

Some hints on MS Excel

Financial Modeling

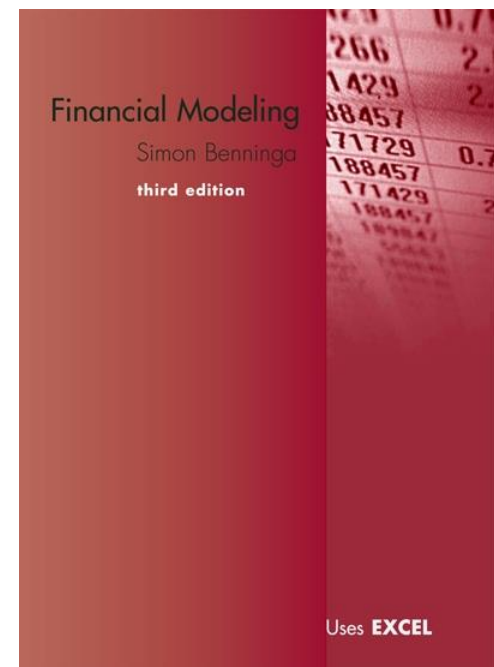
• Best Practice

To accompany

Financial Modeling, 3rd Edition

Simon Benninga

MIT Press, 2008



Put critical variables in one place

	A	B	C
1	Black-Scholes Option-Pricing Formula		
2	S	50	Current stock price
3	X	45	Exercise price
4	r	4.00%	Risk-free rate of interest
5	T	0.75	Time to maturity of option (in years)
6	Sigma	30%	Stock volatility, σ
7			
8	d_1	0.6509	$\leftarrow (LN(S/X)+(r+0.5*\sigma^2)*T)/(\sigma*SQRT(T))$
9	d_2	0.3911	$\leftarrow d_1-\sigma*SQRT(T)$
10			
11	$N(d_1)$	0.7424	\leftarrow Uses formula NormSDist(d_1)
12	$N(d_2)$	0.6521	\leftarrow Uses formula NormSDist(d_2)
13			
14	Call price	8.64	$\leftarrow S*N(d_1)-X*\exp(-r*T)*N(d_2)$
15	Put price	2.31	\leftarrow call price - S + X*Exp(-r*T): by Put-Call parity
16		2.31	$\leftarrow X*\exp(-r*T)*N(-d_2) - S*N(-d_1)$: direct formula

Most of the time: Critical variable should be at the top left-hand corner

Never never never use a number if you can use a formula

- Don't *hard-wire* numbers!
- You'll get into big trouble!!
 - Bob, what happens if you change the depreciation rate in cell B2?
 - Uh, sir ... Nothing seems to happen to the cash flows. But that's clearly wrong ...

Save often

- Like voting in Chicago: “Vote early and vote often”

Turn off auto “jump down”

The screenshot shows the 'Excel Options' dialog box with the 'Advanced' tab selected. The 'Editing options' section is visible, containing several checkboxes and dropdown menus. A yellow callout box with blue text points to the 'After pressing Enter, move selection' checkbox, which is currently unchecked. The 'Direction' dropdown is set to 'Down'. Other options include 'Automatically insert a decimal point' (unchecked), 'Enable fill handle and cell drag-and-drop' (checked), 'Alert before overwriting cells' (checked), 'Allow editing directly in cells' (checked), 'Extend data range formats and formulas' (checked), 'Enable automatic percent entry' (checked), 'Enable AutoComplete for cell values' (checked), 'Zoom on roll with IntelliMouse' (unchecked), 'Alert the user when a potentially time consuming operation occurs' (checked), and 'Use system separators' (checked). The 'When this number of cells (in thousands) is affected' is set to 33554. The 'Decimal separator' and 'Thousands separator' are also visible.

Excel Options

Popular
Formulas
Proofing
Save
Advanced
Customize
Add-Ins
Trust Center
Resources

Advanced options for working with Excel.

Editing options

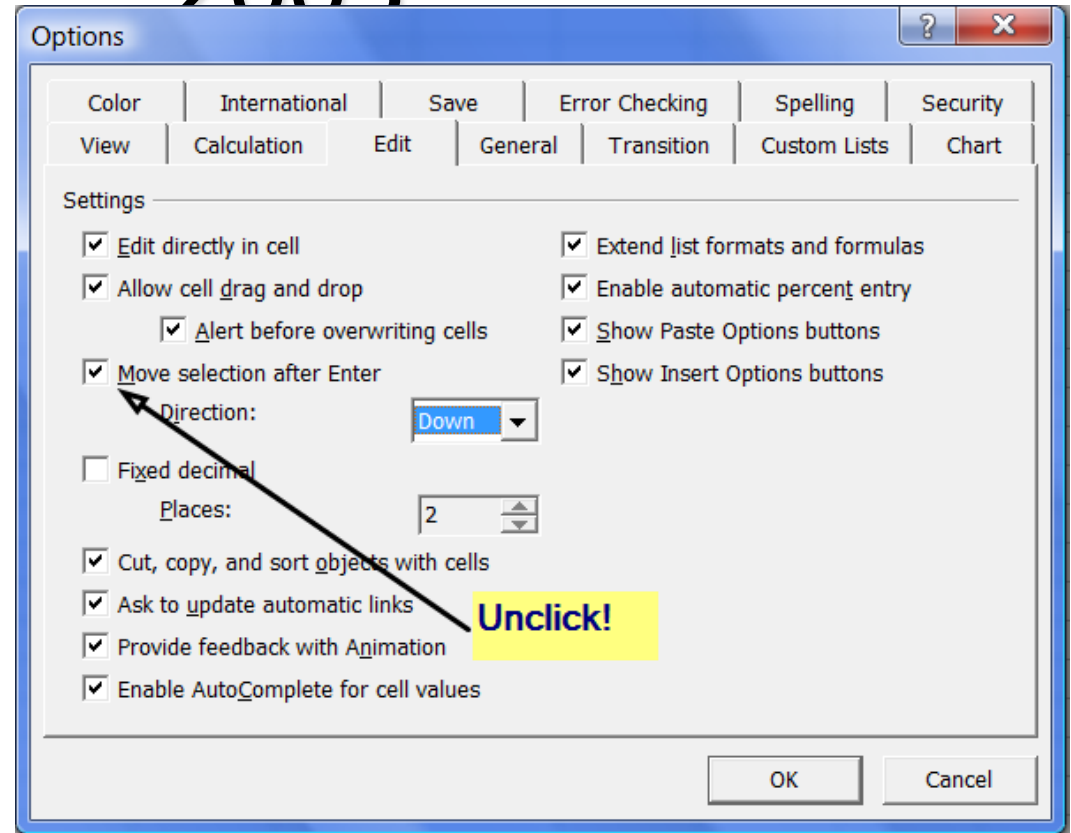
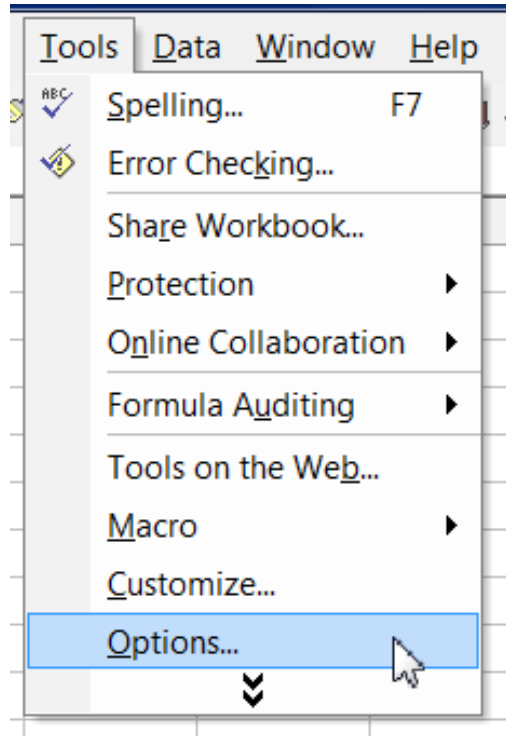
- After pressing Enter, move selection
Direction: Down
- Automatically insert a decimal point
Places: 2
- Enable fill handle and cell drag-and-drop
 - Alert before overwriting cells
- Allow editting directly in cells
- Extend data range formats and formulas
- Enable automatic percent entry
- Enable AutoComplete for cell values
- Zoom on roll with IntelliMouse
- Alert the user when a potentially time consuming operation occurs
When this number of cells (in thousands) is affected: 33554
- Use system separators
Decimal separator: .
Thousands separator: ,

Turn this damn thing OFF!

You need to see what you've done!

This is the Excel 2007 version—Excel 2003 on next slide

Auto “jump down” in Excel 2003



Make your default one Excel sheet

Excel Options

Popular

Formulas

Proofing

Save

Advanced

Customize

Add-Ins

Trust Center

Resources

Change the most popular options in Excel.

Top options for working with Excel

- Show Mini Toolbar on selection ⓘ
- Enable Live Preview ⓘ
- Show Developer tab in the Ribbon ⓘ

Color scheme: Blue ▾

ScreenTip style: Show feature descriptions in ScreenTips ▾

Create lists for use in sorts and fill sequences: [Edit Custom Lists...](#)

When creating new workbooks

Use this font: Body Font ▾

Font size: 11 ▾

Default view for new sheets: Normal View ▾

Include this many sheets: 1 ▴ ▾

Who needs all those empty sheets? SLOPPY!

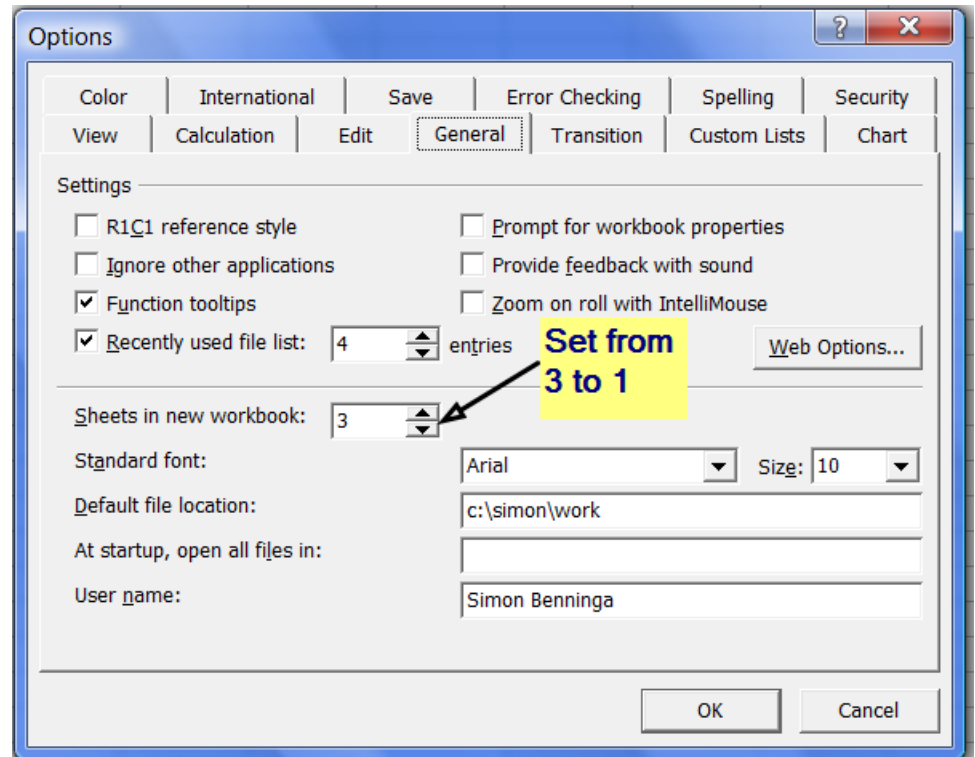
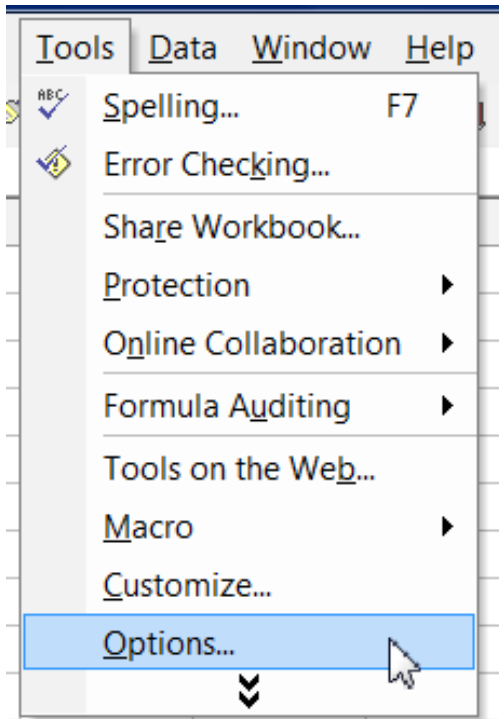
Personalize your copy of Microsoft Office

User name: Benninga

Choose the languages you want to use with Microsoft Office: [Language Settings...](#)

Excel 2007

In Excel 2003: Tools | Options | General



Point to cells, don't write cell references

	A	B	C	D	E	F	G	H
1	McDONALD'S--DAILY STOCK PRICES, 29 Dec 89 - 31 Dec 99							
2	Date	Stock price						
3	29-Dec-89	8.50						
4	2-Jan-90	8.59	1.059%	<-- =B4/B3-1		Computing the frequency distribution of MCD		
5	3-Jan-90	8.50	-1.048%	<-- =B5/B4-1		Largest daily return	=max(C4:C2531)	
6	4-Jan-90	8.34	-1.882%			Smallest daily return	MAX(number1, [number2], ...) (31)	
7	5-Jan-90	8.19	-1.799%			Bin	How many?	Percentage
8	8-Jan-90	8.34	1.832%			-10.08%	0	0.000%
9	9-Jan-90	8.28	-0.719%			-9.38%	1	0.040%
10	10-Jan-90	8.13	-1.812%			-8.68%	0	0.000%
11	11-Jan-90	8.07	-0.738%			-7.99%	1	0.040%
12	12-Jan-90	7.91	-1.983%			-7.29%	0	0.000%
13	15-Jan-90	7.82	-1.138%			-6.59%	1	0.040%
14	16-Jan-90	7.91	1.151%			-5.89%	1	0.040%
15	17-Jan-90	7.91	0.000%			-5.19%	1	0.040%
16	18-Jan-90	7.94	0.379%			-4.49%	3	0.119%
17	19-Jan-90	7.85	-1.134%			-3.80%	11	0.435%
18	22-Jan-90	7.63	-2.803%			-3.10%	36	1.424%
19	23-Jan-90	7.76	1.704%			-2.40%	68	2.690%
20	24-Jan-90	7.63	-1.675%			-1.70%	138	5.459%
21	25-Jan-90	7.60	-0.393%			-1.00%	337	13.331%

I'm pointing at the cells for the **Max** function.

Put things in adjacent columns

	A	B	C
1	PRICING THE AUGUST 2006 QQQQ OPTIONS		
2	Current date	28-Jul-06	
3	Option expiration date	18-Aug-06	
4			
5	S	37.11	
6	X	37	
7	T	0.06	<-- =(B3-B2)/365
8	Interest	5.00%	
9	Sigma	20.66%	
10			
11	Call price	0.8447	<-- =BSCall(B5,B6,B7,B8,B9)
12	Put price	0.6284	<-- =BSPut(B5,B6,B7,B8,B9)
13			
14	Actual prices		
15	Call	0.75	
16	Put	0.55	

BAD

	A	B	C
1	PRICING THE AUGUST 2006 QQQQ OPTIONS		
2	Current date		28-Jul-06
3	Option expiration date		18-Aug-06
4			
5	S	37.11	
6	X	37	
7	T	0.06	<-- =(C3-C2)/365
8	Interest	5.00%	
9	Sigma	20.66%	
10			
11	Call price	0.8447	<-- =BSCall(B5,B6,B7,B8,B9)
12	Put price	0.6284	<-- =BSPut(B5,B6,B7,B8,B9)
13			
14	Actual prices		
15	Call	0.75	
16	Put	0.55	

BAD

Much better!

	A	B	C
1	PRICING THE AUGUST 2006 QQQQ OPTIONS Using the historical volatility σ		
2	Current date	28-Jul-06	
3	Option expiration date	18-Aug-06	
4			
5	S	37.11	
6	X	37	
7	T	0.06	<-- =(B3-B2)/365
8	Interest	5.00%	
9	Sigma	20.66%	
10			
11	Call price	0.8447	<-- =BSCall(B5,B6,B7,B8,B9)
12	Put price	0.6284	<-- =BSPut(B5,B6,B7,B8,B9)
13			
14	Actual prices		
15	Call	0.75	
16	Put	0.55	

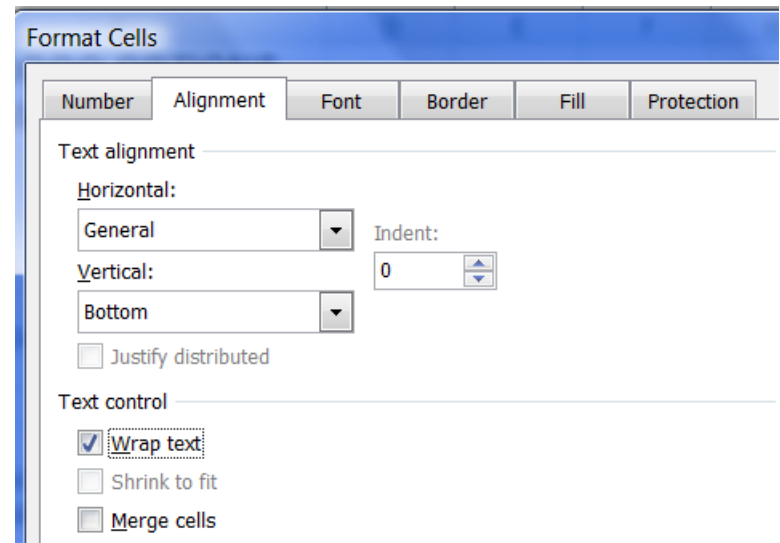
Put items in adjacent cells, let cells be wide enough to accommodate text.

Also OK

Cell B2 has been word-wrapped

	A	B	C
1	PRICING THE AUGUST 2006 QQQQ OPTIONS		
2	Current date	28-Jul-06	
3	Option expiration date	18-Aug-06	
4			
5	S	37.11	
6	X	37	
7	T	0.06	<-- =(B3-B2)/365
8	Interest	5.00%	
9	Sigma	20.66%	
10			
11	Call price	0.8447	<-- =BSCall(B5,B6,B7,B8,B9)
12	Put price	0.6284	<-- =BSPut(B5,B6,B7,B8,B9)
13			
14	Actual prices		
15	Call	0.75	
16	Put	0.55	

Can also use [Alt]+[Enter] to put in hard return when inside cell (this wraps cell)



Play with your model

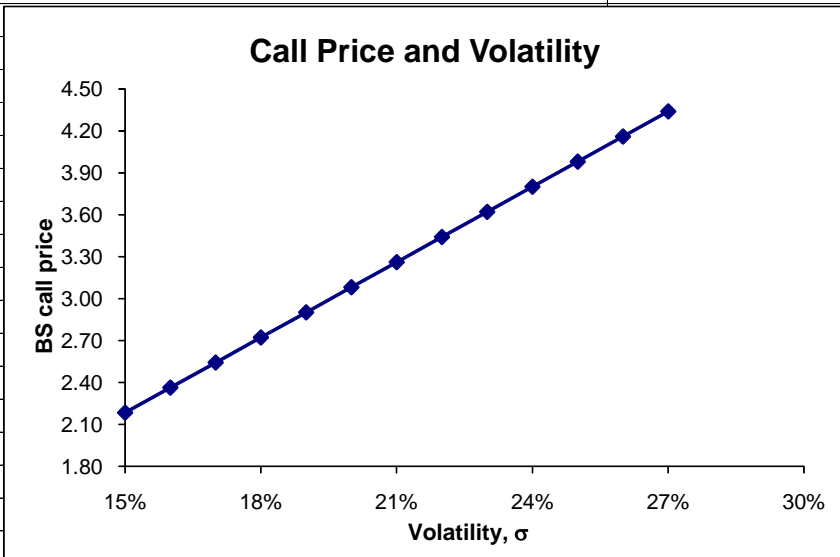
- After you're finished with your model:
EXPERIMENT to see what happens with different values
- Can you explain your results?
 - If not, maybe you've made a mistake?
 - OR: Maybe you're about to learn something?

Annotate like mad!

You need to remember what you've done!

Notice the parameter annotations for cells B2:B6

	A	B	C	D
1	Black-Scholes Option Price is Monotonic in Sigma			
2	S	45	Current stock price	
3	X	50	Exercise price	
4	T	1	Time to maturity of option (in years)	
5	r	8.00%	Risk-free rate of interest	
6	Sigma	30.00%	Stock volatility	
7				
8	Call price	4.88	<-- =BSCall(B2,B3,B4,B5,B6)	
9				
10	Data table: Call price as function of volatility σ			
11		4.8759	<-- =B8, table header	
12	15%	2.1858		
13	16%	2.3646		
14	17%	2.5437		
15	18%	2.7229		
16	19%	2.9023		
17	20%	3.0817		
18	21%	3.2612		
19	22%	3.4407		
20	23%	3.6202		
21	24%	3.7997		
22	25%	3.9792		
23	26%	4.1587		
24	27%	4.3381		
25				
26				
27				
28				



Annotations: use Getformula

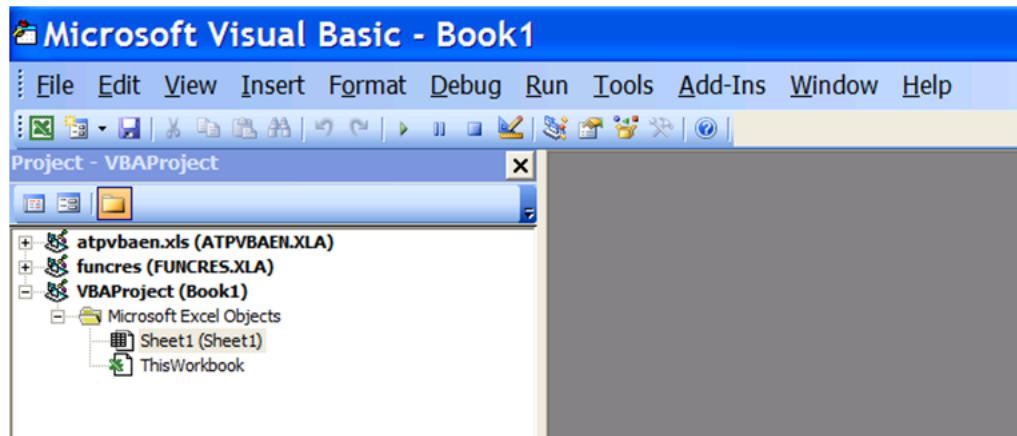
- Getformula is a small VBA program you can add to an Excel notebook
- File on FM3 disk, “Adding Getformula to Your Spreadsheet”

Getformula

Adding Getformula to your spreadsheet

Open the spreadsheet in which you want the formula to work.

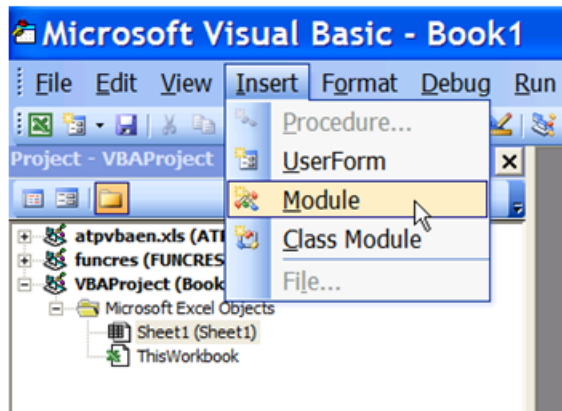
Push [Alt]+F11. This will open the VBA editor. The screen will look something like this:



I

(Depending on all kinds of things, your screen may look different. Don't worry about this.)

Hit Insert|Module



Now insert the following text into the Module window (just copy/paste from this document):

```
'Prints out formulas as text
'Thanks to Maja Sliwinski and Beni Czaczkes
Function getformula(r As Range) As String
    Application.Volatile
    If r.HasArray Then
        getformula = "<-- " & " {" & r.FormulaArray & "}"
    Else
        getformula = "<-- " & " " & r.FormulaArray
    End If
```

Less detail is often better than more

- Easy to add details
- Psychologically difficult to delete

Redundance is important

- Check your calculations
- Do things several ways

Same calculation done twice using different methods.

	A	B	C
1	MORTGAGE EXAMPLE WITH POINTS AND ORIGINATION FEE		
2	Loan principal	100,000.00	
3	Loan term (years)	1	
4	Quoted interest rate	8%	
5	Discount points	1	
6	Origination fee	0.5%	
7			
8	Month	Cash flow	
9	0	98,500.00	<-- =B2*(1-B5/100-B6)
10	1	-8,698.84	<-- =PMT(\$B\$4/12,\$B\$3*12,\$B\$2)
11	2	-8,698.84	
12	3	-8,698.84	
13	4	-8,698.84	
14	5	-8,698.84	
15	6	-8,698.84	
16	7	-8,698.84	
17	8	-8,698.84	
18	9	-8,698.84	
19	10	-8,698.84	
20	11	-8,698.84	
21	12	-8,698.84	
22			
23	Monthly IRR	0.9044%	<-- =IRR(B9:B21)
24	EAIR	11.41%	<-- =(1+B23)^12-1
25			
26	Monthly IRR using Excel's Rate function	0.9044%	<-- =RATE(12,8698.84,-98500)

Irrelevant cells should be avoided

- Use formula auditing to see what cells are doing!

The screenshot shows the Microsoft Excel interface with the 'Formulas' ribbon selected. The 'Formula Auditing' group is active, and the 'Trace Dependents' button is highlighted. The spreadsheet displays a mortgage calculation for 'SALLY & DAVE'S CONDO--prepayment of 25-year mortgage'. The following table summarizes the data shown in the spreadsheet:

Row	Column A	Column B	Column C
1	SALLY & DAVE'S CONDO--prepayment of 25-year mortgage		
2	Condo purchase price	100,000.00	
3	Annual rent	24,000.00	
4	Property tax, annual	2,000.00	
5	Other expenses, annual	1,000.00	
6	Depreciation	4,000.00	<-- =B2/25
7	Tax rate	30%	
9	Mortgage		
10	Principal	50,000.00	
11	Interest	8%	
12	Term	25	
13	Annual payment	\$4,688.92	<-- =PMT(B11,B12,-B10)
15	In year	10	
16	Principal owing	40,092.08	<-- =PV(B11,15,B13) Note that in any year the remaining principal is the PV of fu
17	Prepayment penalty	2%	
18	Total paid	40,893.92	

Numbers may be wrong, but the logic must be right

- Modeling is the art of getting the relationships and the form right
- Numbers are not as important as relations