The University of Texas at Austin
McCombs School of Business

**DS235**

**Introduction to Decision Science**

# DADM EXCEL ADD IN

**ROBERT HAMMOND**
Clinical Assistant Professor, The University of Texas at Austin

The University of Texas at Austin
McCombs School of Business

# CONTENTS

1 Installation for Windows

2 Installation for Mac

3 Monte Carlo

4 Decision Trees

# 1. DOWNLOAD THE ADD IN

- Download and save the add-in to your computer in a folder that you can easily find.
  - Save the add-in to a folder where you can keep it indefinitely, such as the Documents folder or a folder where you keep modeling tools.
  - When you install DADM, it will load automatically each time you open Excel. After installing it, you can de-activate the add-in if you do not want it to load.

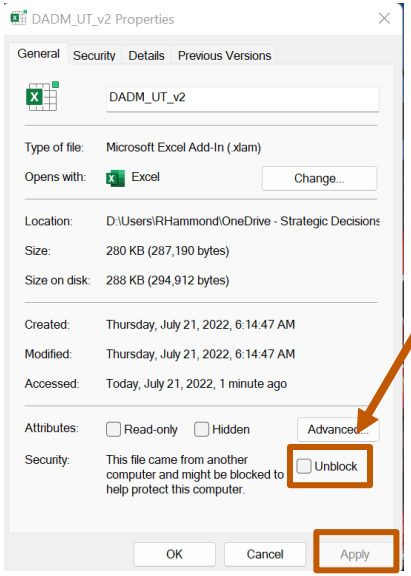
# 2. UNBLOCK THE ADD-IN FILE

Windows might automatically block (disable) the add-in file if it is downloaded from the internet, SharePoint/Teams, or an email. If this happens, the add-in will not work unless it is unblocked with the following steps:

a) Go to the folder where you saved the add-in

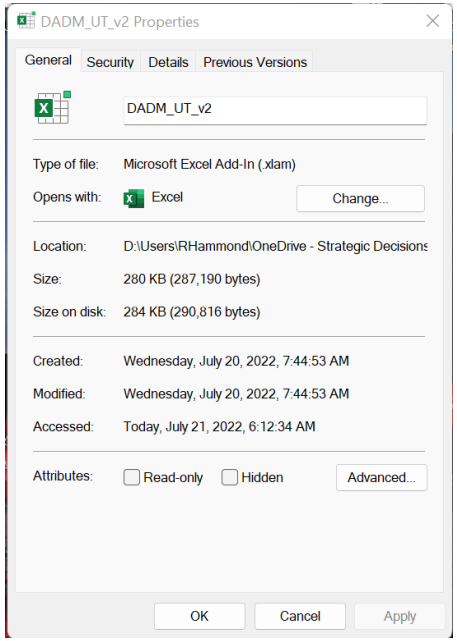
b) Right click on the add-in file and click Properties

c) Check the box beside “Unblock” at the bottom and click Apply, then click OK




If you do not see the checkbox to unblock, then you do not need to do this step.

The screenshot to the right shows how that would appear.



# 3. LOAD ADD-IN TO EXCEL

To load the add-in to Excel (DADM will load every time you open Excel)

a) Open Excel and a new workbook

b) Click “File” on the menu ribbon

c) On the left-side menu, click “Options” near the bottom (if you don’t see it, click “More…” at the bottom of that menu)

d) In the new window, click “Add-ins” near the bottom of the left-side menu

e) At the bottom of this window, ensure that “Excel Add-ins” is selected in the drop-down menu and click “Go…”


f) In the Add-ins window, click “Browse…” and navigate to where you saved the DADM add-in file

g) Select the add-in file and click “OK” and click “OK” again to close the add-in window

# OPTIONAL: DE-ACTIVATE THE ADD-IN

To de-activate the Excel add-in:

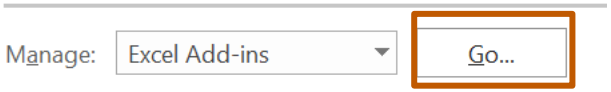
a) Open Excel and a new workbook

b) Click “File” on the menu ribbon

c) On the left-side menu, click “Options” near the bottom (if you don’t see it, click “More…” at the bottom of that menu)

d) In the new window, click “Add-ins” near the bottom of the left-side menu

e) At the bottom of this window, ensure that “Excel Add-ins” is selected in the drop-down menu and click “Go…”




f) In the Add-ins window, **uncheck** the box for the DADM add-in and click “OK”

1 Installation for Windows

2 Installation for Mac

3 Monte Carlo

4 Decision Trees

# 1. DOWNLOAD THE ADD IN

- Download and save the add-in to your computer in a folder that you can easily find.
  - Save the add-in to a folder where you can keep it indefinitely, such as the Documents folder or a folder where you keep modeling tools.
  - When you install DADM, it will load automatically each time you open Excel. After installing it, you can de-activate the add-in if you do not want it to load.

# 2. LOAD ADD-IN TO EXCEL

To load add-in to Excel (DADM will load every time you open Excel):

a) Open Excel and a new workbook

b) Click “Tools” on the Mac menu bar

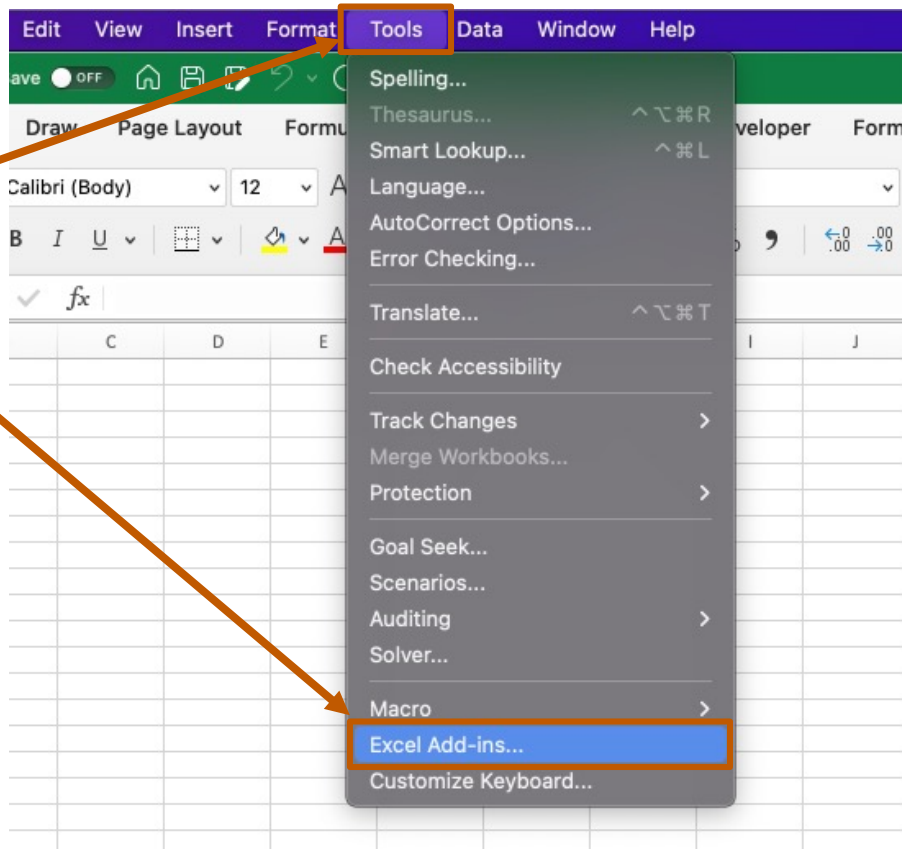
c) On the drop-down menu, click “Excel Add-ins…”

d) In the new window, click “Browse…”

e) Navigate to where you saved the DADM add-in file and click on it to select it

f) Click “Open”

g) Click “OK” in the add-ins window



# OPTIONAL: DE-ACTIVATE THE ADD-IN

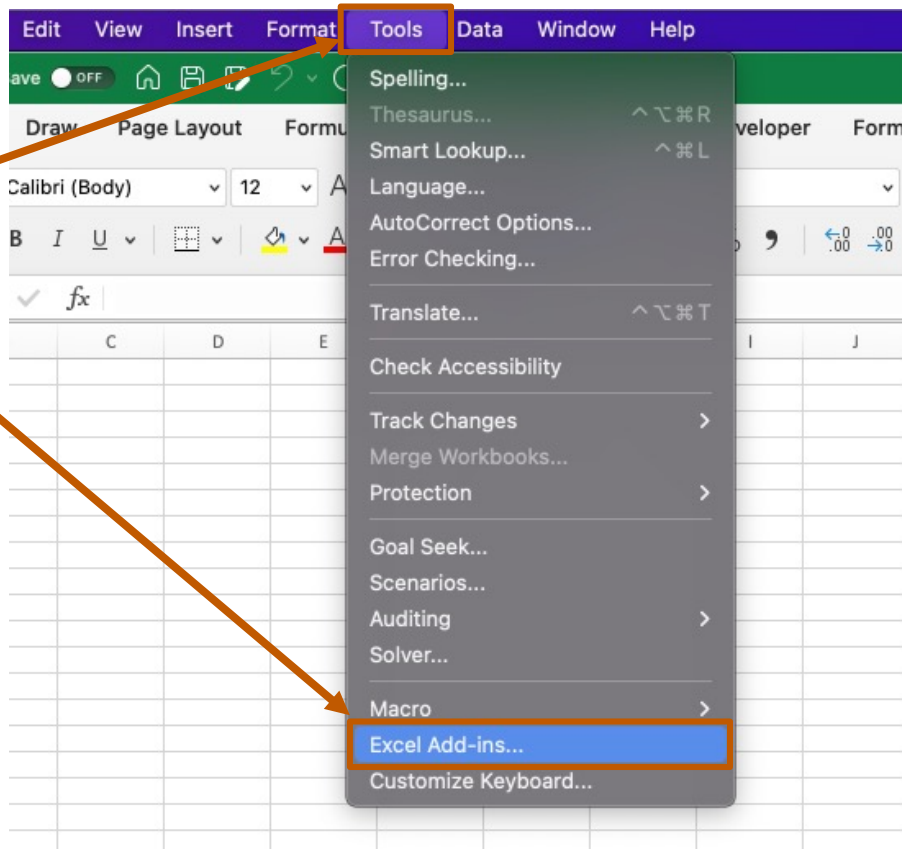
To De-activate the Excel add-in:

a) Open Excel and a new workbook

b) Click “Tools” on the Mac menu bar

c) On the drop-down menu, click “Excel Add-ins…”

d) In the new window, **uncheck** the box for DADM and click “OK”



The University of Texas at Austin
McCombs School of Business

1 Installation for Windows

2 Installation for Mac

3 Monte Carlo

4 Decision Trees

# SET UP A SIMULATION MODEL

## Requirements

1. At least one probability distribution input.
2. At least one output. If there are multiple outputs, they all need to be on the same sheet.
3. Select the sheet with the output(s) when running the simulation.

## Optional

1. One (only one) decision input
2. Label(s) for output(s)
3. Label for decision

# AVAILABLE PROBABILITY DISTRIBUTIONS

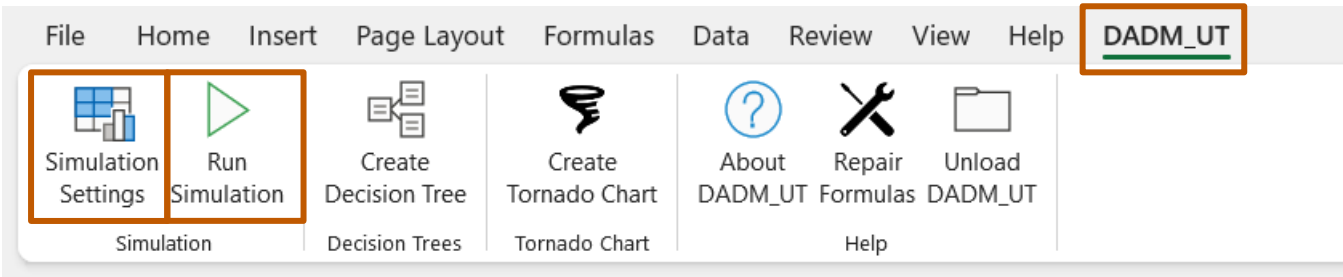
| Distribution | Excel Functions | Restrictions on arguments | Comments |
|---|---|---|---|
| **Bernoulli** | bernoulli_(p) | 0<=p<=1 | 1 if a success, 0 otherwise, where success has probability p |
| **Binomial** | bnomial_(n,p) | n>=0, 0<=p<=1 | Number of successes in n independent trials, where p is the probability of success on each trial |
| **Poisson** | poisson_(mean) | mean>0 | Nonnegative integer-valued, often used for the number of events in some amount of time or place |
| **Discrete** | discrete_(values,probs) | # of values must match # of probs, and probs must sum to 1 | General discrete distribution where values is any list of possible values and probs is the corresponding list of probabilities |
| **Uniform** | uniform_(min,max) | min<=max | Flat distribution, where any value between min and max is equally likely |
| **Normal** | normal_(mean,stdev) | stdev>0 | Famous symmetric bell-shaped distribution with given mean and standard deviation |
| **Triangular** | triangular_(min,mostlikely, max) | min<=mostlikely<=max | Distribution bounded by min and max, with peak at mostlikely value |
| **Pert** | pert_(min,mostlikely,max) | min<=mostlikely<=max | A “rounded” version of the triangular distribution |
| **Beta** | beta_(alpha1,alpha2,min, max) | alpha1>0, alpha2>0, min<=max | Bounded by min and max, shape determined by alpha1 and alpha2 |
| **Exponential** | exponential_(mean) | mean>0 | Nonnegative “memoryless” distribution with given mean and mode at 0 |
| **Erlang** | erlang_(n,beta) | n>0, n integer, beta>0 | Right-skewed nonnegative distribution with integer shape parameter n and mean equal to n*beta |
| **Gamma** | gamma_(alpha,beta) | alpha>0, beta>0 | Generalization of Erlang distribution where the shape parameter alpha can be any nonnegative value. Mean is alpha*beta. |
| **Lognormal** | lognorm_(mean,stdev) | mean>0, stdev>0 | Right-skewed nonnegative distribution with given mean and standard deviation |
| **Weibull** | weibull_(alpha,beta) | alpha>0, beta>0 | Right-skewed nonnegative distribution with shape parameter alpha and scale parameter beta. Mean is a complex function of alpha and beta. |

# RUNNING A MONTE CARLO SIMULATION

1. Select the worksheet that has the random functions (your model)


2. Click “Simulation Settings” on the DADM_UT ribbon menu
3. Specify at least one output cell (see next page for other optional settings)
4. Click “OK” to close the Simulation Settings window


5. Click “Run Simulation” on the DADM_UT ribbon menu to run the simulation



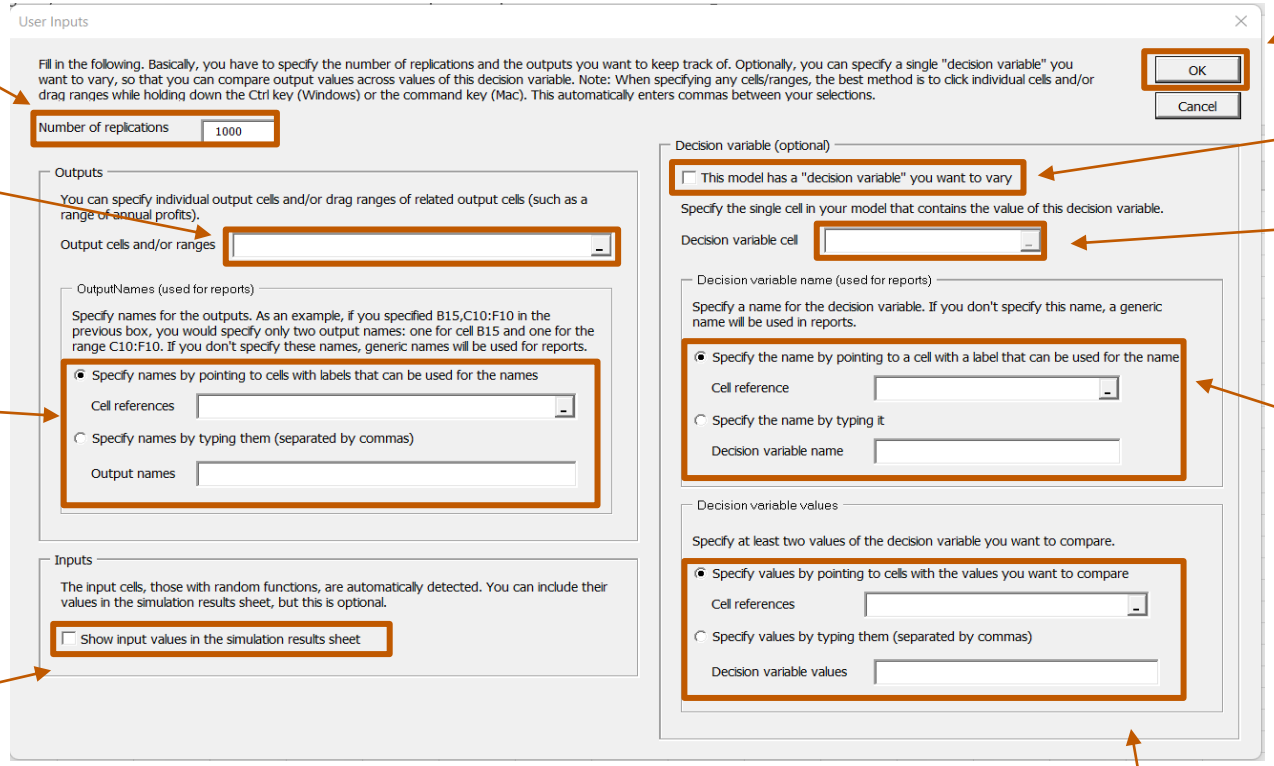
# MONTE CARLO SIMULATION MENU

Number of Monte Carlo iterations /samples to run

Calculated cells that you want as outputs from the simulation (e.g., value measures)

Specify labels of the simulation outputs

Check this box to include the sampled values of the inputs for each simulation iteration in the results




**Click OK to run the simulation**

Check this box to use a decision

Specify the cell for the decision input

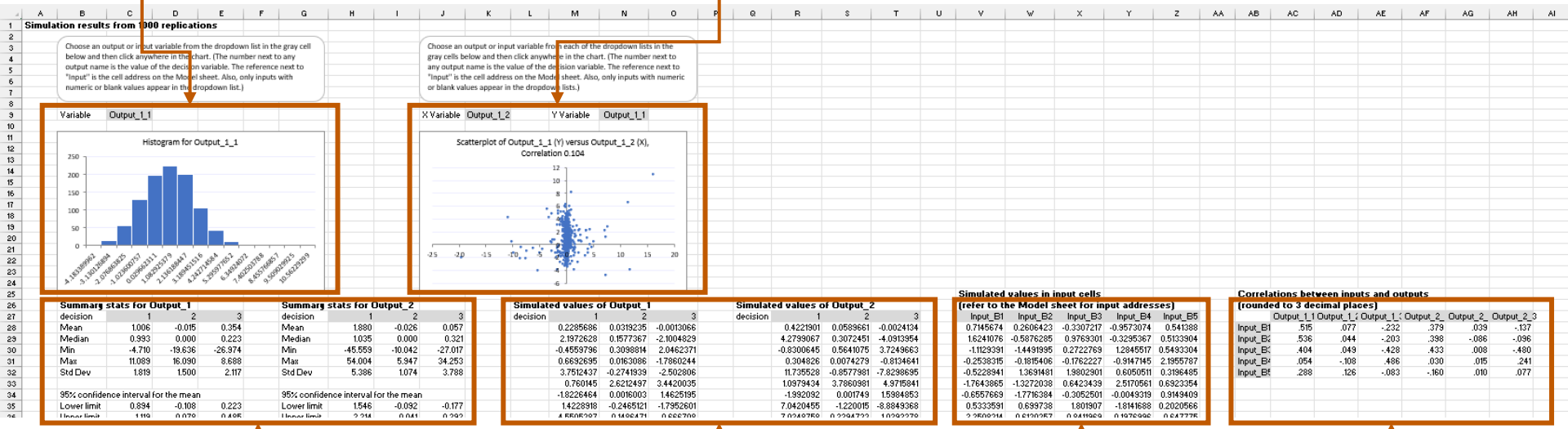
Specify the label for the decision

Specify the choices available for the decision

# SIMULATION RESULTS REPORT

View histogram of samples for any input distribution or output calculation.

View scatter plot between any two inputs or outputs. Gives the correlation between the selected variables.
Compare inputs to inputs, outputs to outputs, or inputs to outputs.




Summary statistics for outputs.

Output values calculated for each Monte Carlo replication.

Input values sampled for each Monte Carlo replication.

Table of correlations between each input and each output.

# SIMULATION SUMMARY STATS

Statistics for each output are shown separately. There can be more than 2 outputs.

If there is a decision variable, statistics are shown for each alternative.

| | A | B | C | D | E | F | G | H | I | J | K |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 26 | | **Summary stats for Output_1** | | | | | **Summary stats for Output_2** | | | | |
| 27 | | decision | 1 | 2 | 3 | | decision | 1 | 2 | 3 | |
| 28 | | Mean | 1.006 | -0.015 | 0.354 | | Mean | 1.880 | -0.026 | 0.057 | |
| 29 | | Median | 0.993 | 0.000 | 0.223 | | Median | 1.035 | 0.000 | 0.321 | |
| 30 | | Min | -4.710 | -19.636 | -26.974 | | Min | -45.559 | -10.042 | -27.017 | |
| 31 | | Max | 11.089 | 16.090 | 8.688 | | Max | 54.004 | 5.947 | | |
| 32 | | Std Dev | 1.819 | 1.500 | 2.117 | | Std Dev | 5.386 | 1.074 | | |
| 33 | | | | | | | | | | | |
| 34 | | 95% confidence interval for the mean | | | | | 95% confidence interval for the mean | | | | |
| 35 | | Lower limit | 0.894 | -0.108 | 0.223 | | Lower limit | 1.546 | -0.092 | | |
| 36 | | Upper limit | 1.119 | 0.078 | 0.485 | | Upper limit | 2.214 | 0.041 | 0.292 | |
| 37 | | | | | | | | | | | |
| 38 | | Probabilities | >=1.006 | >=-0.015 | >=0.354 | | Probabilities | >=1.88 | >=-0.026 | >=0.057 | |
| 39 | | | 0.498 | 0.611 | 0.458 | | | 0.356 | 0.615 | 0.541 | |
| 40 | | | | | | | | | | | |
| 41 | | Percentiles | | | | | Percentiles | | | | |
| 42 | | 5th pctile | -1.769 | -0.885 | -2.290 | | 5th pctile | -3.555 | -0.983 | -5.463 | |
| 43 | | 25th pctile | -0.280 | -0.079 | -0.781 | | 25th pctile | -0.343 | -0.120 | -1.115 | |
| 44 | | 75th pctile | 2.214 | 0.064 | 1.463 | | 75th pctile | 3.103 | 0.091 | 1.589 | |
| 45 | | 95th pctile | 4.004 | 0.900 | 3.544 | | 95th pctile | 9.932 | 1.163 | 4.460 | |
| 46 | | | | | | | | | | | |

By default, the probability of being greater than or equal to the simulation mean is calculated but this can be changed.

Some common percentiles are calculated from simulation results

Calculate the probability of being above or below a value for the output. The top row is the value to calculate the probability for, and the bottom row is the probability.
Enter any of >, >=, <, <= followed by a number.

1 Installation for Windows

2 Installation for Mac

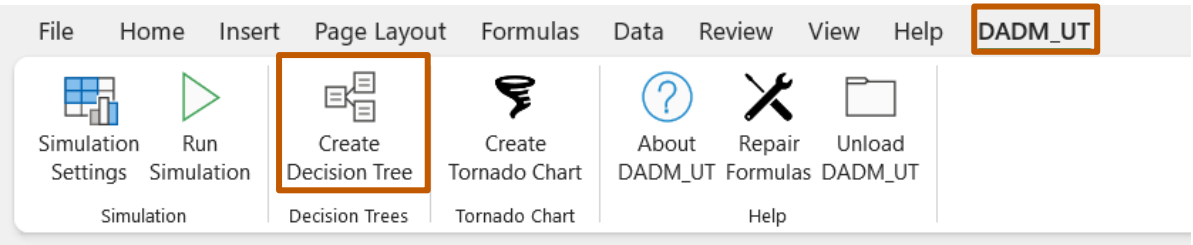
3 Monte Carlo

4 Decision Trees

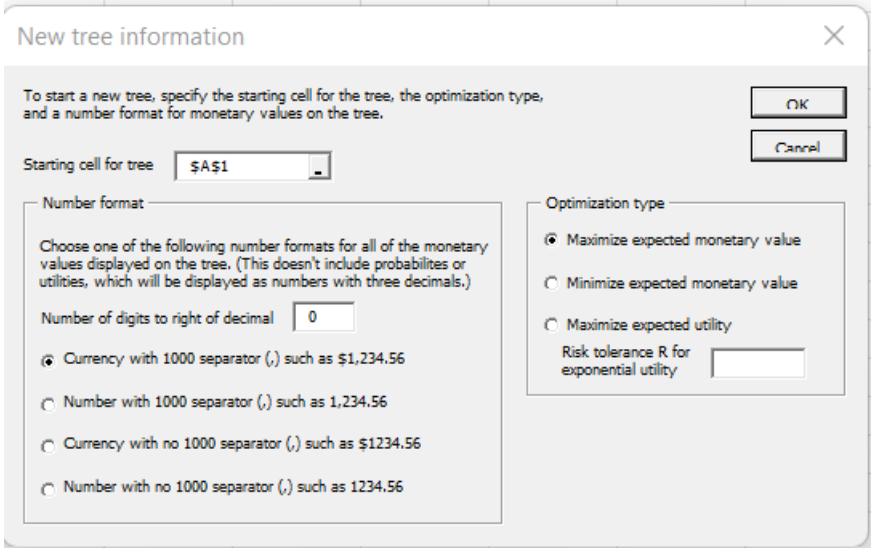
# CREATE A DECISION TREE

1. Select or create the worksheet where you will build the tree

2. Click Create Decision Tree on the DADM_UT ribbon menu




3. In the "New tree information" window, you can select formatting options and define whether decisions should maximize or minimize value, or just click OK to accept the default settings. **Note that these settings cannot be changed later.**

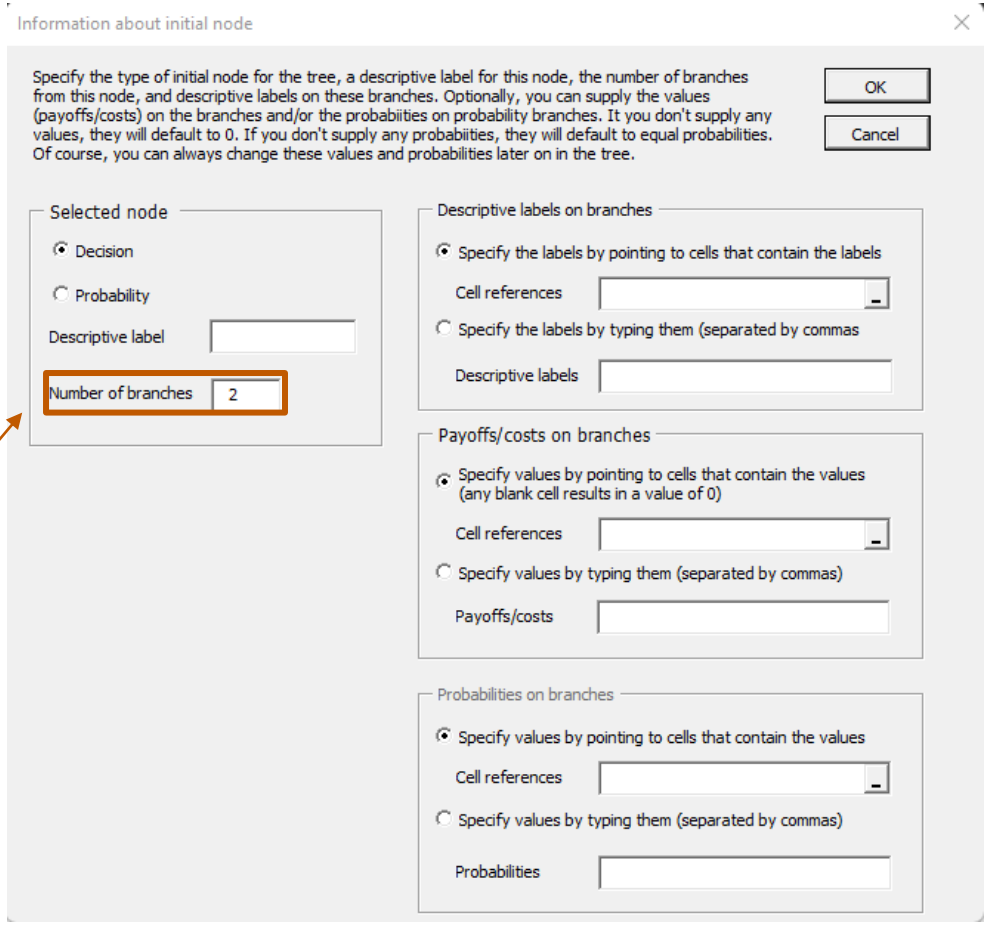


# BUILD THE DECISION TREE

1. The “Information about initial node” window opens for the first node when the tree is created, and also whenever you create a new node.

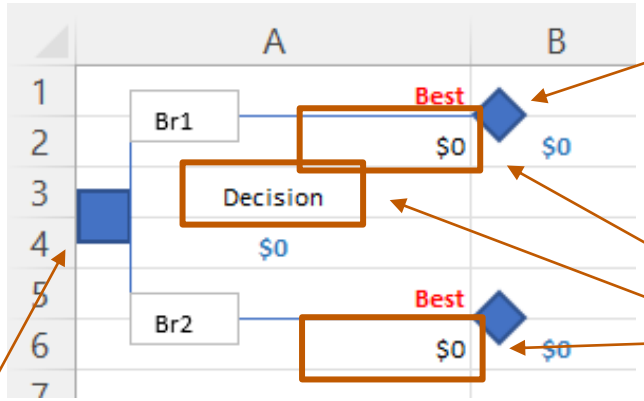
2. Select the nodes type, enter a name for it, and enter the number of branches.

   **Once a node is created, the number of branches it has cannot be changed.** But all other settings in this window can be changed later. (You can delete and a node and re-create it to change the number of branches, but this will also delete any nodes that come after it in the tree)




3. Enter labels, payoffs/cost, and (if applicable) probabilities for each branch. These can be changed later in the Excel worksheet.

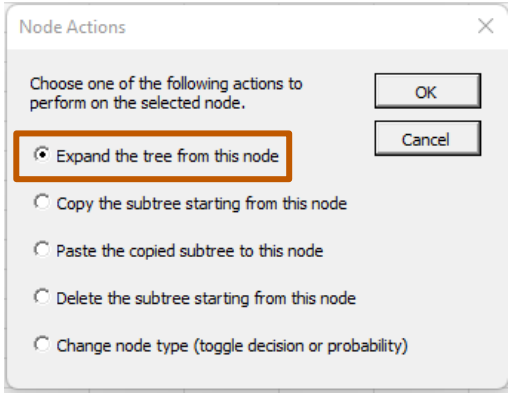
# EDITING A TREE

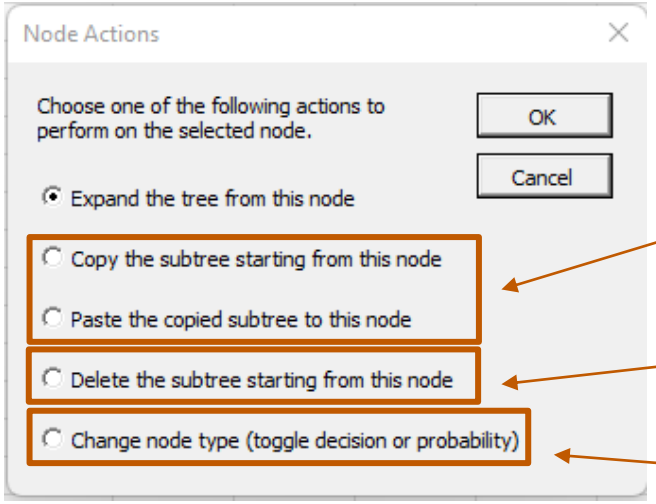



Click a node for a menu of node actions

Click on the cell for a node label or the branch payoffs or probabilities to directly edit them.

Click on a diamond endpoint node to add a node to the tree.




A subtree can be copied and pasted to any endpoint on the tree. Subtrees cannot be copied from one Excel sheet to another.

Delete a subtree. This cannot be undone.

Change a decision node to an uncertainty node or an uncertainty node to a decision node.