

Using the Template Spreadsheet Four - Alternative to Solver

You may have noticed that changing values one at a time to use MS “Solver” for a large number of individual optimization problems can be time consuming. We estimate that doing all 244 Watershed properties using Solver – without using any automation methods in Visual Basic, which would be beyond the scope of this course – would take about 3 hours.

For this reason we have decided to give you – in the Template spreadsheet named *Alternative to Solver* – a formula as a shortcut for getting the optimum rent for each property. You do not need to worry about deriving this formula (it is based on finding the maximum of the revenue function using basic calculus). Following best practices for avoiding error in complex formulas, the formula’s components are laid out in three interim steps in the spreadsheet. However, if you are interested, for each individual property the optimal rent in \$ is a function of the Slope Beta and Y-intercept Alpha of the forecasting model, and the 10th and 90th percentile rents for that property type and location:

Nightly rent in \$\$ =

$$\frac{[(\text{Beta} * ((10^{\text{th}} - ((90^{\text{th}} - 10^{\text{th}})/8)))/(1.25 * (90^{\text{th}} - 10^{\text{th}})) - \text{Alpha}]}{*[(1.25 * (90^{\text{th}} - 10^{\text{th}}))/(2 * \text{Beta})]} .$$

Use of the MS Excel “If” statement in the *Alternative to Solver Spreadsheet Template*

Note that the formula above does not automatically exclude values subject to the constraint the all percentile rents chosen must be greater than 10% percentile. This constraint needs to be added using the MS “If” formula. The “If” formula gives a choice, if a certain condition is met, one value is shown in the cell – if a different condition, a different value. For example, “IF(a = b, c, d) means that whenever the value in cell a = the value in cell b, the resulting value displayed this will be equal to cell c; otherwise it will be equal to cell d. If the optimal percentile rent is less than 10th percentile, the 10th percentile rent should be used instead. This 10th percentile \$ value is of course available from the original unmodified database input.

We will now test whether you have generated optimal rents correctly. (Note that if you repeat optimization you did in Solver using the above algorithm, the two answers may vary by a small amount. These errors in the Solver estimate are no more than 2%, and will not impact final project results). You are now ready to attempt the *Alternative to Solver* quiz.