and grains. If a variable is defined over source and destination regions, e.g. in the case of exports, the destination regions can be selected in the box below the source regions (in the example this is EU27). The same is true for products (in the example the choice is v_f, or vegetables and fruits).

3.3 Editing region lists

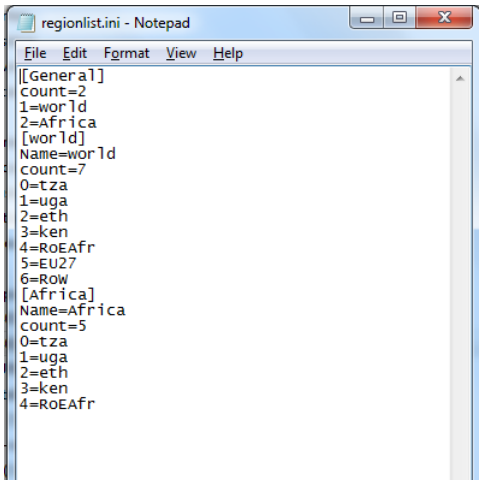
It might be useful to display results for regional aggregates of the countries and/or regions of the MAGNET model. You can edit regions by pressing the Edit Regions button. The Choice of regions window appears (see screenshot). When selecting the option All under 'Aggregation', all regions are shown including aggregates you've made yourself. In this example the 7 regions appear of the MAGNET model plus the aggregate world. Selecting the option 'Selection below' just gives the countries and/or regions that are part of the aggregate you've created. Similarly selecting 'Aggregated' only shows your aggregates, i.e. world, and selecting 'Not aggregated' displays the countries and/or regions in the MAGNET model.



You can create a new aggregate by making a selection of the countries in the column on the left hand side, e.g. tza, uga, eth, ken and RoEAfr (you can select them all by pressing CTRL) and then pressing the arrow pointing to the right (if you press the two arrows pointing to the right all regions/countries in the column on the left move to the right, idem undoing the selection you press the singly or double arrow to the left). In the box below 'New aggregate name' you then write the name of your aggregate (in the example Africa) and you press Make new aggregate. To finish you press OK. If you want to do the same thing for destination regions you need to repeat the process in the box below the source regions of the Show results window.

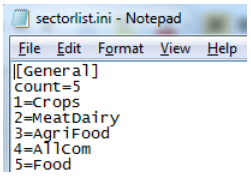


The aggregates in GEMSE_Analyst are stored in in the subdirectory Input Data\AggregatieConversie. This may be handy to know in case you are using exactly the same regional aggregation and aggregates in another project and want to reuse them in this project. It is a simple text file which can be manually adjusted (see screenshot). In our example there are two aggregates, world and Africa, and subsequently the country and/or region composition of each is shown. In order to get rid of obsolete aggregates, but more importantly to get rid of obsolete countries and/or regions (e.g. obtained from a different model), a shortcut that seems to work is to rename the regionlist.ini file to, for example, regionlistbbb.ini and reopen GEMSE_Analyst, Show Results of the scenarios you're interested in. The correct countries and/or regions of your models now should appear. You can then quickly remake the aggregates you're interested in (which will be stored in a new regionlist.ini file) or rename (and adjust) the old one back to regionlist.ini.



3.4 Edit product lists

The procedure for selecting products and making aggregates is identical to that for regions and so not repeated here. You can start editing product lists by clicking Edit products. The products in GEMSE_Analyst are stored in the subdirectory Input Data\AggregatieConversie as a simple text file (see screenshot). In our example we have created five aggregates, one for crops, one for meat and dairy products, one for agriculture and/or food commodities, one for all commodities and one for food commodities (their composition is not shown).



3.5 Some tips on variables to focus on and display options

The variables that are interesting in any economic analysis include the main drivers and the main outcomes of important macroeconomic variables. Below follows an illustration of how you could approach this. For all selections made, pressing Make Tables shows the results in a spreadsheet in GEMSE_Analyst which can simply be copy pasted in Excel. The button Table Settings allows you to play with what you display by row and what by column. Right-clicking in the spreadsheet shows how to adjust display options including decimal place, number format and font format.

The drivers commonly include GDP, population and yields (land productivity). It may be instructive to show these for all countries and/or regions in the world (possibly aggregated to a higher level, e.g. in the example for Africa, EU27 and Rest of the World) and in yearly percentage changes. You could also show developments in GDP per capita by selecting only the GDP variable and selecting the per capita option. Results could be nicely shown in a bar chart in Excel.

In terms of macroeconomic outcomes by region and/or country, the developments in value added shares (using endowment volume at agent prices; selecting the option to show absolute results; and selecting destination(!) product shares, possibly using an aggregation of products) may be illustrative of how the structure of the economy is changing over time. This could be used to prepare a pie chart in Excel (for each region and/or country) for the start and end year of the period you are interested in. Subsequently you could take a closer look at a country's factor market developments over the whole period. First you could display (yearly percentage) changes in sectoral employment (again possibly at a higher sectoral aggregation) and wages. Similarly you could display changes in land use by sector and land price developments. Both could be put in a bar chart in Excel.

You could then take a look at (yearly percentage) changes in consumption by households (private consumption) in a country or region. Considering only food items allows you to say something about food security (if consumption is going up for all food items, food security could be considered to improve overall). Using a food aggregate and displaying changes in consumption of food over time for all countries and/or regions in the world could provide a good overview of what happens to food security globally. All these results could be displayed in a bar chart in Excel. A different presentation format, more interesting for changes in diet composition, is to display results in shares, which could be used to produce a pie chart in Excel. The same approach could be taken for consumption satisfied by imports (signalling whether or not dependence on food imports has increased) and domestic goods (signalling changes in domestic food security).

Finally, developments in overall exports and imports (in percentage changes over time) are useful to show whether or not trade in certain products (again these could be aggregated to your convenience) is improving. Since trade is bilateral you have to select the world as destination country for exports and as source country for imports. If you want to select a bilateral trade partner you can select a specific country or region in question. Using shares data instead allows you to make pie charts in Excel for the start and end year of the period you are interested in. This could be indicative of the change in the trade profile of a country in terms of trade partners and/or products.

We have so far focused on displaying the results of one scenario. In GEMSE_Analyst you can display results relative to another scenario (in absolute/relative/percentage change differences) as is possible using the tick mark boxes below the column on the left hand side of the Show results window). This is instructive when you want to compare counterfactual policy analyses to a baseline. We have also focused on making tables. Making graphs and maps is possible, by using the graph and map options in the bottom left part of the screen, but more sophisticated graphs can be made with other programs and the graphs and maps functionalities are not fully developed at the moment.

3.6 Saving and re-using table settings

You can save the selections of variables, sectors and regions by clicking on Save Settings above the button Make Tables. You can then give it an appropriate name. If you like to have the settings as default when you start then you have to click on Save Settings and save it as Default. The settings are saved in a file with tbl (table) extension in the subdirectory graphsettings of the MAGNET model (see screenshot). The table settings can be selected from the Tables tab of the Show results menu window.