

Monte Carlo Sim

Excel Add-in User Guide

Distributions • Simulation • Sensitivity Analysis

Version 1.0 — vskeide.github.io/monte-carlo-anitgravity

What is this?

Monte Carlo Sim is an Excel add-in that replaces fixed inputs with probability distributions. It runs thousands of iterations — sampling random values, recalculating your model, and recording results — to produce a full probability profile of your outcomes.

Key Features

- 6 distribution types: Normal, Triangular, PERT, Uniform, Lognormal, Discrete
- Custom Excel functions (=MC.Normal, =MC.PERT, etc.) that work like native formulas
- Configurable iterations (100 – 50,000) with optional seed for reproducibility
- Results dashboard: histogram with percentile markers, CDF curve, full statistics
- Sensitivity analysis: tornado chart showing which inputs matter most
- Export all results to a new Excel worksheet

1. Installation

Step 1: Get the Manifest File

The manifest file (manifestMC.xml) is in the project repository:

```
https://github.com/vskeide/monte-carlo-anitgravity
```

Step 2: Sideload into Excel

Open Excel (desktop app), then:

- Go to Insert !> My Add-ins !> Upload My Add-in
- Browse to and select the manifestMC.xml file
- Click Upload

A new "Monte Carlo" tab will appear in your Excel ribbon.

⚠ The file name doesn't matter

You can rename the manifest to anything. Excel reads the XML content, not the filename.

Step 3: Verify Installation

After sideload, you should see:

- A "Monte Carlo" tab in the ribbon
- MC functions available when typing =MC. in any cell

2. Function Reference

All functions are in the MC namespace. When NOT simulating, they return a deterministic expected value (mean, mode, or midpoint), so your model always shows a sensible number.

Function	Parameters	Description
=MC.NORMAL()	mean, stdev, [name]	Normal (Gaussian). Returns mean when idle.
=MC.TRIANGULAR()	min, mode, max, [name]	Triangular. Returns mode when idle.
=MC.PERT()	min, mode, max, [name]	PERT (Beta-shaped). Weighted mean when idle.
=MC.UNIFORM()	min, max, [name]	Uniform. Returns midpoint when idle.
=MC.LOGNORMAL()	mu, sigma, [name]	Lognormal. Returns E[X] when idle.
=MC.OUTPUT()	value, name	Marks cell as simulation output. Pass-through.
=MC.SIMID()	(none)	Returns current iteration (0 when idle).

Choosing the Right Distribution

Normal — =MC.NORMAL(mean, stdev)

Use when values cluster symmetrically around a known average. Example: revenue forecasts, error margins.

```
=MC.NORMAL(500000, 75000, "Revenue")
```

Triangular — =MC.TRIANGULAR(min, mode, max)

Use when you can estimate min, most likely, and max. Common in project estimation.

```
=MC.TRIANGULAR(100, 150, 250, "Days to Complete")
```

PERT — =MC.PERT(min, mode, max)

Like triangular but smoother, with more weight around the mode. Standard in DCF and project management.

```
=MC.PERT(200000, 250000, 350000, "Operating Costs")
```

Uniform — =MC.UNIFORM(min, max)

Any value in the range is equally likely. Good for truly unknown variables.

```
=MC.UNIFORM(0.05, 0.15, "Tax Rate")
```

Lognormal — =MC.LOGNORMAL(mu, sigma)

Values are always positive and right-skewed (e.g., asset prices, durations).

```
=MC.LOGNORMAL(12, 0.3, "Stock Price")
```

3. Worked Example: DCF Valuation

This example turns a simple 5-year DCF model into a Monte Carlo simulation with uncertain revenue growth, operating margin, and discount rate.

Step 1: Build the Base Model

Start with a normal DCF in Excel:

Cell	Content
B1 (Base Revenue)	1,000,000
B2 (Revenue Growth)	8%
B3 (Operating Margin)	25%
B4 (Discount Rate / WACC)	10%
B5 (Terminal Growth)	2%
B8 (Year 5 Revenue)	=B1*(1+B2)^5
B9 (Year 5 EBIT)	=B8*B3
B10 (Terminal Value)	=B9*(1+B5)/(B4-B5)
B11 (PV of Terminal)	=B10/(1+B4)^5

Step 2: Replace Inputs with Distributions

Replace the uncertain values with MC functions:

Cell	MC Formula
B2	=MC.PERT(0.04, 0.08, 0.14, "Revenue Growth")
B3	=MC.TRIANGULAR(0.18, 0.25, 0.32, "Op Margin")
B4	=MC.NORMAL(0.10, 0.015, "WACC")
B5	=MC.UNIFORM(0.01, 0.03, "Terminal Growth")

The formulas in B8–B11 stay exactly the same — they reference B2–B5 as before.

Step 3: Mark the Output

Wrap the cell you want to analyze:

```
B12:  =MC.OUTPUT(B11, "Enterprise Value")
```

You can mark multiple outputs — each gets its own results dashboard.

Step 4: Run the Simulation

- Click "Monte Carlo" in the ribbon !' Open Panel
- Set iterations (1,000 for testing, 5,000+ for final analysis)
- Optionally set a seed (> 0) for reproducible results
- Click %¶ Run Simulation

The engine backs up your formulas, samples all distributions each iteration, recalculates Excel, records outputs, then restores your original formulas when done.

🔄 Your model is restored automatically

After simulation completes, all cells return to their original formulas. Nothing is permanently changed.

Step 5: Interpret the Results

Switch to the Results tab to see:

Histogram

Shows the distribution of possible outcomes. The shaded band highlights the 90% confidence interval. Dashed lines mark the 5th, 50th, and 95th percentile values.

CDF (Cumulative Distribution Function)

Shows the probability that the outcome is "d any given number. Answer questions like: "What's the probability the EV exceeds \$2M?"

Statistics Table

- Mean, Median, Mode — central tendency
- Standard Deviation — spread of outcomes
- Skewness & Kurtosis — shape of the distribution
- Percentiles: 1st, 5th, 10th, 25th, 50th, 75th, 90th, 95th, 99th
- 90% Confidence Interval
- $P(X < 0)$ — probability of a negative outcome

Step 6: Sensitivity Analysis

The Sensitivity tab shows a tornado chart ranking each input by impact. A coefficient of +0.7 for "Revenue Growth" means a 1 std dev increase in growth produces a 0.7 std dev increase in Enterprise Value.

Step 7: Export

Click "Export Results to Sheet" to create a new worksheet with all statistics, sensitivity coefficients, and raw iteration values.

4. Tips & Best Practices

Start Small, Then Scale

Run 1,000 iterations first to verify. Then increase to 5,000–10,000 for final results.

Name Your Inputs

Always provide the optional name parameter — names appear in the tornado chart.

```
=MC.PERT(100, 200, 300, "Project Cost")    ! • named
=MC.PERT(100, 200, 300)                    ! • unnamed
```

Use Seeds for Reproducibility

Set seed > 0 for identical results every run. Use seed = 0 for a fresh random run.

Validate Distribution Choices

PERT is usually better than Triangular for finance because it concentrates more probability around the mode.

Multiple Outputs

Wrap several cells with MC.OUTPUT to track multiple KPIs (NPV, IRR, payback) simultaneously.

5. Quick Reference

Action	Where	Details
Define input	Any cell	=MC.NORMAL(), =MC.PERT(), etc.
Mark output	Result cell	=MC.OUTPUT(value, "name")
Configure	Task Pane !' Setup	Iterations, seed
Run	Task Pane or Ribbon	%¶ Run Simulation
View results	Task Pane !' Results	Histogram, CDF, stats
Sensitivity	Task Pane !' Sensitivity	Tornado chart + coefficients
Export	Task Pane !' Export	New worksheet with all data