



Lecture 5. Working with spreadsheets

FOR 2022. Financial Analysis for Natural Resources.



School of Forest Resources

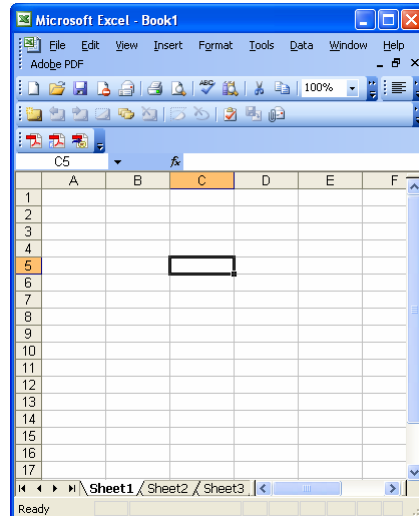


About spreadsheets and this course...

- Spreadsheets are huge time saving tools!
- Spreadsheets and computers are not allowed on exams
- Check your formulas!
- Give me electronic copy of all work done using spreadsheets (give me printout as well)

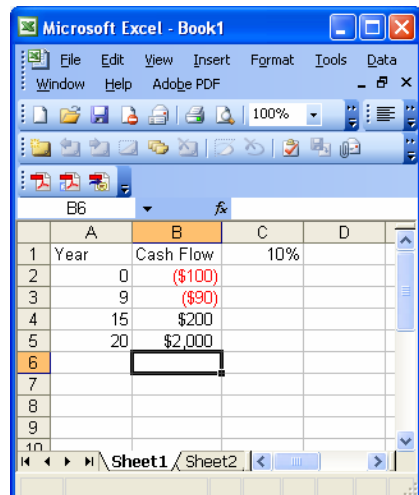
● ● ● | Spreadsheet basics

- Rows numbered: 1, 2, 3,...
- Columns lettered: A, B, C,...
- Cell reference for highlighted cell: C5 or c5



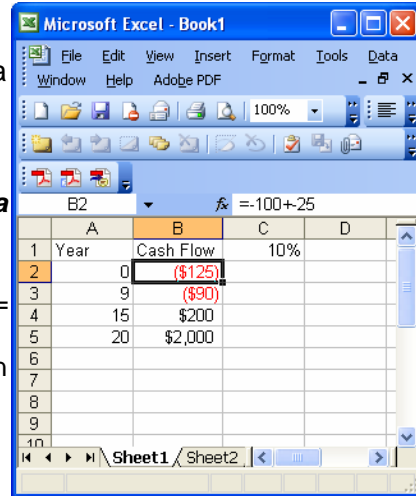
● ● ● | Spreadsheet basics

- You can enter text or numbers into a cell directly
- Various formats for numbers
 - Currency
 - Accounting
 - Percentage



Spreadsheet basics

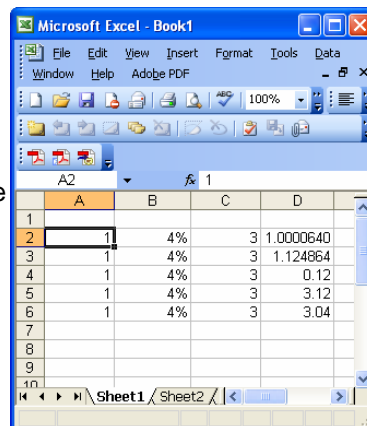
- You can also enter formulas into a spreadsheet
 - Note spreadsheet has result of formula
 - Formula itself is shown in **formula bar**.
 - Here, the formula is $=-100+-25$
 - To enter a formula, start with the $=$ sign
 - You can enter a formula directly in a cell or select a cell with a single left mouse click and enter the formula in the formula bar.



Spreadsheet basics

- Mathematical operators and order of ascendancy
 - Power and square root $^$ or SQRT()
 - Multiplication and division $*$ or $/$
 - Add and subtract $+$ or $-$
- Use of brackets or parentheses to change the order of mathematical operations.
- Cell Formula

D2	$=A2+B2^C2$
D3	$=(A3+B3)^C3$
D4	$=A4*B4*C4$
D5	$=(A5+B5)*C5$
D6	$=A6*(B6+C6)$



● ● ● | Spreadsheet basics

- Relative cell references
 - If I enter =C1 into cell C2, this is a relative cell address.
 - It means, always look in the same column, and look one cell above me.
 - If I copy this cell and paste it into cell B6, I will get...

The screenshot shows a Microsoft Excel window titled "Microsoft Excel - Book1". The spreadsheet has columns A, B, C, and D, and rows 1 through 10. The data is as follows:

	A	B	C	D
1	Year	Cash Flow	10%	
2		0	(\$200)	10%
3		9	(\$100)	
4		17	\$350	
5		28	\$2,500	
6				
7				
8				
9				
10				

The formula bar shows "=C3" and the active cell is C3.

● ● ● | Spreadsheet basics

- Relative cell references
 - If I enter =C1 into cell C2, this is a relative cell address.
 - It means, always look in the same column, and look one cell above me.
 - If I copy this cell and paste it into cell B6, I will get...
 - 250000%
 - Note that cell format was copied as well!

The screenshot shows the same Microsoft Excel window. The data is identical to the previous screenshot, but now cell B6 is selected and contains the value "250000%". The formula bar shows "=B5".

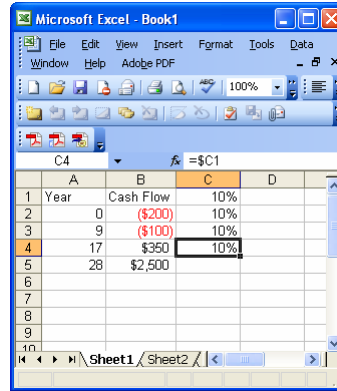
	A	B	C	D
1	Year	Cash Flow	10%	
2		0	(\$200)	10%
3		9	(\$100)	
4		17	\$350	
5		28	\$2,500	
6				
7				
8				
9				
10				

Spreadsheet basics

- o Absolute cell references
 - By using the \$ sign in front of either column or row, I can lock the reference to a column, row, or exact cell.
 - This can be useful when copying formulas...
 - Cell Formula

C2	= c\$1
C3	= \$c\$1
C4	= \$c1

Now, I'll copy cells c2 to c4 into cells b6 to b8...



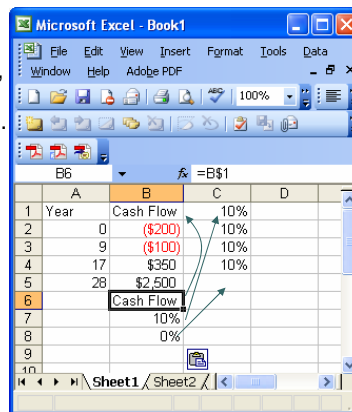
Spreadsheet basics

- o Absolute cell references
 - By using the \$ sign in front of either column or row, I can lock the reference to a column, row, or exact cell.
 - This can be useful when copying formulas...
 - Cell Formula

C2	= c\$1
C3	= \$c\$1
C4	= \$c1

Now, I'll copy cells c2 to c4 into cells b6 to b8...

- | | |
|------|---------|
| Cell | Formula |
| B6 | =B\$1 |
| B7 | =\$C\$1 |
| B8 | =\$C5 |



● ● ● | Calculate present value

- Using the present value formula, we will calculate the present value of each cash flow in the project.

- $V_0 = V_n(1+i)^{-n}$
- We will enter this into cell c3 for the cash flow of -\$100 that occurs in year nine of the project as:
 - $=B3*(1+c1)^{-A3}$
- The result is (59.19) or - \$59.19

The screenshot shows an Excel spreadsheet with the following data:

Year	Cash Flow	6%	8%
0	(\$200)		
9	(\$100)	(59.19)	
17	\$350		
28	\$2,500		

The formula bar for cell C3 shows: $=B3*(1+C1)^{-A3}$

● ● ● | Calculate present value

- Relative cell addresses in this formula!
- If we copy this formula to another row or column, it won't be correct!

The screenshot shows the same Excel spreadsheet as above, but with the formula copied to cell C4. The formula bar for cell C4 shows: $=B4*(1+C1)^{-A4}$. This is incorrect because it references cell B4 (which is empty) and cell C1 (which is 6%), instead of the intended B3 and C3.

Year	Cash Flow	6%	8%
0	(\$200)		
9	(\$100)	(59.19)	
17	\$350		
28	\$2,500		

The formula bar for cell C4 shows: $=B4*(1+C1)^{-A4}$

● ● ● | Calculate present value

- Relative cell addresses in this formula!
- If we copy this formula to another row or column, it won't be correct!
- Let's add another interest column and see what our formula does when we copy it to cell d4...error!
- How to fix? Use absolute cell reference tool!

Year	Cash Flow	6%	8%
0	(\$200)		
9	(\$100)	(59.19)	
17	\$350		
28	\$2,500		

● ● ● | Calculate present value

- Our new formula in cell c3 is:
 - $=\$b3*(1+c\$1)^{-\$a3}$
 - This means:
 - Column b always has our cash flow or future value of V_n
 - Row 1 of whatever column we are in has the interest rate that we want to use!
 - Column a always has the year of the cash flow (n)
- Now let's copy this cell into cell d4....

Year	Cash Flow	6%	8%
0	(\$200)		
9	(\$100)	(59.19)	
17	\$350		
28	\$2,500		

● ● ● | Calculate present value

- Our new formula in cell c3 is:
 - $=\$b3*(1+c\$1)^{-\$a3}$
 - This means:
 - Column b always has our cash flow or future value of V_n
 - Row 1 of whatever column we are in has the interest rate that we want to use!
 - Column a always has the year of the cash flow (n)
- Now let's copy this cell into cell d4...and we have the correct present value!

The screenshot shows a Microsoft Excel spreadsheet with the following data:

Year	Cash Flow	6%	8%
0	(\$200)		
9	(\$100)	(59.19)	
17	\$350		94.59
28	\$2,500		

The formula bar for cell D4 shows: $=\$B4*(1+D\$1)^{-\$A4}$

● ● ● | Calculate present value

- Now I can copy cell c3 into the range of cells c2..d5 and all the present values are correct!

The screenshot shows the same Microsoft Excel spreadsheet, but now with the present values calculated for all rows:

Year	Cash Flow	6%	8%
0	(\$200)	(200.00)	(200.00)
9	(\$100)	(59.19)	(50.02)
17	\$350	129.98	94.59
28	\$2,500	489.08	289.78

The formula bar for cell C5 shows: $=\$B5*(1+C\$1)^{-\$A5}$

● ● ● | Calculate net present value

- Now I will enter the formula to sum a range of cells into cell c6

- =sum(c2..c5)

- This value is the net present value of the project at a 6% interest rate!

- I can copy this into cell d6 and get the correct sum for the project at 8% interest.

The screenshot shows an Excel spreadsheet with the following data:

Year	Cash Flow	6%	8%
0	(\$200)	(200.00)	(200.00)
9	(\$100)	(59.19)	(50.02)
17	\$350	129.98	94.59
28	\$2,500	489.08	289.78
		359.86	134.35

● ● ● | Spreadsheet power – sensitivity analysis

- I can change inputs on my spreadsheet to see the effects on net present value!

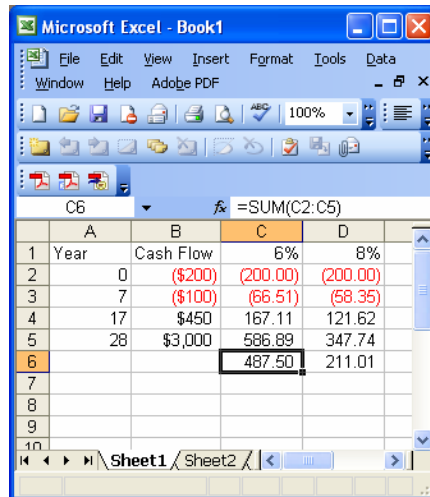
- Lower or higher interest rates!

The screenshot shows an Excel spreadsheet with the following data:

Year	Cash Flow	4%	10%
0	(\$200)	(200.00)	(200.00)
9	(\$100)	(70.26)	(42.41)
17	\$350	179.68	69.25
28	\$2,500	833.69	173.36
		743.12	0.19

Spreadsheet power – sensitivity analysis

- I can change inputs on my spreadsheet to see the effects on net present value!
 - Changed cash flows in amount or timing!
- Determine effects of different inputs with ease!



The screenshot shows a Microsoft Excel spreadsheet titled "Microsoft Excel - Book1". The spreadsheet has a menu bar (File, Edit, View, Insert, Format, Tools, Data, Window, Help, Adobe PDF) and a toolbar. The active cell is C6, containing the formula $=SUM(C2:C5)$. The spreadsheet data is as follows:

	A	B	C	D
1	Year	Cash Flow	6%	8%
2	0	(\$200)	(200.00)	(200.00)
3	7	(\$100)	(66.51)	(58.35)
4	17	\$450	167.11	121.62
5	28	\$3,000	586.89	347.74
6			487.50	211.01
7				
8				
9				
10				

Cautions!

- Spreadsheets are GREAT!
- Check your formulas with hand or calculator!
 - Especially after cutting and pasting formulas to make sure your cell address are correct!
- More complex formulas can be entered – but use care to make sure order of calculations is correct!
- Finally, when the tests and quizzes come, you'll have to do your work with a calculator!



Next lecture...

- Present and future value of a series of payments...