

With a Data Table in Excel, you can easily vary one or two inputs and perform What-if analysis. A Data Table is a range of cells in which you can change values in some of the cells and come up with different answers to a problem.

There are two types of Data Tables –

- One-variable Data Tables
- Two-variable Data Tables

If you have more than two variables in your analysis problem, you need to use Scenario Manager Tool of Excel. For details, refer to the chapter – What-If Analysis with Scenario Manager in this tutorial.

## One-variable Data Tables

A one-variable Data Table can be used if you want to see how different values of one variable in one or more formulas will change the results of those formulas. In other words, with a one-variable Data Table, you can determine how changing one input changes any number of outputs. You will understand this with the help of an example.

### Example

There is a loan of 5,000,000 for a tenure of 30 years. You want to know the monthly payments (EMI) for varied interest rates. You also might be interested in knowing the amount of interest and Principal that is paid in the second year.

## Analysis with One-variable Data Table

Analysis with one-variable Data Table needs to be done in three steps –

**Step 1** – Set the required background.

**Step 2** – Create the Data Table.

**Step 3** – Perform the Analysis.

Let us understand these steps in detail –

### Step 1: Set the required background

- Assume that the interest rate is 12%.
- List all the required values.
- Name the cells containing the values, so that the formulas will have names instead of cell references.
- Set the calculations for EMI, Cumulative Interest and Cumulative Principal with the Excel functions – PMT, CUMIPMT and CUMPRINC respectively.

Your worksheet should look as follows –

	A	B	C	D
2		Rate per Annum	0.12	Interest_Rate
3		No. of Monthly Payments	360	NPER
4		Loan Amount	5000000	Loan_Amount
5		Type	0	Type
6		EMI	=PMT(Interest_Rate/12,NPER,Loan_Amount,0,Type)	EMI
7		Start Period	13	Start_Period
8		End Period	24	End_Period
9		Interest paid in the 2nd Year	=CUMIPMT(Interest_Rate/12,NPER,Loan_Amount,Start_Period,End_Period,Type)	Cum_Interest
10		Principal paid in the 2nd Year	=CUMPRINC(Interest_Rate/12,NPER,Loan_Amount,Start_Period,End_Period,Type)	Cum_Principal

You can see that the cells in column C are named as given in the corresponding cells in column D.

### Step 2: Create the Data Table

- Type the list of values i.e. interest rates that you want to substitute in the input cell down the column E as follows –

	E	F	G	H
1	Interest Rate	EMI	Cum Interest	Cum Principal
2				
3	12.0%			
4	12.2%			
5	12.4%			
6	12.6%			
7	12.8%			
8	13.0%			
9	13.2%			
10	13.4%			
11	13.6%			
12	13.8%			
13	14.0%			
14				
15				

As you observe, there is an empty row above the Interest Rate values. This row is for the formulas that you want to use.

- Type the first function (**PMT**) in the cell one row above and one cell to the right of the column of values. Type the other functions (**CUMIPMT** and **CUMPRINC**) in the cells to the right of the first function.

Now, the two rows above the Interest Rate values look as follows –

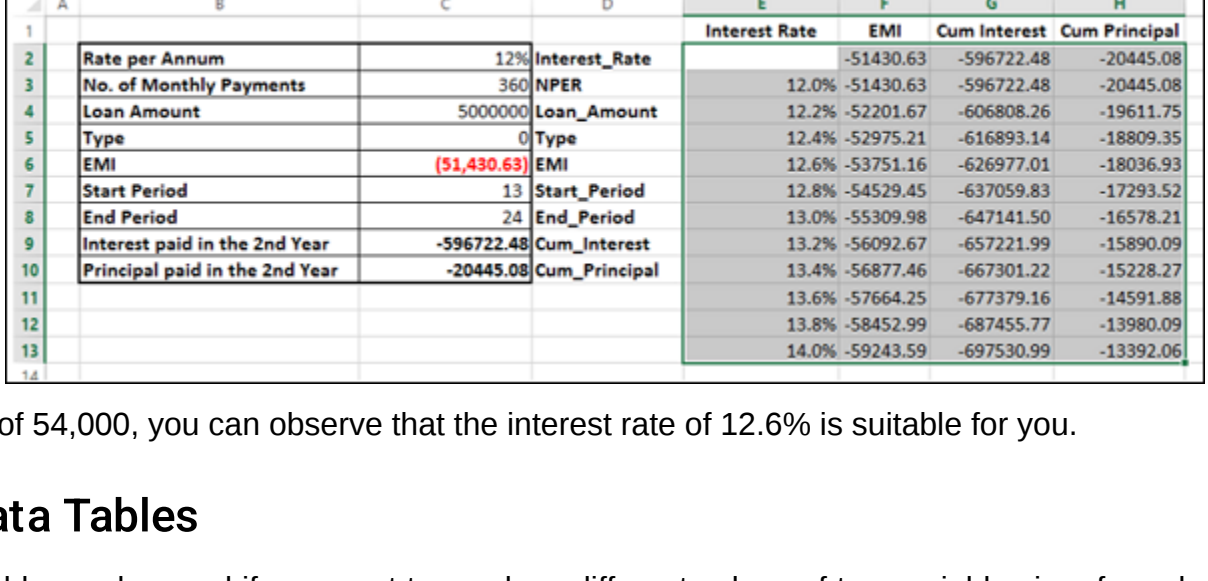
	E	F	G	H
1	Interest Rate	EMI	Cum Interest	Cum Principal
2		=EMI	=Cum_Interest	=Cum_Principal

The Data Table looks as given below –

	E	F	G	H
1	Interest Rate	EMI	Cum Interest	Cum Principal
2		-51430.63	-596722.48	-20445.08
3	12.0%			
4	12.2%			
5	12.4%			
6	12.6%			
7	12.8%			
8	13.0%			
9	13.2%			
10	13.4%			
11	13.6%			
12	13.8%			
13	14.0%			
14				
15				

### Step 3: Do the analysis with the What-If Analysis Data Table Tool

- Select the range of cells that contains the formulas and values that you want to substitute, i.e. select the range – E2:H13.
- Click the DATA tab on the Ribbon.
- Click What-if Analysis in the Data Tools group.
- Select Data Table in the dropdown list.



Data Table dialog box appears.

- Click the icon in the Column input cell box.
- Click the cell **Interest\_Rate**, which is C2.

	A	B	C	D	E	F	G	H
2		Rate per Annum	12%	Interest_Rate		-51430.63	-596722.48	-20445.08
3		No. of Monthly Payments	360	NPER		-51430.63	-596722.48	-20445.08
4		Loan Amount	5000000	Loan_Amount		-51430.63	-596722.48	-20445.08
5		Type	0	Type		-51430.63	-596722.48	-20445.08
6		EMI	=PMT(Interest_Rate/12,NPER,Loan_Amount,0,Type)	EMI		-51430.63	-596722.48	-20445.08
7		Start Period	13	Start_Period		-51430.63	-596722.48	-20445.08
8		End Period	24	End_Period		-51430.63	-596722.48	-20445.08
9		Interest paid in the 2nd Year	=CUMIPMT(Interest_Rate/12,NPER,Loan_Amount,Start_Period,End_Period,Type)	Cum_Interest		-51430.63	-596722.48	-20445.08
10		Principal paid in the 2nd Year	=CUMPRINC(Interest_Rate/12,NPER,Loan_Amount,Start_Period,End_Period,Type)	Cum_Principal		-51430.63	-596722.48	-20445.08
11						-51430.63	-596722.48	-20445.08
12						-51430.63	-596722.48	-20445.08
13						-51430.63	-596722.48	-20445.08
14						-51430.63	-596722.48	-20445.08
15						-51430.63	-596722.48	-20445.08

You can see that the Column input cell is taken as \$C\$2. Click OK.

The Data Table is filled with the calculated results for each of the input values as shown below –

	A	B	C	D	E	F	G	H
2		Rate per Annum	12%	Interest_Rate	Interest Rate	EMI	Cum Interest	Cum Principal
3		No. of Monthly Payments	360	NPER	12.0%	-51430.63	-596722.48	-20445.08
4		Loan Amount	5000000	Loan_Amount	12.2%	-52201.67	-606808.26	-19613.75
5		Type	0	Type	12.4%	-52975.21	-616893.14	-18809.35
6		EMI	=PMT(Interest_Rate/12,NPER,Loan_Amount,0,Type)	EMI	12.6%	-53751.16	-626977.01	-18036.93
7		Start Period	13	Start_Period	12.8%	-54529.45	-637059.83	-17293.52
8		End Period	24	End_Period	13.0%	-55309.98	-647141.50	-16578.21
9		Interest paid in the 2nd Year	=CUMIPMT(Interest_Rate/12,NPER,Loan_Amount,Start_Period,End_Period,Type)	Cum_Interest	13.2%	-56092.67	-65721.99	-15890.09
10		Principal paid in the 2nd Year	=CUMPRINC(Interest_Rate/12,NPER,Loan_Amount,Start_Period,End_Period,Type)	Cum_Principal	13.4%	-56877.46	-667301.22	-15228.27
11					13.6%	-57664.25	-677379.16	-14591.88
12					13.8%	-58452.99	-687455.77	-13980.09
13					14.0%	-59243.59	-697530.99	-13392.06

If you can pay an EMI of 54,000, you can observe that the interest rate of 12.6% is suitable for you.

## Two-variable Data Tables

A two-variable Data Table can be used if you want to see how different values of two variables in a formula will change the results of that formula. In other words, with a two-variable Data Table, you can determine how changing two inputs changes a single output. You will understand this with the help of an example.

### Example

There is a loan of 50,000,000. You want to know how different combinations of interest rates and loan tenures will affect the monthly payment (EMI).

## Analysis with Two-variable Data Table

Analysis with two-variable Data Table needs to be done in three steps –

**Step 1** – Set the required background.

**Step 2** – Create the Data Table.

**Step 3** – Perform the Analysis.

### Step 1: Set the required background

- Assume that the interest rate is 12%.
- List all the required values.
- Name the cells containing the values, so that the formula will have names instead of cell references.
- Set the calculation for EMI with the Excel function – **PMT**.

Your worksheet should look as follows –

	A	B	C	D	E	F	G	H	I	J	K	L
2		Rate per Annum	0.12	Interest_Rate								
3		No. of Monthly Payments	360	NPER								
4		Loan Amount	5000000	Loan_Amount								
5		Type	0	Type								
6		EMI	=PMT(Interest_Rate/12,NPER,Loan_Amount,0,Type)	EMI								
7		Start Period	13	Start_Period								
8		End Period	24	End_Period								
9		Interest paid in the 2nd Year	=CUMIPMT(Interest_Rate/12,NPER,Loan_Amount,Start_Period,End_Period,Type)	Cum_Interest								
10		Principal paid in the 2nd Year	=CUMPRINC(Interest_Rate/12,NPER,Loan_Amount,Start_Period,End_Period,Type)	Cum_Principal								
11												
12												
13												
14												

You can see that the cells in the column C are named as given in the corresponding cells in the column D.

### Step 2: Create the Data Table

- Type **=EMI** in cell F2.

	E	F	G	H	I	J	K	L
2		Interest Rate						
3		EMI	-51430.63					
4								
5								
6								
7								
8								
9								
10								
11								
12								
13								
14								

Type the first list of input values, i.e. interest rates down the column F, starting with the cell below the formula, i.e. F3.

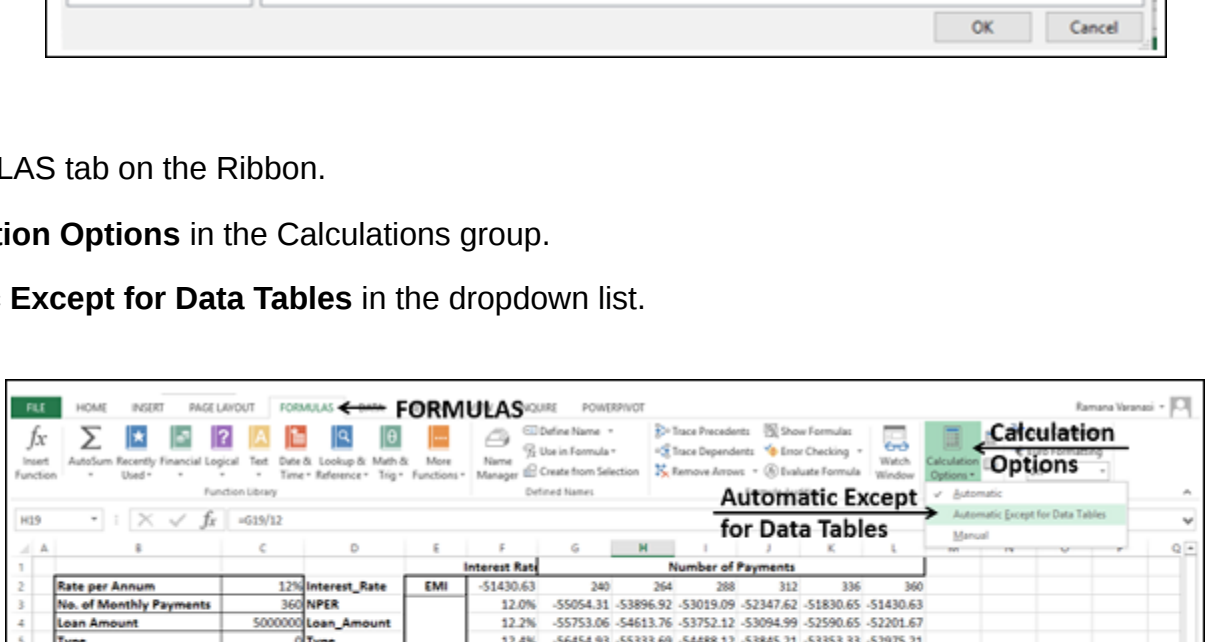
- Type the second list of input values, i.e. number of payments across row 2, starting with the cell to the right of the formula, i.e. G2.

The Data Table looks as follows –

	E	F	G	H	I	J	K	L
2		Interest Rate						
3		EMI	-51430.63	240	264	288	312	336
4								
5								
6								
7								
8								
9								
10								
11								
12								
13								
14								

### Do the analysis with the What-If Analysis Tool Data Table

- Select the range of cells that contains the formula and the two sets of values that you want to substitute, i.e. select the range – F2:L13.
- Click the DATA tab on the Ribbon.
- Click What-if Analysis in the Data Tools group.
- Select Data Table from the dropdown list.



You will see that the Row input cell is taken as \$C\$3 and the Column input cell is taken as \$C\$2. Click OK.

The Data Table gets filled with the calculated results for each combination of the two input values –

	E	F	G	H	I	J	K	L
2		Interest Rate						
3		EMI	-51430.63	240	264	288	312	336
4								
5								
6								
7								
8								
9								
10								
11								
12								
13								
14								

If you can pay an EMI of 54,000, the interest rate of 12.2% and 288 EMIs are suitable for you. This means the tenure of the loan would be 24 years.

## Data Table Calculations

Data Tables are recalculated each time the worksheet containing them is recalculated, even if they have not changed. To speed up the calculations in a worksheet that contains a Data Table, you need to change the calculation options to **Automatically Recalculate** the worksheet but not the Data Tables, as given in the next section.

## Speeding up the Calculations in a Worksheet

You can speed up the calculations in a worksheet containing Data Tables in two ways –

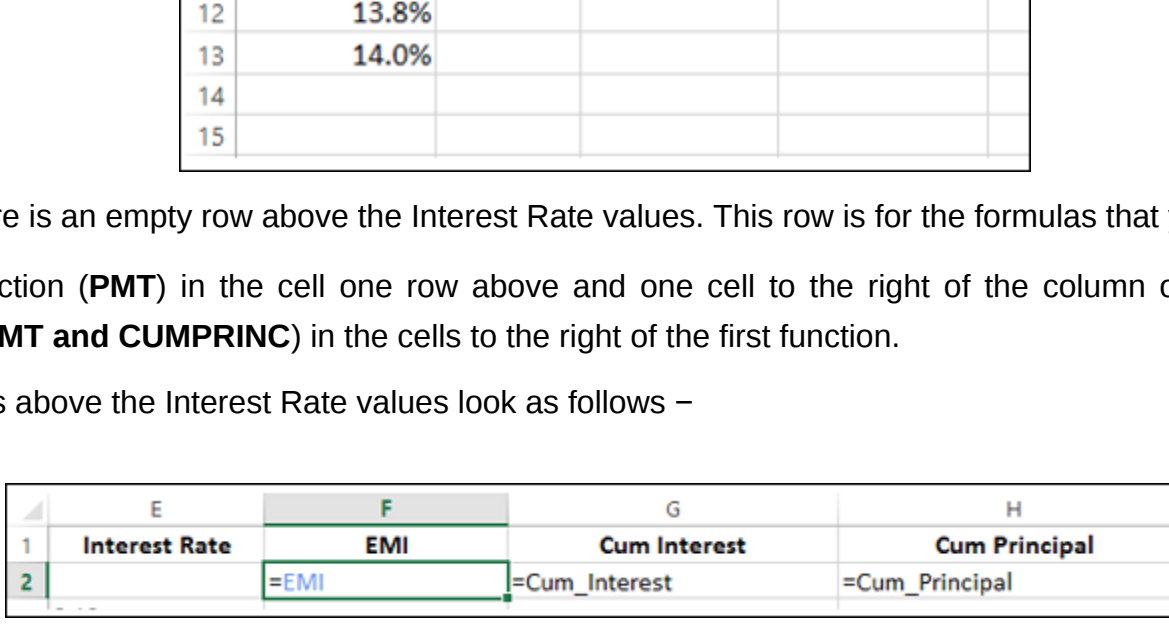
- From Excel Options.
- From the Ribbon.

### From Excel Options

- Click the FILE tab on the Ribbon.
- Select Options from the list in the left pane.

Excel Options dialog box appears.

- From the left pane, select **Formulas**.
- Select the option **Automatic except for data tables** under **Workbook Calculation** in the Calculation options section. Click OK.



	E	F	G	H
1	Interest Rate	EMI	Cum Interest	Cum Principal
2		-51430.63	-596722.48	-20445.08
3	12.0%			
4	12.2%			
5	12.4%			
6	12.6%			
7	12.8%			
8	13.0%			
9	13.2%			
10	13.4%			
11	13.6%			
12	13.8%			
13	14.0%			
14				