

*In the name of Allah*



Amirkabir University of Technology  
Industrial Engineering Department

## Engineering Economy

### Data Tables in Excel

By: Akbar Esfahanipour

### Data tables in Excel

---

- ▶ Sensitivity analysis in Excel
- ▶ Connected to a spreadsheet calculation
- ▶ Amazing tool!

## Basic Data Table example

- ▶ Cash flow in year 1: 234
- ▶ Cash flow growth, years 2 – 7: 10% annually
- ▶ Initial cost: 1,150
- ▶ Discount rate: 15%
  
- ▶ Questions:
  - ❖ What's the NPV?
  - ❖ What's the IRR?

▶ 3

## Initial example in Excel

	A	B	C	D	E	F	G	H	I
1	CF <sub>1</sub>	234							
2	Growth rate	10%							
3	Discount rate	15%							
4									
5	Year	0	1	2	3	4	5	6	7
6	Cash flow	-1150.00	234.00	257.40	283.14	311.45	342.60	376.86	414.55
7									
8	NPV	101.46	<-- =+B6+NPV(B3,C6:I6)						
9	IRR	17.60%	<-- =IRR(B6:I6,0)						

### Data table questions

- ❑ What happens to NPV and IRR when we vary:
  - ❖ Initial investment?
  - ❖ Growth rate?
  - ❖ Discount rate?
  - ❖ Combination of the above?

▶ 4

Data table 1: NPV for varying discount rates

	A	B	C	D	E	F	G	H	I
1	CF <sub>1</sub>	234							
2	Growth rate	10%							
3	Discount rate	15%							
4									
5	Year	0	1	2	3	4	5	6	7
6	Cash flow	-1150.00	234.00	257.40	283.14	311.45	342.60	376.86	414.55
7									
8	NPV	101.46	<-- =B6+NPV(B3,C6:I6)						
9	IRR	17.60%	<-- =IRR(B6:I6,0)						
10									
11		Data table: NPV for various discount rates							
12			101.46	<-- =B8 , data table header					
13		0%	1,070.00						
14		2%	887.19						
15		4%	725.37						
16		6%	581.65						
17		8%	453.58						
18		10%	339.09						
19		12%	236.44						
20		14%	144.14						
21		16%	60.90						
22		18%	-14.37						
23		20%	-82.61						
24		22%	-144.64						
25		24%	-201.15						
26		26%	-252.76						
27		28%	-300.01						

- ❖ Data table header (cell C12) refers to computation in example (cell B8).
- ❖ Data table left column (cells B13:B27) are changed discount rates.
- ❖ Cells C13:C27 give NPVs

► 5

Creating basic example &amp; data table structure

	A	B	C	D	E	F	G	H	I
1	CF <sub>1</sub>	234							
2	Growth rate	10%							
3	Discount rate	15%							
4									
5	Year	0	1	2	3	4	5	6	7
6	Cash flow	-1150.00	234.00	257.40	283.14	311.45	342.60	376.86	414.55
7									
8	NPV	101.46	<-- =B6+NPV(B3,C6:I6)						
9	IRR	17.60%	<-- =IRR(B6:I6,0)						
10									
11		Data table: NPV for various discount rates							
12			101.46	<-- =B8 , data table header					
13		0%							
14		2%							
15		4%							
16		6%							
17		8%							
18		10%							
19		12%							
20		14%							
21		16%							
22		18%							
23		20%							
24		22%							
25		24%							
26		26%							
27		28%							
28									

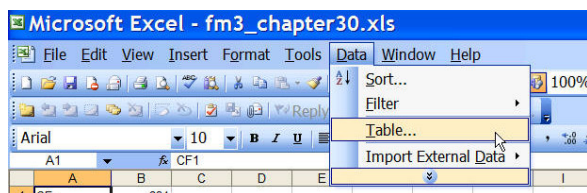
► 6

## Marking table and use DataTable command

	A	B	C	D	E	F	G	H	I
1	CF <sub>1</sub>	234							
2	Growth rate	10%							
3	Discount rate	15%							
4									
5	Year	0	1	2	3	4	5	6	7
6	Cash flow	-1150.00	234.00	257.40	283.14	311.45	342.60	376.86	414.55
7									
8	NPV	101.46	← =B6+NPV(B3,C6:I6)						
9	IRR	17.60%	← =IRR(B6:I6,0)						
10									
11									
12			101.46	← =B8, data table header					
13									
14									
15									
16									
17									
18									
19									
20									
21									
22									
23									
24									
25									
26									
27									

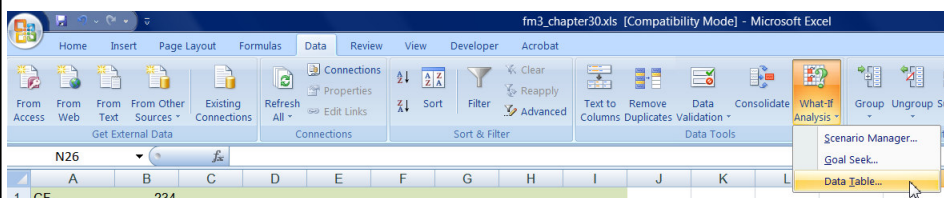
► 7

- Excel 2003: Data Table is on Toolbar



Where to find  
data table in  
excel 2003 and  
excel 2007

- Excel 2007: Data Table is on  
**Data/What-If Analysis**



► 8

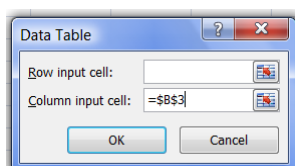
Now Hit **OK** on dialog box

	A	B	C	D	E	F	G	H	I
1	CF <sub>1</sub>	234							
2	Growth rate	10%							
3	Discount rate	15%							
4									
5	Year	0	1	2	3	4	5	6	7
6	Cash flow	-1150.00	234.00	257.40	283.14	311.45	342.60	376.86	414.55
7									
8	NPV	101.46	=<B6+NPV(B3,C6:I6)						
9	IRR	17.60%	=<IRR(B6:I6,0)						
10									
11									
12									
13									
14									
15									
16									
17									
18									
19									
20									
21									
22									
23									
24									
25									
26									
27									

► 9

What does the dialog box mean?

- Is the parameter to be varied in the **top row** or **left-hand column** of the Data Table?
  - ☐ In our case: **Left-hand column** => column input cell
- Where in the **Basic example** does the parameter occur?
  - ☐ In our case: Cell B3 => use cursor to point at this cell



We just pointed at B3. Excel put in the \$ signs.

► 10

## Two-dimensional data table

**BASIC EXAMPLE**

Year	0	1	2	3	4	5	6	7
Cash flow	-1150.00	234.00	257.40	283.14	311.45	342.60	376.86	414.55

NPV: 101.46 <-- =+B6+NPV(B3,C6:I6)  
IRR: 17.60% <-- =IRR(B6:I6,0)

**Data Table**

Row input cell: \$B\$3  
Column input cell: \$B\$2

Callout: =B8

**Discount rate**

	7%	10%	12%
0	101.46		
5%			
10%			
15%			

In two-dimensional Data Table, the value to be computed (here: NPV) is in the **left-hand top corner**.

▶ 11

## Result

	A	B	C	D	E	F	G	H	I	J	K
1	CF <sub>1</sub>	234									
2	Growth rate	10%									
3	Discount rate	15%									
4											
5	Year	0	1	2	3	4	5	6	7		
6	Cash flow	-1150.00	234.00	257.40	283.14	311.45	342.60	376.86	414.55		
7											
8	NPV	101.46	<-- =+B6+NPV(B3,C6:I6)								
9	IRR	17.60%	<-- =IRR(B6:I6,0)								
10											
11											
12											
13											
14											
15											
16											
17											
18											

**BASIC EXAMPLE**

Callout: =B8

**Discount rate**

	7%	10%	12%
0	101.46		
5%	111.09	-10.79	-82.08
10%	297.62	150.74	65.13
15%	515.79	339.09	236.44
	770.34	558.25	435.41

▶ 12