

Avoiding Common Pitfalls in Financial Modeling: Best Practices and Solutions

JANUARY 2023



Financial Arena



Pitfall #1: Using Long Formulas



Break long formulas down into smaller parts and place them in different rows. This makes the formulas easier to understand, and reduces the risk of errors.



Breaking down complex formulas into separate rows, enhances readability, facilitates review and error checking and increases the overall credibility of the business model and the confidence in the results.



Scenario picker		Average	
position of selected scenario	4,0	=MATCH(C4;Growth_assumptions[Scenarios];0)	✓
Scenarios	Sales Growth		
Best Case	10,0%		
Base Case	6,0%		
Worst Case	3,0%		
Average	8,0%		
COVID	(2,0%)		
Sales Growth	8,0%	=INDEX(Growth_assumptions[Sales Growth];C5)	✓
Sales Growth	8,0%	=INDEX(Growth_assumptions[Sales Growth];MATCH(C4;Growth_assumptions[Scenarios];0))	✗





Pitfall #2: Hardcoding inputs



Always use cell references for input values instead of hardcoding them into formulas / calculations



Entering input values directly into formulas instead of using a cell reference, distorts the results. Using cell references allows to change the input values easily, without having to go back and manually update the formulas.

We detect hardcoding by viewing the formulas (view screenshot below) instead of the results (Alt + M + H) or Ctrl + ` (underneath esc key).

Alternatively, we use Ctrl + Specials + Row Differences, or even Find and Replace function (Ctrl + H), looking for indications of hardcoding (“+”, “-”).



	E	F	G	H	I	K	L	M	N
	Live Scenario				=InpFxdIH1				
Period End	=Check!F\$3	Errors				42735	43100	43465	43830
Forecast Period Flag	=Track!\$1\$4	Track changes				0	0	1	1
Actuals vs Forecast	0	Alerts				Actuals	Actuals	Forecast	Forecast
Model counter	0	counter				2	3	4	5
EBITDA			=SUM(J18:Q18)			=K11-K15+K17	=L11-L15+L17	=M11-M15+M17	=N11-N15+N17
=CapEx_Depreciation!E\$88	=CapEx_Depreciation!	=CapEx_Depreciation!	=CapEx_Depreciation!	=CapEx_Depreciation!	=CapEx_Depreciation!	=CapEx_Depreciation!K\$88	=CapEx_Depreciation!L\$88	=CapEx_Depreciation!M\$88	=CapEx_Depreciation!N\$88
EBIT						=K18-K20	=L18-L20	=M18-M20	=N18-N20
=Debt!E\$121	=Debt!F\$121	=Debt!G\$121	=Debt!H\$121	=Debt!	=Debt!	=Debt!K\$121	=Debt!L\$121	=Debt!M\$121	=Debt!N\$121
EBT			=SUM(J24:Q24)			=K21-K23 + 50	=L21-L23	=M21-M23	=N21-N23
=Tax!E\$16	=Tax!F\$16	=Tax!G\$16	=Tax!H\$16	=Tax!	=Tax!	=Tax!K\$16	=Tax!L\$16	=Tax!M\$16	=Tax!N\$16
Deferred Income Taxes			=SUM(J27:XFD27)			6,2	1,1		
Total Income Taxes			=SUM(J28:Q28)			=SUM(K26:K27)	=SUM(L26:L27)	=SUM(M26:M27)	=SUM(N26:N27)
Net Income to Common			=SUM(J30:Q30)			=K24-K28	=L24-L28	=M24-M28	=N24-N28





Pitfall #3: Hiding Columns / Rows



Avoid hiding rows or columns. Instead use **Data -- Group**, in order to keep important information visible. Include a warning msg to make it clear to the end user that information is grouped



Keeping important information visible is essential for transparency and accuracy of a model. Hiding can lead to errors and misunderstandings, whereas grouping data makes it easier to understand and review the model.



G	H	N	O	P	Q	R
30-Sep-15	31-Mar-16	31-Mar-19	30-Sep-19	31-Mar-20	30-Sep-20	
16,7%	16,7%					
12,5%	12,5%	12,5%				
10,0%	10,0%	10,0%	10,0%	10,0%		



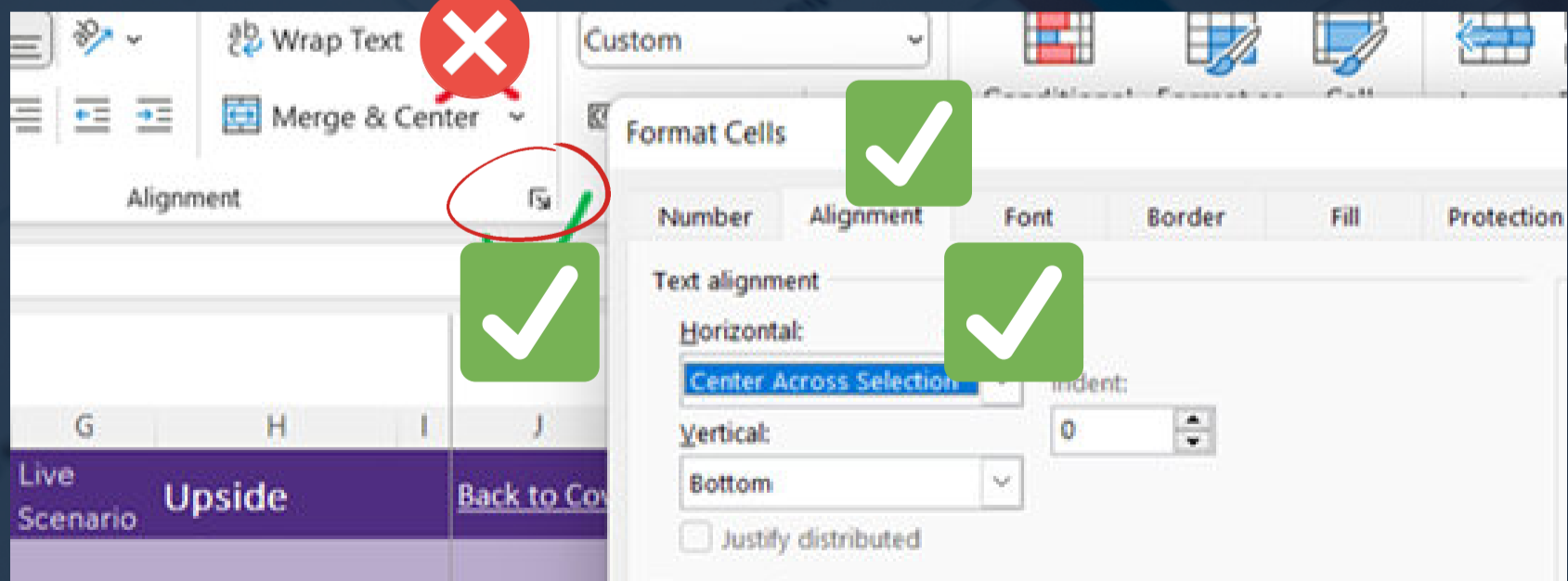
Pitfall #4: Merging Cells



Use Central Across Selection (Alignment -- Format Cells -- Alignment) to keep the model flow (e.g., select down a column) of your model intact.



Merging cells can cause errors and hampers the model flow, as well as the update and the edit of the model. Central across selection keeps the structure of the model intact.





Pitfall #5: Double-counting



Double-check that you are selecting the correct cells when calculating subtotals / totals, so to avoid double-counting and enhance the model credibility.



If the model includes multiple totals/subtotals, we should ensure that the correct cells are selected when calculating those totals or subtotals. Otherwise, for e.g. it could lead to double-counting certain expenses or revenues, resulting in an inaccurate forecast, which in turn, could affect major decisions such as resource allocation, investing etc.

In the example below, to extract Net Income to Common, we only use the subtotals (pointed with a green array).



Net Revenue				→ 213,5	236,6	204,8	294,1	246,8	269,8	207,8	236,2
Cost of Sales	I/S	Mln USD	1.476,61	- 159,90	164,60	167,90	176,69	190,87	195,93	200,58	220,14
SG&A	I/S	Mln USD	32,27	- 3,40	3,60	3,80	3,90	4,02	4,26	4,51	4,78
Total Costs			1.508,88	→ 163,3	168,2	171,7	180,6	194,9	200,2	205,1	224,9
Cost Adjustments - Gain/(Loss)			-	0,0	0,0	0,0	-	-	-	-	-
EBITDA			400,61	→ 50,2	68,4	33,1	113,5	51,9	69,6	2,7	11,3
Depreciation	P/L, cf	Mln USD	552,26	- 15,40	15,50	15,80	99,96	100,53	101,10	101,69	102,29
EBIT				→ 34,8	52,9	17,3	13,6	(48,6)	(31,5)	(99,0)	(91,0)
Interest Expense	PL	Mln USD	81,72	- 15,00	15,00	14,00	11,25	8,86	7,35	5,66	4,61
EBT			(233,37)	→ 19,8	37,9	3,3	2,3	(57,5)	(38,9)	(104,7)	(95,6)
Current Taxes	IS		- 11,51	- 3,00	8,00	-	0,51	-	-	-	-
Deferred Income Taxes			10,00	→ 2,7	6,2	1,1					
Total Income Taxes			21,51	→ 5,7	14,2	1,1	0,5	0,0	0,0	0,0	0,0
Net Income to Common			(254,88)	→ \$14,1	\$23,7	\$2,2	\$1,8	(\$57,5)	(\$38,9)	(\$104,7)	(\$95,6)

✘ Pitfall #6: Mix-up Sign Conventions



Be careful when mixing up positive and negative numbers and double-check the signs of your calculations.

In financial modeling, the use of opposite sign conventions, can ultimately impact the decision making process.



Below, we observe that, the "yellow EBITDA" is significantly different from the other ones. There, costs are marked with a positive sign, so we subtract them from the net revenue. In the column O, costs were marked with a negative sign, leading to a great EBITDA inconsistency.



	E	F	G	H	I	J	K	L	M	N	O	P	Q
son Manufacturing		Live Scenario	Base w/o upgrade			Back to Cover							
Forecast													
Period End		1,00	Errors			31-Δεκ-15	31-Δεκ-16	31-Δεκ-17	31-Δεκ-18	31-Δεκ-19	31-Δεκ-20	31-Δεκ-21	31-Δεκ-22
Forecast Period Flag		#REF!	Track changes			-	-	-	1,00	1,00	1,00	1,00	1,00
Actuals vs Forecast		-	Alerts			Actuals	Actuals	Actuals	Forecast	Forecast	Forecast	Forecast	Forecast
Model counter		-	counter			1	2	3	4	5	6	7	8
STATEMENT													
Gross Revenue	I/S	MIn USD	2.146,65	-	244,80	269,30	239,20	252,00	258,83	294,53	285,60	302,40	
Freight & Warehousing	I/S	MIn USD	285,93	-	31,30	32,70	34,40	32,13	37,14	37,89	38,64	41,73	
Net Revenue					213,5	236,6	204,8	219,9	221,7	256,6	247,0	260,7	
Cost of Sales	I/S	MIn USD	1.388,71	-	159,90	164,60	167,90	161,04	176,78	180,32	183,92	194,24	
SG&A	I/S	MIn USD	31,10	-	3,40	3,60	3,80	3,90	3,98	4,06	4,14	4,22	
Total Costs			1.419,81		163,3	168,2	171,7	164,9	180,8	184,4	188,1	198,5	
EBITDA			809,66		50,2	68,4	33,1	54,9	40,9	441,0	58,9	62,2	



Pitfall #7: Mislinking & Anchoring



Be mindful of mislinking and anchoring errors, in order to ensure formulas reference the correct cells and ranges. Proper anchoring is useful for left-to-right consistency or else one single formula accros each row.



By being mindful of these errors, modelers ensure that their calculations are reliable. This is crucial in producing accurate predictions. Testing the formulas of the model is also an important step in this process.

Below, the pointed cell in the column O, links to the wrong cell. Consequently, the result, which is the ending net PP&E, is false, and by extension, all subsequent calculations are false, making the model unreliable.



	E	F	G	H	I	J	K	L	M	N	O	P	Q
son Manufacturing		Live Scenario	Base w/o upgrade			Back to Cover							
Model Period End		1,00	Errors			31-Δεκ-15	31-Δεκ-16	31-Δεκ-17	31-Δεκ-18	31-Δεκ-19	31-Δεκ-20	31-Δεκ-21	31-Δεκ-22
Forecast Period flag		35,00	Track changes			-	-	-	1,00	1,00	1,00	1,00	1,00
Actuals vs Forecast		-	Alerts			Actuals	Actuals	Actuals	Forecast	Forecast	Forecast	Forecast	Forecast
Model column counter		-	counter			1	2	3	4	5	6	7	8
						=I98							
NET PP& BALANCE - BEG						-	-	-	397,70	313,74	=N97	16,72	(67,46)
CapEx - New Assets		-	MIn USD	-	-	-	-	-	16,00	17,00	17,30	17,50	18,00
Total Depreciation - forecast		-	MIn USD	505,56	-	-	-	-	99,96	100,53	101,10	101,69	102,29
NET PP& BALANCE - END			MIn USD			-	-	397,70	313,74	230,22	16,72	(67,46)	(151,75)



Pitfall #8: Use OFFSET function

Use simpler alternatives:

1. Combination of INDEX-MATCH: It is simpler to use than the OFFSET function and is non-volatile.
2. SUMIF /SUMIFS: great option when used as a lookback function.
3. Dynamic Array Formulas: can be used to create a table or a range of cells with relevant information, and it's easy to update and maintain.



Why to avoid using OFFSET:

1. Maybe difficult to understand, especially for non-technical users.
2. It is a volatile function, which means it recalculates every time the worksheet recalculates.
3. It requires to specify the number of rows and columns to offset, which can be easy to miscalculate.



Scenario picker	1,0	
Scenarios	Sales Growth	
Best Case	10,0%	
Base Case	6,0%	
Worst Case	3,0%	
Offset Function	10,0%	=OFFSET(C6;C4;0)

Scenario picker	1,0	
Scenarios	Sales Growth	
Best Case	10,0%	
Base Case	6,0%	
Worst Case	3,0%	
	0,0	10,0% =INDEX(H7:H9;H4;0)





Pitfall #9: Nested IFs



Break down nested IFs into separate rows calculations.



Nested IFs are a common cause of reduced transparency in models. They take a long time for end-users to decode and understand. They are prone to errors, because the multiple logical states that comprise the nested IFs, are infrequently properly tested by modelers.

```
Function Library | Defined Names | Formula Auditi  
=IF(C4>4;"OK";"try harder";IF(C10=B10;"Good Job";"Check it";IF(G14<>0;"Done";"Not Done";IF(I4<2;"Excellent";"Review")))
```



OK	=IF(C4>4;"OK";"try harder")	
Check it	=IF(B10=C10;"Good Check";"Check it")	
Not Done	=IF(G14<>0;"Done";"Not Done")	
Excellent	=IF(I4<2;"Excellent";"Review")	





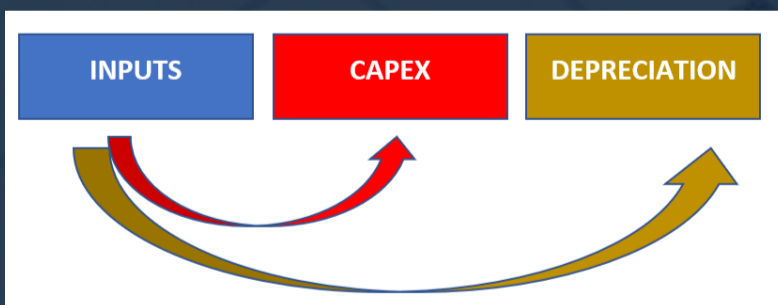
Pitfall #10: Daisy Chain



Ensure that all formulas of the model link directly to the initial data source. This will allow the model to be more accurate, maintainable and easy to update.



When formulas link to other formulas instead of linking directly to the initial data source, it is created a chain of formulas that are dependent on each other, making it difficult to trace errors and update the model. By linking directly to the initial data source, we ensure that the model is accurate, easier to trace errors and up-to-date. This is especially important when working with complex models.





Pitfall #11: Not testing the model



Test the model to check for errors and ensure that it is working correctly.



Testing the model can help to identify errors and ensure that it is working correctly, which is important to ensure the credibility of the model. The importance of financial models makes the existence of an error-checking mechanism necessary, and the complexity of financial models leads to a flexible and automatically updated mechanism, as shown below (turquoise array).

Forecast				31-Δεκ-15	31-Δεκ-16	31-Δεκ-17	31-Δεκ-18	31-Δεκ-19	31-Δεκ-20	31-Δεκ-21	31-Δεκ-22
Period End	1,00	Errors					1,00	1,00	1,00	1,00	1,00
Forecast Period Flag	35,00	Track changes		-	-	-	1,00	1,00	1,00	1,00	1,00
Actuals vs Forecast	-	Alerts		Actuals	Actuals	Actuals	Forecast	Forecast	Forecast	Forecast	Forecast
Model counter	-	counter		1	2	3	4	5	6	7	8
Cost Adjustments - Gain/(Loss)				0,0	0,0	0,0	-	-	-	-	-
EBITDA			440,91	50,2	68,4	33,1	54,9	40,9	72,3	58,9	62,2
Depreciation	P/L, cf	Mln USD	552,26	15,40	15,50	15,80	99,96	100,53	101,10	101,69	102,29
EBIT				34,8	52,9	17,3	(45,0)	(59,6)	(28,8)	(42,8)	(40,1)
Interest Expense	PL	Mln USD	84,22	15,00	15,00	14,00	11,25	9,53	8,15	6,45	4,85
EBT			(195,56)	19,8	37,9	3,3	(56,3)	(69,1)	(37,0)	(49,2)	(44,9)
Current Taxes	IS		11,00	3,00	8,00	-	-	-	-	-	-
Deferred Income Taxes			10,00	2,7	6,2	1,1					
Total Income Taxes			21,00	5,7	14,2	1,1	0,0	0,0	0,0	0,0	0,0
Net Income to Common			(216,56)	\$14,1	\$23,7	\$2,2	(\$56,28)	(\$69,1)	(\$37,0)	(\$49,2)	(\$44,9)



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