A Simple Model

IFS: Integrating Financial Statements (Transcript)

NOTES TO ACCOMPANY VIDEOS

These notes are intended to supplement the videos on ASimpleModel.com. They are not to be used as stand-alone study aids, and are not written as comprehensive overviews of the topic detailed. The purpose of these notes is to provide a tangible collection of the visuals used in the videos with comments highlighting the more important aspects covered.

003 Integrating Financial Statements (Transcript)

DURATION: 35:04

In this video you will learn to build an integrated financial statement model. This model provides the core or platform from which most thorough financial models are built. This can be used to run through scenarios, budgets, to build discounted cash flow models and leveraged buyout models among other forms of analysis.

In this example we will use two years of historical data, [00:20] from the income statement and the balance sheet. As a quick side note, to move between tabs without using your mouse, hold the Ctrl key and then use the Page Up and Page Down keys. The tabs that follow break the model building process into a series of steps. I wanted to use this approach for two reasons:

First, I think it makes it easier to understand the process. [00:40] You should think about building an integrated financial statement model as a process of inputting historical data and then projecting the three financial statements - the income statement, the balance sheet and the cash flow statement. And then building out your supporting schedules – the Debt Schedule and the Property, Plant and Equipment Schedule. [01:00]

Second, if a particular part of this process is already known to you or you find it boring you can skip it and move on.

Lastly, this is the first video I made for this website. When I was getting started, I asked friends for advice and what I heard most often was to inject personality. Well I completely underestimated the difficulty I would have in describing what I was doing while maneuvering around in Excel. [01:21] So if by personality they meant monotone robot I nailed it. Hope you can excuse the dry instruction. I figure if you're spending your spare time to learn how to build financial models you're likely a bit of a nerd anyway. Thanks a lot and I hope you enjoy the series.

Chapter 1: Input Historical Data [1:35]

The first step in building a financial model is to input the historical data. [01:40] To do that, go to the cell you would like to fill, hit the Equal key and then using the Ctrl and Page Up keys, tab over to the Income Statement. Select the corresponding cell and hit Enter. What that does is put the formula =Income Statement!B7, which you can see here, in the cell for your first year of revenue. [02:00] You can then paste this formula over by highlighting the adjacent cell and hitting Ctrl + R. I'm going to duplicate that process for all cells with yellow shading and blue text, that you can see here, as that indicates an input. It's a bit of a dull process so I'll probably edit it out, and return later to hardcode the formulas. [02:20] Once the data has been linked, we can go back and input the formulas.

Because we do not have the revenue figure for the preceding year, revenue growth for the first year of historical data is simply not available. [02:40] In the second year, it is the quotient of the current year over the previous year less one. Cost of goods sold as a percent of sales, is your COGS figure over revenue. [03:00] Gross profit is revenue plus cost of goods sold. And as a percent of sales… Operating expenses as a percent of sales. [03:20] Operating income is your gross profit plus your operating expenses. Pre-tax income is your operating income plus interest expense. [03:40] Because the tax rate on historical income statements is not always meaningful, we will input NM. Net income is your pre-tax income [04:00] less income tax expense. And because EBITDA is so frequently referenced in financial analysis, I included a gray shaded area at the bottom of the Income Statement to calculate the EBITDA figure for the year. To do that we will link to EBIT above, [04:20] and then use the =Sum() function to calculate EBITDA.

We can now move on to the Balance Sheet. Here we will use the same process to input historical data. [04:40] And with historical data filled in, go back and fill in the formulas. Total current assets is the sum of all of your current assets. We will carry that across. [05:00] Total assets is the total current assets and your property, plant and equipment. Total current liabilities and total liabilities is the sum of total current liabilities and long-term liabilities. Total equity [05:30] and total liabilities and equity. Finally, every balance sheet should have a check to make sure that your total assets equal your total liabilities and equity. And by subtracting one from the other, so long as the difference is zero, your balance sheet balances. And with that you're done inputting the historical data.

Chapter 2: Projecting the Income Statement [6:01]

[06:00] In this segment we will be projecting the Income Statement. This will require that we develop several assumptions related to growth and profitability. The assumptions used to project financial statements are incredibly important. But because we are focusing on the mechanics of the process of building a model, we're going to keep them very simple. So to project revenue growth we're going to assume a 10% growth rate year over year.

The formula for revenue is revenue in the preceding year times one plus your growth rate. [06:30] For cost of goods sold, we will take the average as a percent of sales for the two historical years and use that for the projected period. To fix the cell reference, when you've selected the reference hit F4 which will put dollar signs before the cell reference and lock that for the projected period. To demonstrate that, if you notice all of the projected periods reference the same cell.

[07:02] So you're then going to multiply revenue by your percent for cost of goods sold to calculate cost of goods sold. Gross profit is revenue less cost of goods sold. And as a percent of sales. And hit Ctrl + R to paste those formulas across. For operating expenses, or SG&A we will take a similar approach to the one taken for COGS, and paste that across. [07:37] Operating income, or EBIT is your gross profit less operating expenses. Interest expense will be calculated on your Debt Schedule. So we're going to highlight this purple to remind us to revisit once we've developed our Debt Schedules below.

[08:05] We can go ahead and input the formula for pre-tax income. For income tax expense, we're going to assume a tax rate of 35% and then calculate income tax expense as pre-tax income multiplied by our tax rate. Net income is pre-tax income less our income tax expense. [08:34] To calculate EBITDA below we can link to it EBIT or carry the formula across. Depreciation will come from one of our supporting schedules. So much like interest expense, we will highlight this purple to return to it.

[08:58] I will be introducing amortization in a future model so for the time being we can just zero this out. And then EBITDA is the sum of EBIT, depreciation and amortization. And we can carry that formula across as well. And with the exception of interest expense and depreciation we now have a projected Income Statement.

Chapter 3: Projecting the Balance Sheet [9:21]

Having projected the Income Statement we can move on to the Balance Sheet. The first item to address in projecting the Balance Sheet is a subset of assumptions at the bottom of the Balance Sheet used to project working capital accounts.

[09:32] Let's start with AR days, or accounts receivable days. Accounts Receivable represents the sum of invoiced balances due to the company. So think of accounts receivable days as the number of days it takes the company to collect payment after a sale. The formula is your accounts receivable balance in that year divided by the quotient of revenue over the number of days in a year. [10:00] Inventory days measures the average number of days the company holds its inventory before selling it. The formula to calculate inventory days is your inventory balance in that period divided by the quotient of the cost of goods sold over 365.

[10:29] AP days or accounts payable days represents the average number of days the company takes to pay its suppliers. The formula for AP days is your accounts payable balance divided by the quotient of your cost of goods sold over the number of days in that period, which is 365. By selecting the cells and highlighting the adjacent cells and then using Ctrl + R we can paste that formula over. [11:02] We will then take the average in the historical period for these three working capital accounts and project that sum, or that figure across. With these metrics projected, we can return to the Balance Sheet.

[11:33] Cash will come from our cash flow statement so for the time being we will highlight this purple. To calculate accounts receivable, take revenue, divide by 365 and then multiply by the accounts receivable base figure below and project that across. For inventory take COGS, divide by 365 and multiply by your inventory days below. [12:10] In this model to limit the number of variables we are going to straight-line prepaid expenses. So just set the first year equal to the proceeding and project that across. Then calculate total current assets as the sum.

[12:32] PP&E, or property, plant and equipment will be calculated on a supporting schedule. So for the time being we can highlight this purple as a reminder to revisit it. And carry the formula for total assets across. Accounts payable is calculated as COGS divided by 365 times your accounts payable based metric below. [13:01] Project that across. The line of credit and current maturities of long-term debt will come from your Debt Schedule. So we will highlight this purple. Carry the sum across. Long-term debt will also come from your Debt Schedule. Carry total liabilities across. [13:30] Common stock and additional paid in capital will both be straight-lined. Retained earnings is equivalent to retained earnings in the preceding year plus net income on the Income Statement. Total equity is the sum of all your equity accounts. And then total liabilities and equity.

[14:00] And finally carry your check across as well. You'll notice that this does not equal zero and that is because our balance sheet is not complete yet, as we are missing cash, property, plant and equipment and all our debts items. These will provided by our supporting schedules. So for the time being we are done with the balance sheet.

Chapter 4: Projecting the Cash Flow Statement [14:21]

[14:21] With the Income Statement and Balance Sheet projected we can move on to the Cash Flow Statement. Like the income statement, the cash flow statement also shows a firm's economic activity over a given period. But the cash flow statement involves the process of converting the income statement from an accrual basis of accounting to a cash basis by adjusting net income for items that do not affect cash flows. [14:42] So the cash flow statement starts with net income from the income statement which you can project across. You then add back depreciation and amortization as they are non-cash items. Because we do not yet have depreciation calculated, we will highlight this purple. And recall that amortization in this model is zero.

[15:06] You then have to account for changes in working capital. A simple way to think about this is to consider that as assets increase it consumes cash. And as liabilities increase it provides cash. So for accounts receivable we will take the accounts receivable balance from the previous period and subtract the balance in the current period. [15:30] Do the same for inventory as it is also an asset. If it helps to think about inventory increasing as using cash to purchase more inventory then that might help understand the cash outflow.

[15:48] For accounts payable because it is a liability we will do the opposite and take accounts payable in the current period and subtract accounts payable in the previous period. Net cash provided by operating activities is in the sum of your net income, depreciation, amortization and your working capital accounts. [16:16] And we can paste all of these formulas across. As we have not yet calculated the capital expenditures we can highlight this purple. [16:31] Net cash used in investing activities will be equivalent to our CapEx, or capital expenditures. Cash flow from financing activities will be calculated with our debt schedule. You can sum it below.

[16:56] Net cash flow is equivalent to net cash provided by operating activities, investing activities, financing activities. We can carry that across. Your beginning cash balance is your cash balance at the beginning of the year. [17:18] And if you think about a balance sheet being dated 12/31 then we can assume that the cash balance at 12/31 is the same or close to the cash balance on January 1st. So we can take our cash balance from the previous year's balance sheet and carry that across. The ending cash balance is the sum of your net cash flow and beginning cash balance. Carry that across.

[17:38] And now that we have our ending cash balance we can revisit the balance sheet. Recall that cash comes from the cash flow statement. [17:56] Link this to the ending cash balance. Carry that across and get rid of the purple shading. And with the exception of variables calculated on our supporting schedules we have now projected the cash flow statement.

Chapter 5: The Debt Schedule [18:19]

Having projected the three principal financial statements, we can move on to the supporting schedules. The supporting schedules are integral to the financial model and provide an organized template for projecting components of the financial statements that we have highlighted purple. [18:34] The number of variables required to calculate items presently highlighted purple can increase substantially with the complexity of the model. This model limits these variables, but it's a good starting point to expand upon moving forward.

003 Integrating Financial Statements (Transcript)

[18:43] Let's start with the Debt Schedule. The first objective of the debt schedule is to calculate the required line of credit, sometimes called a revolver, that will finance any shortfall in cash. [18:53] This model will incorporate a classic credit line sweep. The line of credit is drawn when there is a deficit in cash and paid down when there is a surplus.

[19:02] First let's link the historical line of credit balances from the balance sheet. Now as we link the model think about the fact that you are attempting to measure the amount of cash available to finance the company's activities. [19:23] We will start in the first projected year with cash available at the beginning of the year. This is the same as pulling cash from the end of last year. If you think about balance sheets being dated December 31 of each year then it's safe to assume that cash on January 1st is nearly equivalent. We can carry that sum across.

[19:47] To our beginning cash balance we will then add cash provided by the company in that year. So start with operating activities, then cash from investing activities. We will then include cash provided by financing activities. [20:04] But we have to be careful to only include cash flow from financing activities before the revolver. Here we can include a minimum cash balance. By subtracting this sum from the cash provided by the company in that year, you require that the line of credit be used to maintain cash on the balance sheet equivalent to the figure inserted here. [20:26] Let's assume we want the company to maintain a balance of at least $2 million. You can then project these three across.

[20:33] We can now calculate total cash available or required from the line of credit. To do that take cash balance at the beginning of the year, cash provided by operations and investing, cash provided by financing before your line of credit and subtract the minimum cash balance.

[20:52] Finally, the balance for the line of credit will be equivalent to the maximum so we will use the =Max() function of zero, or the present line of credit balance outstanding plus cash available or required. [21:10] So what this is showing is that because cash available is equivalent to $2.3 million and the outstanding balance on your line of credit is roughly $1.4 million, you can pay down your line of credit and the resulting balance is zero. Let's paste these formulas across.

[21:32] And now we can move on to projecting debt balances. First let's link historical long-term debt, and current portions of long-term debt, to the historical balances on the balance sheet. [22:00] The current portion of long-term debt shows the amount of debt the company is paying down every year. To be consistent, we will project this same sum forward. And because the sum is being paid down we can subtract it from the principal balance and project that across as well. [22:17] Below we will calculate interest expense for our two sources of debt: long-term debt and the line of credit. We are going to make two very simple assumptions here and say that the company pays 8% interest for long-term debt, and 5% interest for the line of credit.

[22:32] Calculating interest expense requires taking an average of the balance at the beginning of the year, or end of previous year, and the current year, and multiplying that sum by the interest rate. You take an average because debt is paid down throughout the year, and therefore interest will be paid on this balance as it is paid down. [22:54] So the formula looks like this, equals average, then take the sum of long-term debt and current portion of long-term debt in the previous year, and the sum of long-term debt and current portion of long-term debt in the current year, and multiply that by your 8% interest rate that we assumed above.

[23:19] The formula for interest expense on line of credit is very similar. Take the average of the line of credit balance in the previous year and the balance in this year and multiply that by your assumed interest rate. [23:36] We can then project these two across. And our total interest expense is the sum of interest expense on long-term debt and interest expense on line of credit. And project that across as well.

[23:50] With our debt schedule projected, we can now link the corresponding purple highlighted components on our financial statements above. So let's start with interest expense on the income statement. We can remove the purple shading. [24:15] And the shortcut for this is ALT + H + H + N. we can then link the debt balances on the supporting schedule to our balance sheet starting with the line of credit, and current maturities, and long-term debt. [24:48] And that formula again is ALT + H + H + N to remove the purple shading.

And finally we can show the cash impact from financing activities. [25:11] To show the cash impact from the revolving credit facility we take the sum in this period and subtract the sum in the previous period. Recall that this is a cash outflow because we are paying down the sum of approximately $1.4 million. [25:30] And similarly for long-term debt take the sum in the current period and subtract the sum from the previous period and carry both of those across. ALT + H + H + N to remove shading. And with that we are done with the debt supporting schedule.

Chapter 6: The PP&E Schedule [25:52]

[25:54] The PP&E schedule is the last component in this model. With this schedule you are calculating the value of the company's property, plant and equipment. This is done by taking the balance of PP&E at the beginning of the year, adding capital expenditures and subtracting depreciation. [26:09] It might help to think of capital expenditures as purchases of new equipment which would increase the value of PP&E. And depreciation as the value that the equipment you have purchased loses over time.

[26:19] So let's start with our beginning PP&E balance, which we will link from the balance sheet. Remember that the balance at the beginning of the year is the same as the balance at the end of the previous year. [26:34] Let's skip over capital expenditures momentarily. In this model we are going to project depreciation as a percentage of revenue. There are more detailed and complicated approaches but this provides a good introduction.

[26:48] So first calculate depreciation as a percentage of revenue for the two historical periods. We can do this with the values found on our income statement. Depreciation and revenue, paste that formula over. [27:09] We will then use the average of these two historical percentages. Remember F4 to lock cell references and then paste that across. So to calculate depreciation in the projected period, take revenue in that period and multiply by the percentage you just calculated. [27:36] And we can project this across.

We are going to make a very simple assumption for capital expenditures - that capital expenditures will outpace depreciation for the projected period. It makes sense that the asset base would grow as the size of the company grows. With that in mind, let's assume CapEx of $3.5 million in the first projected year and increase this sum by half a million every year.

[28:04] Finally PP&E is the sum of the beginning PP&E balance plus your capital expenditures less your depreciation in that period. And we can project that across. [28:25] We must of course also project the beginning balances across but this will not yet look accurate because the PP&E schedule is linking to the balance sheet which currently does not have a value for PP&E. [28:40] So let's remedy that by linking the balance sheet to the supporting schedule. And then project that across. Ctrl + R and ALT + H + H + N to remove the purple background. Recall that we have depreciation on our income statement as well. We can now link to our supporting schedule below. Paste that across.

[29:13] And then on the cash flow statement, we will input our capital expenditures as a negative sum. So enter equals and then a negative sign and then link to capital expenditures on your supporting schedule and paste that across. [29:49] Capital expenditures is negative on your cash flow statement because it represents purchase of equipment and therefore a cash outflow. And with that we've completed the property, plant and equipment supporting schedule.

Conclusion [29:55]

[29:56] With the last supporting schedule built, you have completed the model. I can only imagine how crazy excited you must be. But before the end of the video I want to point out that what you've built is dynamic. [30:07] Consider what happens when you affect revenue. Right now if you look at your cash balance in the last year it's around $8.5 million. [30:17] If your revenue were to grow at only 5% per year your cash balance drops from $8.5 to $5.8 million. It's important to understand how changing an input affects your model and whether or not a change would require other changes.

[30:34] Recall for example that we hardcoded CapEx in our supporting schedule below. These capital expenditures relate to a company that's growing at 10% year-over-year. But now our model's growing at 5% year-over-year. [30:49] So let's reduce our capital expenditures and watch what happens to our cash balances above. Instead of growing at half a million, let's grow at $250,000 a year. And simultaneously you can observe how your ending cash balance will go up. Paste that across and now you see that your ending cash balance is at $8.3 million.

[31:18] There are many scenarios you could consider. For example, let's say you believe the company will do a very poor job of collecting payment for goods and services sold. So instead of being a formula, let's change this to an input. [31:33] And as we change these values observe the cash impact it has on changes in working capital which affects net cash provided by operating activities. [31:49] So instead of 38 days, let's say that it starts to take 40 days to receive payment for invoiced balances, and that this continues to increase every year.

These figures represent cash that the company has tied up in accounts receivable. [32:14] Because your cash is tied up, the company starts pulling on its revolving credit facility, which also reduces net cash flow. In addition to reducing cash flow, it also creates a burden because the business has to pay interest expense on their line of credit. So now on account of those changes the business has an ending cash balance of $2 million which is due to the revolver. Because we included a minimum cash balance.

[32:40] Another thing I wanted to point out is that for this exercise I provided the historical data. When you are building financial models the historical data is generally provided by the company. Or if it's a public company, is readily available. If for example you wanted to build a financial projection for Apple you could go to the Apple Investor Relations webpage, which looks like this. [33:02] View the 10-K, or annual report. And in this case go to page 44 and you would have the historical data for your model.

[33:14] To make it more convenient to input data you could change the format of your model to have all the inputs on the same page. So for revenue, if you were to hit Ctrl + C, which is copy, and then ALT + E + S + V you paste the values. [33:32] You could then format this as an input with a yellow background and blue text. I'll do that quickly for the remainder of the inputs. [33:49] That done you can delete all these other tabs by selecting them, Alt + H + D + S deletes workbook worksheets but be careful because there's no undo function for this. And you now have a standalone model. I forgot to bring over the year.

[34:07] The last thing I'll discuss is the interest expense circularity. Interest expense creates a circularity in your model that can cause it to #REF out. What that means is if you were to delete revenue for example, your model would look like that. [34:26] If you then put the value back in your model doesn't work because interest expense can't calculate. To fix this just delete this line and then go back and insert interest expense once again, which is cell D128. [34:40] This occurs because interest expense impacts net income. Which impacts your cash surplus or deficit. Which impacts your debt levels. Which in turn impacts interest expense. [34:54] I plan to provide more detail on this in the future but for now, I just want to provide a quick fix should your model crash.

And that's it. You can stop watching this right now.