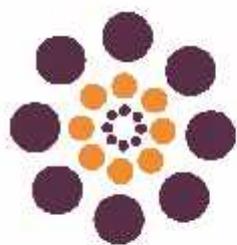# Introduction to Financial Modelling in Excel

Online Course Notes

Module 3 of 4

"Building a Financial Model"

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Specialists in Financial Modelling

Contents of this Module:

MODULE THREE: Building a Financial Model

Module 3 consists of five videos:

- Model Build - Inputs & Assumptions
- Model Build - Revenue
- Model Build - Expenses
- Model Build - P&L
- Model Build - Cashflow

*Log into your online course and download the Excel template. Follow along with the video demonstration, and save your model. Note that the Excel model you build in Module Three **is a required upload for this course**, however, we will continue working on the model in Module Four, so please do not upload it until you have completed the entire course.*

Video: Model Build – Inputs and Assumptions

Background: Our case study is we're running a small but busy café and we've been asked by our bank to put together a P&L and Cashflow. We're going to use all of the tools and the techniques that we've been learning about to put together this financial model for our café.

Building an Assumptions Page

It is very important that models are well documented, and assumptions must be stated clearly. A properly documented model will help you and other users follow it well, and help users if you are no longer around when a change needs to be made to the model. Including sources is handy for when you or someone else wants to go back and check the validity of your assumptions.

Document assumptions and sources as you build the model. It is much easier to document as you go than have to go back and do it at the end. We will cover tools and techniques for documenting detailed assumptions in a later section.

A model is only as good as the accuracy of the assumptions!

Exercise:

1. Open the file "IFME Café Model" as shown in the video.

2. Select the last tab called "Assumptions". We can see by the way some of the cells have been formatted that these will contain the input variables (the numbers that can change).

An important modelling technique that is widely accepted is that all input variables are formatted consistently (usually with blue font or using the Input Style). This way, people using the model know that they can make changes to any of the cells formatted in that way.

Revenue Assumptions

- We sell 120 cups of coffee per day on average
- Historically, 40% are large, and 60% are small
- We charge $4 for a large, and $3.50 for a small

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3. Select cell **B9** and enter the assumption of 120 cups per day

It is imperative that we always list sources for all assumptions, and this is why we have listed the sources below the data in cells **A5**, **A7** and **A10**.

4. Select cell **C13** and enter the large cups pricing assumption of $4 and then in cell **C14** enter $3.50 for a small cup
5. Select cell **B13** and enter the large cups % sold assumption of 40% and then in cell B**14** enter 60% for a small cup

It is always important to format correctly, expressing percentage values as percentages and putting dollar signs in to show dollar values. One of the most common errors in Financial Modelling is confusing

units e.g. treating a number of units as a price. Needless to say, proper formatting makes any report or model clearer and easier to read for the user.

If you need a refresher on how to format cells, see pages 1-8 of this supplementary material document. (Note that this document is a supplement to the first edition of my book "Using Excel for Business Analysis", so the instructions do not mention Excel 2013, however, very little has change between Excel 2010 and 2013 in terms of formatting cells.)

Modellers should beware of formatting particularly when using percentages. If a cell is formatted as a percentage, any figure entered will automatically be converted to a fraction. For example, if you enter the number 5 in any normal cell, the value is 5. However, if the cell is formatted as a percentage, the number 5 will automatically be converted to a value of 0.05. This could potentially lead to incorrect calculations. *Try this out for yourself.*

Expense Assumptions

- The Barista's salary is $50k, plus 25% oncosts
- Rent is $1,200 per month
- Utilities are $100 per month
- Consumables are 45c per cup

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1. Select cell **B16** and enter the Barista Salary assumption of $50,000 and the oncosts of 25% in cell **B17**
2. In order to be **absolutely clear** about the *time period* involved here, go to cell **A16** and edit the description to "Barista Annual Salary"
3. Select cell **B19** and enter the Monthly Rent assumption of $1,200, the utilities of $100 in cell **B20** and the consumables of .45 (45 cents) in cell **B21**

Note that we have specified that the rent and utilities are *monthly* amounts to be absolutely clear about the time frame involved. A common mistake in financial modelling is getting the timeframes wrong and we want to make sure that we or someone else does not accidentally model it as an annual amount.

Other Assumptions

Month	Seasonality	Business Days
Jan	20% less than average	22
Feb	10% less than average	20
Mar	average	22
Apr	average	18
May	10% more than average	23
Jun	20% more than average	21
Jul	20% more than average	22
Aug	10% more than average	22
Sep	average	20
Oct	average	20
Nov	10% less than average	22
Dec	20% less than average	19

- Exclude all GST/VAT
- Assume 30% company tax
- Opening cash balance is zero

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As mentioned at the beginning of this course, model design is very important to make your model flow well and make it easy to follow. Generally, we work from left to right in terms of importance to the model. Supporting sheets such as "Assumptions" should go at the far right hand side, calculations go in the middle, and summary sheets such as our P&L sheet in this model will go at the far left hand side.

Video: Model Build – Revenue

Now that we're happy with our assumptions, we can now use these to calculate the revenue. We know that on average we sell 120 cups of coffee per day, so we can multiply this number by the seasonality to give us the number of cups sold per day.

1. Go to the Revenue tab of your "IFME Café Model" file and select cell **B5**
2. Link that through to the average number of cups on the Assumptions page by typing = and then clicking on the Assumptions tab and selecting cell **B9** and hit your F4 shortcut [Command+T if you are using a Mac]. Your formula should be **=Assumptions!$B$9**
3. Multiply this number now by the seasonality assumption. Note that this time we *want* the cell reference to change as we copy the formula across, so we need to leave this one as a relative cell reference. Your formula should be **=Assumptions!$B$9*Assumptions!B6**.
4. Copy it across the row and check that your numbers are the same as shown in the video

We now need to work out how many of these cups are large, and how many of them are small, based on our assumptions.

5. Still on the Revenue tab, select cell **B6** and link it to the percentage of large cups on the assumptions sheet. Your formula should be **=Assumptions!B13**
6. Leave it as a relative cell reference, and copy the formula down one cell. The formula in cell **B7** should be **=Assumptions!B14**
7. Go back into cell **B6**, and change the reference to absolute. Your formula should be **=Assumptions!$B$13**
8. Do the same to cell **B7**. Your formula should be **=Assumptions!$B$14.**
9. Go back into cell **B6**, and change the formula to multiply the percentage amount by the number of cups sold per day. Your formula should be **=Assumptions!$B$13*B5**.
10. Then do the same to cell **B7**. Your formula should be **=Assumptions!$B$14*B5**
11. Ensure that the formatting is correct, and that the desired number of decimal places is showing
12. Do a sense check by highlighting both **B6** and **B7**, look at the SUM in the status bar below and make sure that the two cells total to 96

Always sense-check your numbers **as you build** a model. Don't leave it to the end to check your numbers. Never take the number given for granted. Work it out in your head and use a calculator to make sure your numbers look sensible.

13. Copy both cells across the range as shown, and ensure that your number match with those in the video
14. Total the large and small cups in row 8 by entering the formula **=SUM(B6:B7)** into cell **B8** and copying it across the row

A good financial modeller always looks for opportunities to add error checks into their financial models, and here is a good chance to include one.

15. In cell **B9** enter the formula **=B5-B8** and copy it across. Change the formatting as desired.

Let's add some conditional formatting to row 8, so that if the result in row 8 is not zero, the colour of the entire cell will change.

16. Highlight the range **B9:M9** and from the Home Tab select Conditional Formatting, Highlight Cells Rules, and then More Rules
17. When the dialog box appears, change the second field from "greater than" to "not equal to" and add a zero to the last field. [This works in the same way for Mac Users]
18. Change the format by clicking on the Format button, selecting Fill tab when the dialog box appears, and changing the fill colour to, say, red. You may also choose to make the font colour, say, white.
19. Press OK, and check the error check by going to the Assumptions page, and changing the percentage amount in cell **B14** from 60% to 55% for example. Go back to the Revenue page, and you'll see the error checks in row 8 have turned red due to the conditional formatting we added.

Note, if you would like more practice using Conditional Formatting, detailed instructions are contained in Module 4 of this course.

20. Before moving on, go back to the Assumptions page, and restore cell **B14** to 60% so removing the error alert flags on the Revenue sheet
21. Because we now have forecast demand and our pricing, we can now forecast our sales revenue
22. On the Revenue sheet, select cell **B12** and link it through to my price for large cups ($4). Your formula should be **=Assumptions!C13**
23. Copy the formula in cell **B12** to cell **B13**. Don't be alarmed, if you add another decimal place, you will see that it is picking up the correct price of $3.50.
24. Go back to cell **B12**, and multiply the large cup pricing of $4 by the number of large cups sold per day, and make the first reference absolute. Your formula should be **=Assumptions!$C$13*B6**. Copy this across the row.
25. Go to cell **B12** and do exactly the same thing for the small cups. Your formula should be **=Assumptions!$C$14*B7**. Copy this across the row.
26. Add the two together in row 14 to show the total daily sales. Your formula should be **=SUM(B12:B13)**. Copy this across the row.
27. We can now convert this to a monthly amount in row 15 with the formula **=B14*Assumptions!B4**
28. Change the formatting to remove any extra decimal places, and copy this across the row
29. Check that your totals in row 15 match those shown in the video

It is a requirement of this course that you submit this model for review and your numbers will be checked for accuracy. Please make sure that your numbers match those in the video before moving to the next one.

Video: Model Build – Expenses

Next we can start to calculate our expenses! On our assumptions we have specified that rent and utilities are monthly amounts. It is important to explicitly state this, as it is very easy to misinterpret assumptions. For example, it would be an easy mistake to interpret this as an annual figure instead of monthly.

This sounds very basic, but one of the hardest skills to master in Financial Modelling is that of error prevention. Being aware of the potential for error and employing strategies such as clear labelling is the easiest way to avoid having errors in your model.

1. Go to the Expenses tab of your "IFME Café Model" file and select cell **B5**
2. Link this through to the Barista Salary amount on the Assumptions page. Your formula should be **=Assumptions!$B$16/12**
3. Calculate the oncosts in cell **B6** of the Expenses sheet using the formula **=B5*Assumptions!$B$17**
4. Add the salary and oncosts in cell **B7** using the formula **=SUM(B5:B6)**
5. Copy all three cells **B5, B6** and **B7** across the row
6. Add the rent in cell **B9** using the formula **=Assumptions!$B$19**
7. In the next cell **B10** add the utilities using the formula **=Assumptions!$B$20**

For consumables in cell **B11** we need to multiply the following:
The number of cups sold x consumable cost of 45 cents x working days in the month

8. This can be done using the formula **=Assumptions!$B$21*Revenue!B8*Assumptions!B4**
9. Add the other costs together in cell **B12** using the formula **=SUM(B9:B11)**
10. Copy cells **B9:B12** all the way across the row as shown
11. We can now calculate our Total Expenses in row 14 using the formula **=B7+B12** in cell **B14** and copying it across the row

It is a requirement of this course that you submit this model for review and your numbers will be checked for accuracy. Please make sure that your numbers match those in the video before moving to the next one.

Video: Model Build – Profit & Loss

Now that we have our Revenue and Expenses ready, we can then pull these together into our Profit and Loss Statement.

Background on Profit & Loss Statements

The Profit & Loss Statement, also called P&L, Income Statement or Performance Statement, shows the underlying profitability of the company. It shows exactly how much money the business is making, both for the purpose of calculating tax liability as well as helping the owner or manager run the business.

A P&L can also be used as a tool to compare current performance with past months or years, so tracking the performance of the business, and providing a basis from which to create a forecast or budget. The model we are building today is for the purpose of budgeting the projected P&L for the business over the next twelve months.

All P&L Statements follow a similar format:

	Revenue
–	Expenses
=	**Profit before tax**
-	Tax
=	**Profit after tax**

Now that we have that clear, let's do it!

1. Go to the Summary tab of your "IFME Café Model" file and select cell **B6**
2. Link this cell to the total Monthly Sales we have calculated on the Revenue page. Your formula should be **=Revenue!B15**
3. Select cell **B9** and link through the staff costs on the Expenses page. Your formula should be **=Expenses!B7**.
4. Do the same for the other costs in cell **B10**. Your formula should be **=Expenses!B12**.
5. Create a total for expenses in cell **B11** using the formula **=SUM(B9:B10)**
6. Copy all of the formulas you've just created all the way across the row
7. Add a total for revenue in cell **N6** using the formula **=SUM(B6:M6)**. Widen the column if necessary.
8. Copy the formula in cell **N6** down to cells **N9:N11**
9. We can now calculate our profit in cell **B13** using the formula **=B6-B11**. Copy this across the row.
10. Calculate tax in cell **B14** using the formula **=B13*Assumptions!$B$26**. Copy this across the row.
11. Copy the total formula from cell **N11** to cells **B13** and **B14**
12. Calculate the profit after tax in cell **B15** using the formula **B13-B14**. Copy this across the row.

13. Check that your totals match those shown in the video

It is a requirement of this course that you submit this model for review and your numbers will be checked for accuracy. Please make sure that your numbers match those in the video before moving to the next one.

Video: Model Build – Cashflow

Cash is king! When running a business like this, you can never ever run out of cash. You can have a business that's highly profitable but if you can't pay your staff next month then you don't have a business and because of this, cash flow is probably the most important out of all the financial statements.

Background on Cash flow

- To be competitive, small business owners must prepare for all future events and market changes. One of the most important aspects of such preparation is cash flow planning. Failure to properly plan cash flow is one of the leading causes for small business failures.
- Since capital providers, such as lenders, require a return on their investment, this financing will, of course, bear interest. The longer your operating cycle, the higher your financing cost will be. It is important to analyse your operating cycle and forecast your cash needs to minimise the amount which must be financed without running short of cash.
- A monthly cash-flow projection helps to identify and eliminate deficiencies or surpluses in cash and to compare actual figures to past months.
- When cash-flow deficiencies are found, business financial plans must be altered to provide more cash. When excess cash is revealed, it might indicate excessive borrowing or idle money that could be invested. The objective is to develop a plan that will provide a well-balanced cash flow.
- Keeping a cash reserve and cash projections is crucial to stay ahead of cash flow problems!

What is the Difference between Cash flow and Profit?

Profit and Cash flow do not necessarily go hand in hand. You can make a profit without having cash in the bank. Cash flow refers to actual coming in and out of the bank account. Profit is less concrete, and refers to the underlying profitability or performance of the business.

Building a Cashflow Forecast for our Model

When calculating a cash flow forecast, we need to consider these differences between cash flow and profit. We have built a Profit and Loss Statement, so we can use this as a base, making a few key adjustments in order to calculate cash flow.

Here are the changes we need to make in order to translate the P&L into a Cash flow Forecast:

- Tax will be paid quarterly, so the first tax payment is due in March.
- Revenue and expenses are incurred and paid for on a monthly basis, except for rent and utilities which is incurred monthly, but paid at the end of the quarter.

1. Return to the Summary tab of your "IFME Café Model" file and select cell **B21**. We are going to leave this cell blank, as we are going to assume that our opening cash balance is zero.
2. Select cell **B22** and link this to the revenue amount above. Your formula should be **=B6**.
3. We can also link our staff costs in cell **B24** to the amount above. Your formula should be **=B9**.

The staff costs in the cashflow will be the same as the staff costs in the P&L because we assume that staff get paid each month, for the month in which they work. Rent & Utilities are a little different though, as we only pay these quarterly. In the P&L we need to show the amount used each month, but for cashflow we only show the amount when it is paid. This is one of the key differences between a P&L and a cashflow statement!

4. Because Rent & Utilities is paid quarterly, we don't need to put any costs in there until March. Select cell **D25** and link three months' worth of Rent & Utilities into the single month. Your formula should be **=SUM(Expenses!B9:D10)**
5. Copy this formula now to cells **G25**, **J25** and **M25**. Because we are using relative cell referencing, this should copy across correctly, but just do a quick check to make sure that it's picking up the correct cells.
6. Now consumables are being ordered each month, so we can assume that the costs are incurred as the sales are being made. Select cell **B26** and link through the monthly expenses using the formula **=Expenses!B11**.
7. Go back now to the revenue and staff costs above in rows 22 and 24, and copy this across the row. Copy the consumables in row 26 right across the row.
8. Select cell **B27** and calculate total expenses using the formula **=SUM(B24:B26)**. Copy it across and check that your numbers look the same as those shown in the video.

Now tax is only paid quarterly, so we need to pick up the amount paid in the first quarter from the P&L.

9. Select cell **D28** and link through the quarter's tax using the formula **=SUM(B14:D14)**
10. Copy this formula to cells **G28**, **J28** and **M28** only

11. We can now calculate our closing cash by adding the closing cash to the revenue and subtracting the expenses and the tax. Your formula in cell **B29** should be **=B21+B22-B27-B28**. Copy it across the row.
12. We then need to add in the opening cash in row 21. Leave cell **B21** blank, and link cell **C21** so that the closing balance from the prior month becomes the opening balance for the month. The formula in cell **C21** should be **=B29**.
13. Copy it across the rest of the row and check that your numbers look the same as those shown in the video

It is a requirement of this course that you submit this model for review and your numbers will be checked for accuracy. Please make sure that your numbers match those in the video before moving to the next one.

So building a P&L and building a cashflow are quite different from a modelling perspective. The way that we model a P&L is that we show income and our expense for each period independently. At the end of the period, we simply move onto the next one. Cashflow is quite different because we need to model the opening amount, add revenue, subtract expenses, whatever cash left is the closing balance which then becomes the opening balance for the following period. This then leads through to your closing balance and so on, so any changes in cash in prior months will affect later months. We call this a *corkscrew account*. The way that we model these two types of financial statements is quite different to each other.
See below for an example of a corkscrew cashflow forecast:

Cash Flow Forecast

	July	August	September
Opening Cash	$1,000	$2,000	$1,000
Add: Inflow from receipts	$10,000	$9,000	$11,000
Less: Outflow from payments	$9,000	$12,000	$8,000
Surplus / Deficit	$2,000	($1,000)	$4,000
Add: Financing or repayments		$2,000	$2,050
Cash at end	$2,000	$1,000	$1,950

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