

# Monte Carlo Sim

## Excel Add-in User Guide

Distributions • Simulation • Sensitivity Analysis

Version 1.0 — [vskeide.github.io/monte-carlo-anitgravity](https://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

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## 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.

### Ø=Ü! 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 sideloading, 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

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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.

### Ø=Ü; 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

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## 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

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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