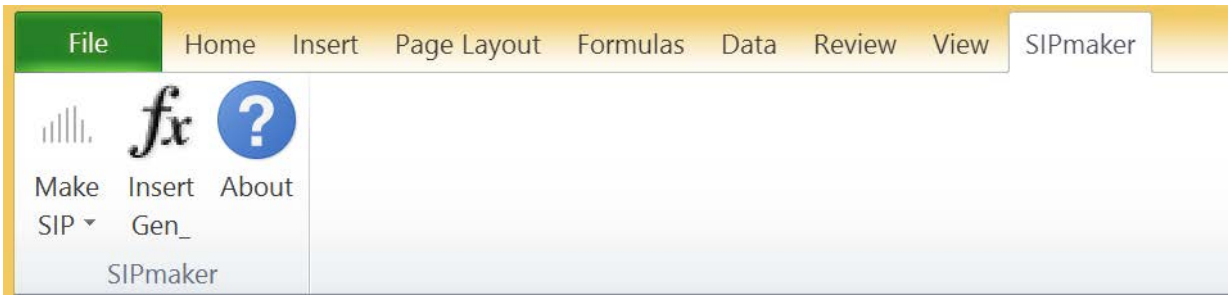
SIPmaker™ Monte Carlo Simulation SIP Library Generator

SIPmaker creates stochastic libraries for Excel according to the SIPmath™ open standard. It uses the calculation engine of XLSim, the Monte Carlo simulation package that accompanies *Decision Making With Insight*[i]. You may build simulation models from scratch as outlined below or create libraries from existing XLSim models.

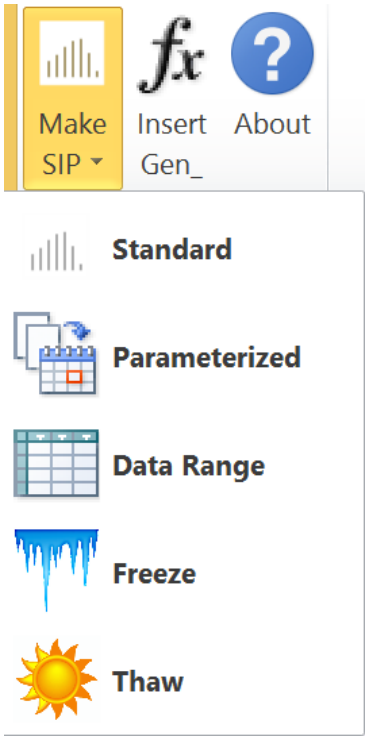
SIPmaker requires Excel 2007 or higher. Run Excel and open SIPmaker.xlsm from the **File** menu. A **SIPmaker** ribbon will be added to the Excel menu bar.



*Auto Load Option.*If you want SIPmaker to load every time you launch Excel, use **Add-ins** under Excel **Options**.

Menu and Dialog Boxes

The tools on the SIPmaker ribbon appear below. **Make SIP** has the following sub commands.

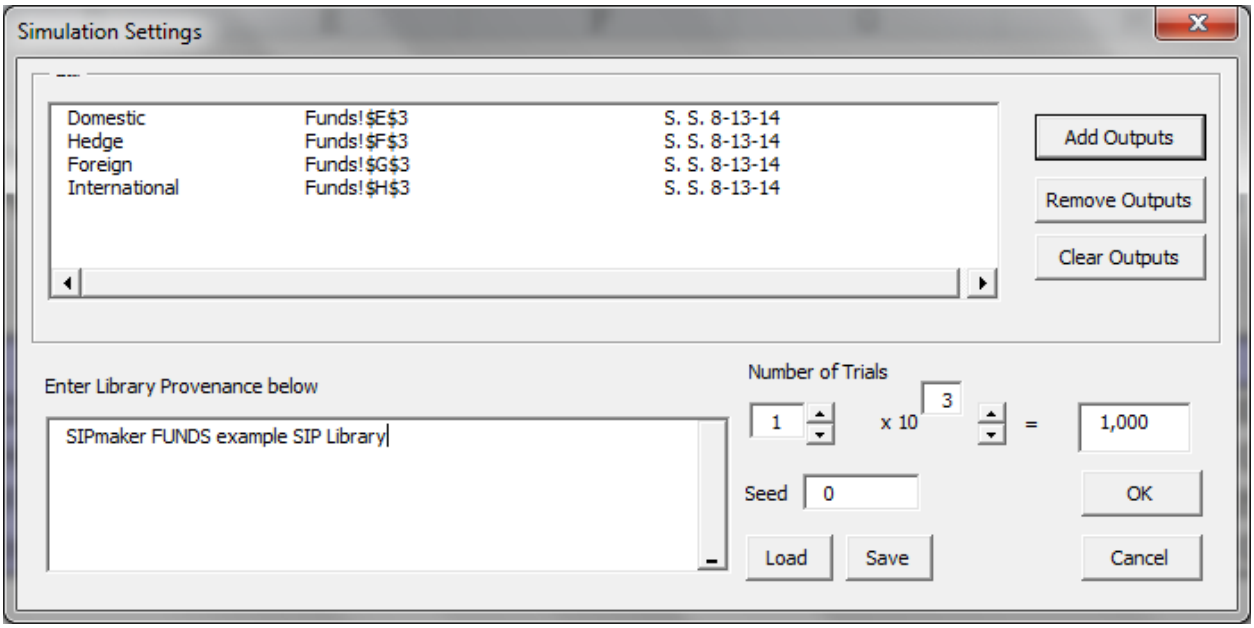


Standard creates a standard SIP with number of trials specified by the user.
Parameterized creates a set of SIPs generated by parameterizing some numerical value within the model, such as the quantity to stock or amount to invest in a project.
Data Range creates a SIP from data.
Freeze is used before saving a spreadsheet model to create a static version that may be viewed by those without XLSim or SIPmaker.
Thaw is used to reactivate a frozen model. **Note:** if the random number formulas display #NAME?, excecute a Freeze followed by a Thaw and resave the model.

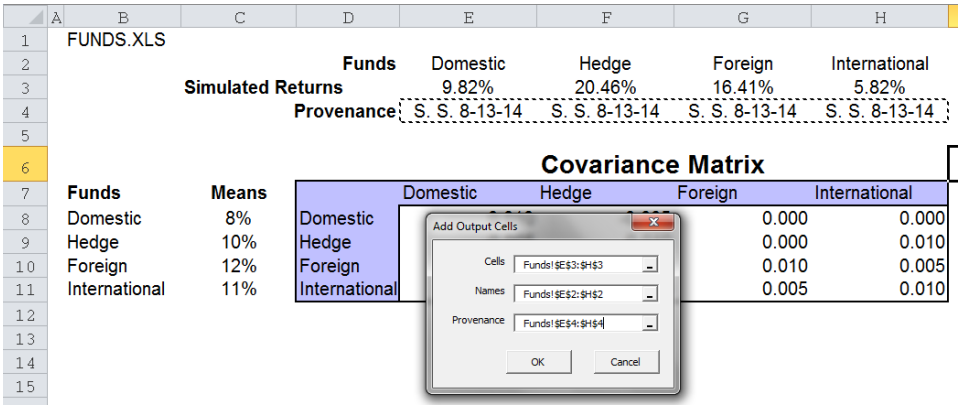
The individual sub commands are described below.

Standard

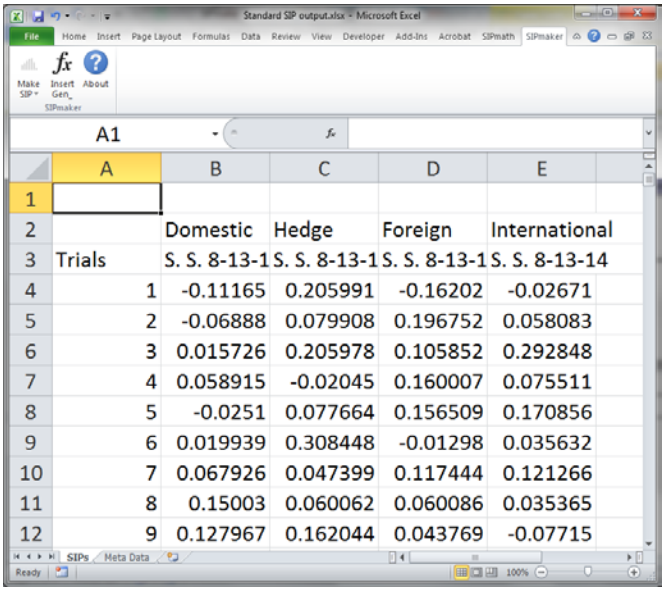
The following dialog box will appear when you select **Standard.** The example below is from the file FUNDS.xls which accompanies SIPmaker. **Note:** When an Excel model has been used to create SIPs, the information in the dialog box is stored when the file is saved.

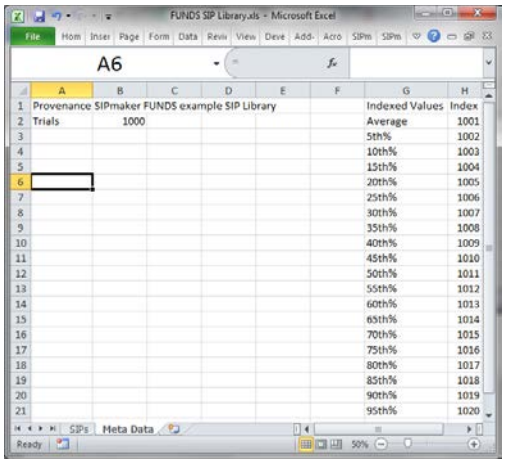


When the "Add Outputs" button is clicked, a pop up box will appear. In this menu you can select cells in your worksheet to create SIPs from, as well as give each output a name and record provenence information.



When you press "OK" after selecting the number of trials, a SIP library will be generated in a new workbook, with one sheet containing the SIPs and another containing the meta data.





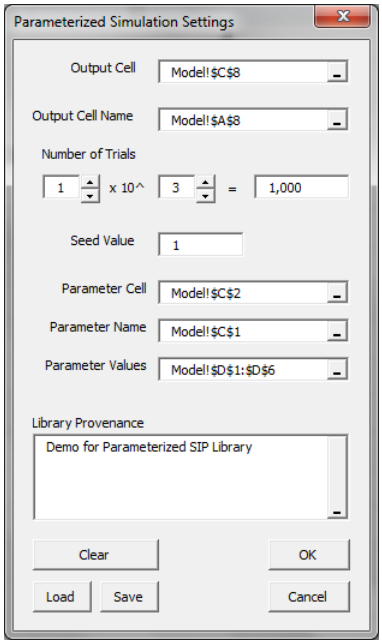
Parameterized

We will use the INVNTORY.xls file to demonstrate parameterized simulation. This file models an inventory problem in which demand is uncertain. There are expiration costs for excessive inventory and airfreight costs for insufficient inventory. The parameter in this model is the amount stocked. **Note:** The names assigned to the output and the parameters must be valid defined names in Excel and therefore may not contain blanks.

Note: This model has already been set up and saved so the dialogue box is already filled in. All that needs to be done is to press OK and generate the SIPs.

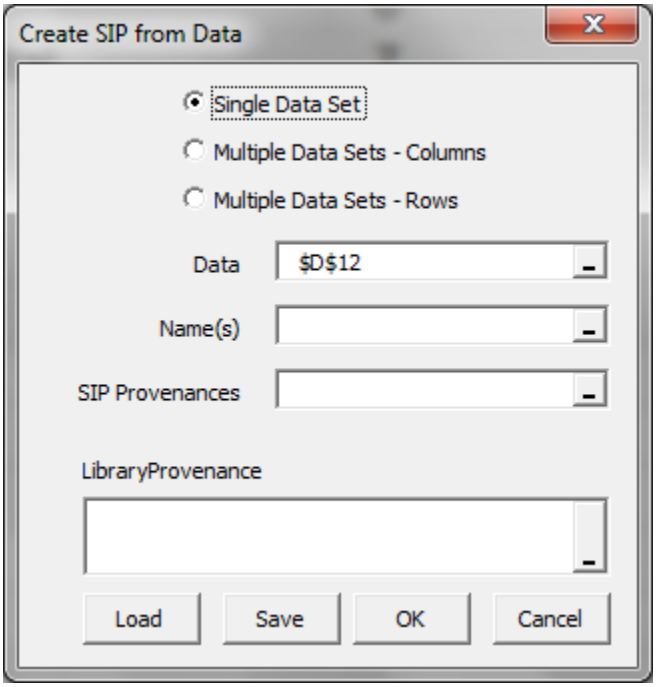
Demand		Amt_Stocked	4
3		5	5
			6
Costs	Per Unit	Total	7
Expiration Cost	$50.00	$100.00	8
Air Freight	$150.00	$0.00	9
Overall_Cost		$100.00	

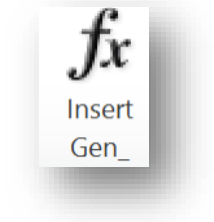
Next, select Parameterized from the Make SIP menu. This dialog box will open:



Data Range

This command produces SIPs from raw data.





Insert Gen_

This is a tool to add random number generating functions to your simulation. Clicking on it will reveal a list of random number generators for use in your SIPmaker models.

To place a random number generating function in the spreadsheet, click the desired cell, then click on the Insert Gen_icon.. Simply select a function from the dropdown menu. **Note:** When models using add-in functions are moved between computers, occasionally **#NAME?** will appear. Use the Freeze and Thaw commands as described above then re-save the file.

Insert Gen_ Random Number Generating Functions

The following list shows random number generating functions available in SIPmaker and their parameters:

- ***gen_Binomial*** (Number of Trials, Probability of Success)
- ***gen_Cumulative*** (Range of Cumulative Probabilities,Range of Associated Values)
- ***gen_Discrete*** (Range of Discrete Probabilities,Range of Associated Values)
- ***gen_Exponential*** (Mean)
- ***gen_Integer***(Lower Integer,Upper Integer) returns integers uniformly distributed between Lower Integer and Upper Integer.

- ***gen_Lognormal*** (Mean, Standard Deviation) generates random variables whose natural log is normally distributed.
- ***gen_MVLognormal*** (vector of Means, Covariance matrix) generates a row of multivariate Lognormal random variables based on a column of means and a lower covariance matrix. It must be entered as an array formula.
- ***gen_MVnormal*** (vector of Means, Covariance matrix)
- ***gen_Myerson*** (25^{th} %, 50^{th} %, 75^{th} %, [Min], [Max]) generates random variables based on the quartiles of a distribution.
- ***gen_Normal***(Mean,Standard Deviation)
- ***gen_Poisson*** (Mean)
- ***gen_Shuffle***(Data Range) is an array formula that returns data in Range randomly shuffled.
- ***gen_Resample*** (Data Range) samples with replacement from the Data range.
- ***gen_Triang*** (Low,Most Likely,High)
- ***gen_Uniform*** (Lower,Upper) returns a continuous random variable uniformly distributed between Lower and Upper.

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[i] Savage, Sam L. *Decision Making with Insight: Includes Insight.xla 2.0*. Belmont, CA: Thompson, 2003. Print.