

# TIMES Time-Stepped Solve (TIMESTEP) Option in ANSWER-TIMES

## Introduction

The purpose of this note is to briefly describe how to invoke the TIMES Time-Stepped Solve (TIMESTEP) option in ANSWER-TIMES.

For an explanation of the TIMES Time-Stepped Solve (TIMESTEP) option, see section 6.2 of TIMES Version 2.8 User Note “User Control Switches in TIMES” (author Antti Lehtila), which can be downloaded from the ETSAP website as *TIMES-Control-Switches.pdf*.

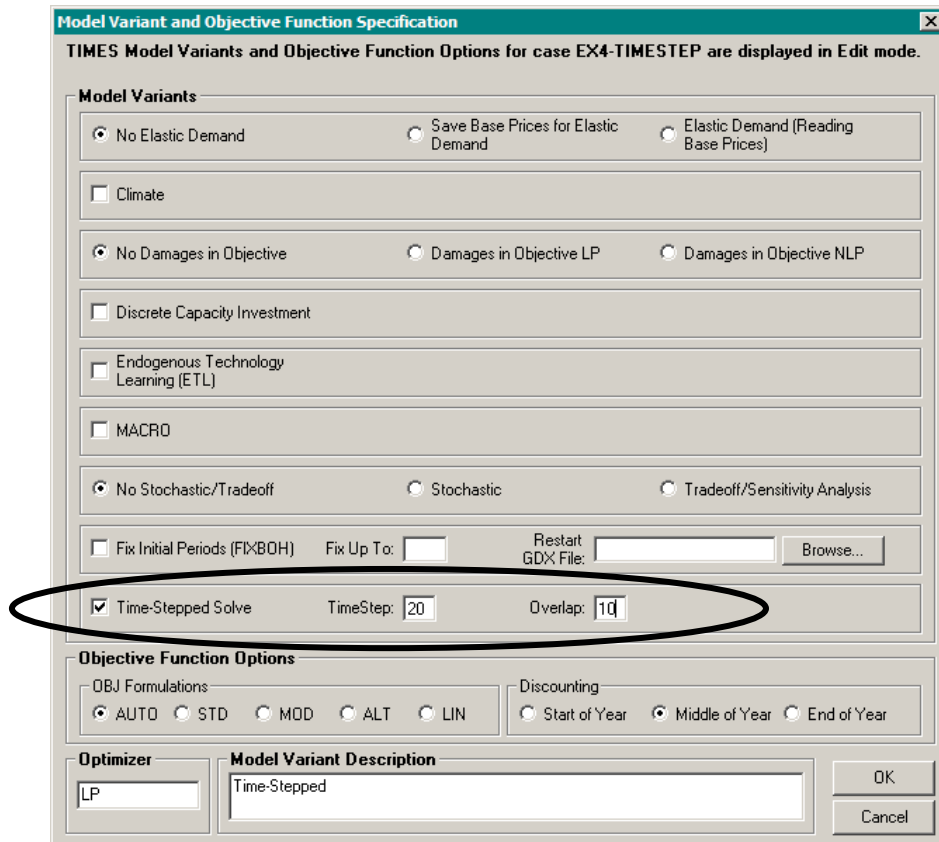
For a concrete example demonstrating Run Model using the TIMES Time-Stepped Solve option, see the online Run (case) called **EX4-TIMESTEP** in database Example4-v661.mdb.

## Time-Stepped Solve in ANSWER-TIMES

The essence of what is required by the ETSAP TIMES GAMS code is to specify values for:

TIMESTEP	the number of years that should be optimized in each solution step
G_OVERLAP	the number of overlapping years between successive optimization steps

To specify in ANSWER-TIMES that a TIMES model run uses the Time-Stepped (TIMESTEP) option, and to specify the values for TIMESTEP and for G\_OVERLAP, click on the **Specify Model Variant...** button on the Run Model form, and then check the Time-Stepped Solve checkbox, and specify values for TIMESTEP and for G\_OVERLAP in the TimeStep and Overlap textboxes respectively:



ANSWER-TIMES then ensures that TIMESTEP is specified as a control variable in the GEN file that controls the TIMES GAMS model run, by inserting:

**\$SET TIMESTEP 20**

and also that G\_OVERLAP is specified, as it happens also by inserting in the GEN file (lower down):

**G\_OVERLAP = 10;**

In ANSWER-TIMES the value for the TIMES parameter G\_OVERLAP must be specified via the Overlap textbox on the Model Variant Specification form. (Right now G\_OVERLAP cannot be specified as a Data Parameter in ANSWER-TIMES.)

### Time-Stepped Solve in conjunction with other TIMES Model Extensions

The TIMES Time-Stepped Solve Option is available in conjunction with most of the other TIMES Model Extensions, so for example a model run that combines Endogenous Technology Learning (ETL) with Time-Stepped Solve is allowable:

The screenshot shows the Model Variant Specification dialog box. The 'Endogenous Technology Learning (ETL)' checkbox is checked and circled. The 'Time-Stepped Solve' checkbox is also checked and circled, with 'TimeStep' set to 20 and 'Overlap' set to 10. The 'MACRO' checkbox is unchecked. The 'No Stochastic/Tradeoff' radio button is selected. The 'Fix Initial Periods (FIXBOH)' checkbox is unchecked. The 'Restart GDY File:' field is empty. The 'Objective Function Options' section shows 'OBJ Formulations' with 'AUTO' selected and 'Discounting' with 'Middle of Year' selected. The 'Optimizer' is set to 'LP + MIP' and the 'Model Variant Description' is 'ETL + Time-Stepped'.

The Time-Stepped Solve Option is not available in conjunction with the Macro, Stochastic and Tradeoff/Sensitivity Analysis Extensions. So for example if the user invokes both Stochastic and Time-Stepped Solve, the Model Variant Description textbox on the Model Variant Specification form indicates "Combination of Model Variants not allowed".

No Stochastic/Tradeoff     **Stochastic**     Tradeoff/Sensitivity Analysis

Fix Initial Periods (FIXBOH)    Fix Up To:     Restart GDX File:

Time-Stepped Solve    TimeStep:     Overlap:

**Objective Function Options**

OBJ Formulations:     AUTO     STD     MOD     ALT     LIN    Discounting:     Start of Year     Middle of Year     End of Year

**Optimizer**        **Model Variant Description**

**Stochastic + Time-Stepped: Combination of Model Variants not allowed.**