

**Dynamic Simulation Scenario Model  
User Guide**

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BOTEC Analysis Corp.  
I-502 Project #430-8b  
Final  
June 28, 2013

The following user guide is to be used with the workbook “8b. Dynamic Simulation Scenarios Model, Final June 25”. Although reading the entire accompanying report for this task is not required to fully understand this user guide, it is required that the user at least read “Part VI: Dynamic Simulation Scenarios”.

## I. Description of Model

This model adapts the price model from Task 430-8(a) by including a new quantity component that estimates the amount of marijuana sold in the I-502 market. Once the price and quantity components are integrated, the model then projects annual tax revenues from FY 2015 to FY 2024, among other outputs.

## II. Parameters

There are 28 parameters, which are used as inputs in the dynamic simulation scenarios and are able to vary over time. Almost all of the parameters’ are governed by four components: (1) starting value, (2) annual increase or decrease, (3) minimum or maximum value, and (4) start year for effect. The starting value is self-explanatory. The annual increase or decrease allows the user to determine if a parameter, for example, will decrease by \$0.15 a year or by 5% percentage points a year. The minimum or maximum value ensures that parameters do not leave a reasonable range. The start year for effect allows the start of an annual increase or decrease to happen in any year, not just FY 2015.

## III. Worksheets (WS)

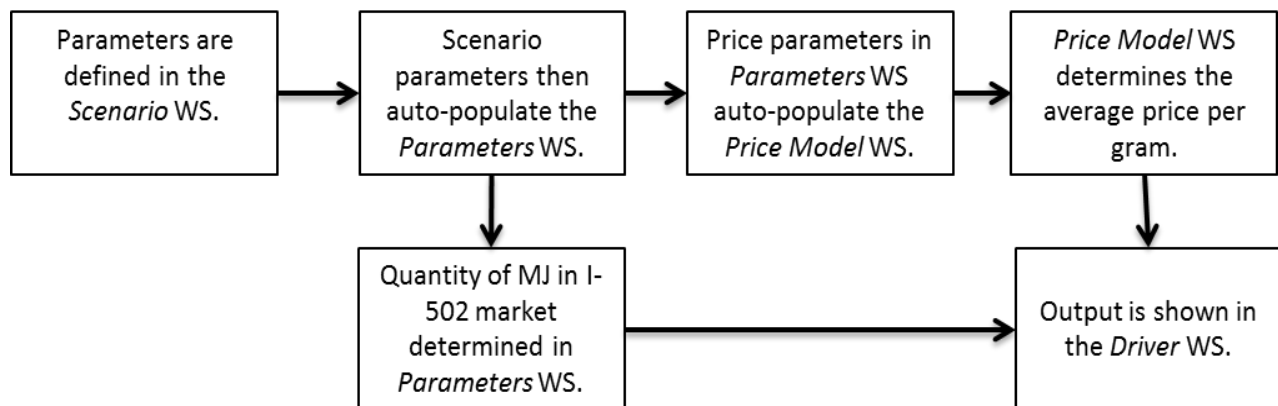
- *Driver*: This WS provides final results and graphs of the model. The quantity of marijuana in the I-502 market, average legal price per gram, tax per gram, and total tax revenue in millions are provided. Graphs of these outputs are also shown.
- *Parameters*: This WS shows all of the parameters, the four components guiding their changes, and the resulting value for each year (Columns D-M), in light red. Cells in Columns D-M that are not highlighted in light red are intermediary outputs calculated from parameter values.
- *Scenarios*: This WS shows the seven scenarios discussed in the main report, plus the base case. Scenarios 8 and 9 (columns M and N) can be changed by the user to make new scenarios. (Details about making new scenarios are in below part V.)
- *Scenario Graphs*: This WS shows the resulting annual revenue from the seven scenarios discussed in the main report, plus the base case. The three graphs that are shown were included in the main report.
- *Price Model*: This is the price model developed in Task 430-8(a). The main output of this WS is the average price per gram.

#### IV. How the Model Works

Four of the WS (not including *Scenario Graphs*) work together to produce the final outputs of the model. The *Scenarios WS* is where the four components governing the parameters values are entered. In cell B2 the current scenario is chosen. If one wants to run the model for Scenario 4, then “4” needs to be entered into cell B2. (The SV# assigns an identification number to each of the starting values and the Par# assigns a number for the other components of the parameter.)

Once the scenario is chosen, the four components then auto-populate the *Parameter WS* in Columns O-Q, which in turn calculates the appropriate values of the values for each year (Columns D-M). The *Parameters WS*, does all of the calculations for the I-502 market quantity model in rows 45-67. But prices are determined in the *Price Model WS* which takes numbers from the *Parameters WS* to auto-populate the yellow highlighted cells in *Price Model WS*. Then information from the *Parameters* and *Price Model WS* are used to determine the final outputs in the *Driver WS*. (See the graphic below for a visual representation of the model.)

#### Layout of Model



Each of the scenarios has to be run separately. If “4” is typed in cell B2 on the *Parameters WS*, then that is the only scenario whose output is displayed. To run another scenario, another number needs to be entered into the *Scenarios WS*, cell B2.

#### V. Creating A Custom Scenario

We anticipate the possibility that WSLCB will want to create a new scenario. In the *Scenario WS* there are two columns, M and N, (in light blue) that have not been used for any scenarios described in the Task 8(b) report. All one has to do is change any of the annual increases/decreases, minimum/maximum or start year to create a new scenario. (Note that if you change the starting value in Column D, it changes the starting value for all of the

scenarios. So if you plan on changing a starting value, it may be wise to make a new copy of the workbook so that the original version is still intact.)

After changing parameters for the new scenario, either in column M or N, one must put the corresponding number from row 3 (8 for column M or 9 for column N) in cell B2 (in light blue) to run that scenario. Then the *Driver WS* will show the results. If one wants to see more results, for example, how the market share changes over time, then look in the appropriate row of the *Parameters WS*.

## VI. How to Keep the Workbook Intact

The user can change the constants in the *Parameters WS* columns M and N, as just described, without worrying about damaging the model's logic in any way. However, since the four *WS* are so integrated, modifying a *formula cell* in one *WS* can crash the entire model. In order to ensure that the model will continue to work, it is recommended that any time a user is interested in reprogramming parts of the model logic, that an extra copy be created. That ensures if any mistakes are made, there is still the original copy.

## VII. Modifying the Workbook So the User Can Change All Parameter Values

The built-in scenario capability is restricted to linear increases or decreases in parameter values over time. If one wants to consider more complicated trajectories of parameter change, this can be done by writing in parameter values for each year in the *Parameters WS*, with a bit of extra work.

1. When the workbook is open, go to "File" and "Save As" and save a new version of the workbook with a different file name.
2. In the *Parameters WS* highlight cells "D6:M42". "Copy" these cells by pressing Control-C and then right click anywhere in the area you just highlighted. Choose "Paste Special", then "Values".
3. Do step 2 again for all of the remaining values in light red on the *Parameters WS*.
4. Now you are ready to change any of the values in the light red cells, the model should still work, and the outputs will be on the *Driver WS*.