

## ANSWERv6-MARKAL Batch Run Enhancements

### Overview

Users of ANSWERv6-MARKAL who work with large multi-region models, particularly where such models have a large number of Rule-based constraints, will be aware that their ANSWER database grows in size quite rapidly when they initiate a Batch Run. This can mean that a Batch Run involving perhaps as few as 5 or 6 Cases may fail because the ANSWER database grows to the point where it exceeds the 2GB limit for a Microsoft Access database.

- The Batch Run facility has been enhanced to reduce the growth in size of the database, **and also to automatically initiate Repair & Compact of the database during the generation of DD and DDS files** if the database size is close to the Microsoft Access 2GB limit.

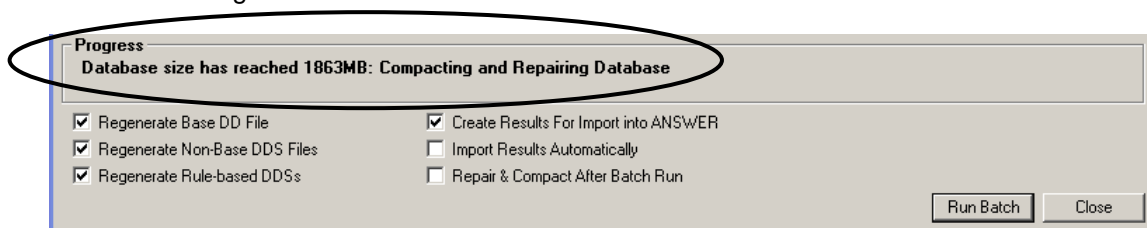
Users working with large multi-region models will also be aware that the time to generate the Base DD, Non-Base DDS and Rule-based DDS files associated with a Batch Run is often substantial.

- The incorporation into the Batch Run facility of the same three Regenerate DD or DDS File checkboxes that have for some years been available on the Run Model form – see the LHS of the screen snapshot below – allows the user to reduce execution time by avoiding unnecessary regeneration of DD and DDS files.

### Summary of Enhancements

ANSWERv6-MARKAL has been enhanced in a number of ways to improve the operation of the Batch Run facility, and also of the Run Model facility, as follows:

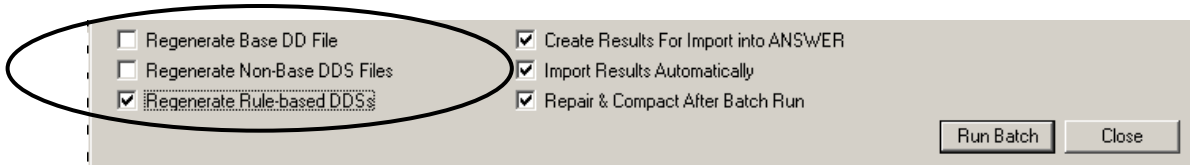
- The code associated with creation of the Rule-based DDS files has been revised to reduce the growth in size of the ANSWER database. The consequent reduced growth in size is beneficial for the operation of both the Batch Run facility and the Run Model facility (for a model with a large number of Rule-based constraints).
- For a Batch Run, the size of the database is checked after the creation of the DD and DDS files for each run in the Batch, and where the database size exceeds 1,800MB the creation of the DD and DDS files is suspended and Repair & Compact is automatically initiated, with the Progress frame on the Batch Run form displaying a message as follows:



Creation of the DD and DDS files for subsequent runs in the Batch then resumes.

- The Batch Run form now incorporates the same three Regenerate DD or DDS File checkboxes that have for some years been available on the Run Model form. In the screen snapshot below (showing the bottom of the new Batch Run form), the user has unchecked the “Regenerate Base DD File” checkbox and the “Regenerate Non-

Base DDS File” checkbox, to reduce execution time by avoiding unnecessary regeneration of these DD and DDS files:



- On both the Batch Run form and the Run Model form, the “Repair & Compact ...” checkbox is now always enabled and hence always available for user selection regardless of the settings of the two checkboxes above it. (In previous versions of ANSWER, disabling of the “Import Results Automatically Checkbox” resulted in the disabling of the “Repair & Compact ...” checkbox.)
- The “Repair and Compact Database” facility has been enhanced so that prior to the Repair and Compact being initiated, all records in all “temporary” tables are deleted. The effect is that after the Repair and Compact has been carried out, the size of the ANSWER database will be considerably reduced as compared with the situation if the records in the “temporary” tables had not been deleted.
  - Additional explanation: an ANSWER database uses a number of “temporary” tables to facilitate certain database operations, including the generation of Rule-based constraints. These “temporary” tables can considerably increase the size of the ANSWER database.

### **Details re Operation of Regenerate DD and DDS checkboxes on Batch Run Form**

Sections 6.1.8, 6.1.9 and 6.1.10 of the ANSWERv6-MARKAL User Manual, describing the operation of the three Regenerate DD and DDS checkboxes in the context of the Run Model facility, are reproduced below. In general the three Regenerate DD and DDS checkboxes operate in the same fashion in the context of the Batch Run facility, but there is an additional caveat:

- When carrying out a Batch Run, some DD and DDS files will be needed for *several* runs in the batch. The simplest example of this is that the (same) Base DD file(files if multi-region) will be needed for *every* run in the batch. ***The Batch Run facility ensures that each Base DD, Non-Base and Rule-based DDS file that is needed, considering all of the runs in the batch as a whole, is generated at most once.***

#### **6.1.8 Run Model 'Regenerate Base DD File' checkbox option**

Regenerate Base DD File

If you run with the 'Regenerate Base DD File' checkbox checked, then ANSWER will regenerate the BASE DD file(s) for each region involved in the model run from the BASE Scenario data in the Database, and consequently you can be certain that the BASE DD file(s) correspond to the current BASE Scenario data.

If you run with the 'Regenerate Base DD File' checkbox unchecked, then ANSWER will generate the BASE DD file only if it does not already exist in the GAMS Work folder, or if the Date&Time Modified for the BASE DD file is later than the Date&Time Modified for the BASE scenario. Running with this checkbox unchecked allows you to save the time it would take to generate a BASE scenario DD file whose Date&Time Modified is later than the Date&Time Modified for the BASE scenario (and so where presumably the BASE DD file already on disk is identical to what would be generated).

Note that for a multi-region run, ANSWER always regenerates the BASE TRADE DD file that contains Bilateral (and Global Trade) data for the regions involved in the model run.

### 6.1.9 Run Model 'Regenerate Non-Base DDS Files' checkbox option

Regenerate Non-Base DDS Files

The operation of the 'Regenerate Non-Base DDS Files' checkbox is similar to the operation of the 'Regenerate Base DD File' checkbox, as described in section 6.1.8 above.

If you run with the 'Regenerate Non-Base DDS Files' checkbox checked, then ANSWER will regenerate all non-BASE scenario DDS files for each region involved in the model run from the non-BASE Scenario data in the Database, and consequently you can be certain that the non-BASE DDS file(s) correspond to the current non-BASE Scenario data. (This excludes Rule-based DDS files, whose regeneration is determined by the setting of the 'Regenerate Rule-based DDSs' checkbox – see section 6.1.10 below.)

If you run with the 'Regenerate Non-Base DDS Files' checkbox unchecked, then ANSWER will generate a non-BASE DD file only if it does not already exist in the GAMS Work folder, or if the Date&Time Modified for the non-BASE DDS file is later than the Date&Time Modified for the associated non-BASE scenario. Running with this checkbox unchecked allows you to save the time it would take to generate a non-BASE scenario DDS file whose Date&Time Modified is later than the Date&Time Modified for the associated non-BASE scenario (and so where presumably the non-BASE DDS file already on disk is identical to what would be generated).

Note that for a multi-region run, ANSWER always regenerates the non-BASE TRADE DDS files that contain Bilateral (and Global Trade) data for the regions involved in the model run.

### 6.1.10 Run Model 'Regenerate Rule-based DDSs' checkbox option

Regenerate Rule-based DDSs

If you run with the 'Regenerate Rule-based DDSs' checkbox checked, then ANSWER will regenerate the Rule-based DDS file(s) for each region involved in the model run from the data in the Database, and consequently you can be certain that the Rule-based DDS file (s) correspond to the current data in the Database.

If you run with the 'Regenerate Rule-based DDSs' checkbox unchecked, then ANSWER will only generate a Rule-based DDS file if the Rule-based DDS file does not already exist in the GAMS Work folder: where the Rule-based DDS file already exists, it will not be regenerated.

**Note that running with the 'Regenerate Rule-based DDSs' checkbox unchecked is a potentially dangerous choice. If you run with this checkbox not checked you are taking full responsibility for the already existing Rule-based DDS file(s) being appropriate: ANSWER does no checking of the Modified Date&Time for the Rule-based DDS against such things as the Modified Date&Time of TechFilters and Scenarios that are involved in the Rule-based Constraints.**