Chapter 9

Tiering Table

Let's take a look at some tiering tables which is a fairly commonly used calculation in financial modelling and that's where it is used in the tax tables and quite often you get a tax-free threshold, you have calculation brackets, you've got pricing quite often in funds management and you invest a certain amount, you pay this much; you invest more, you pay little bit less; you invest more than that, so they tiered it in different pricing calculations. Quite often, the more you buy, the less you get it for. And that is fairly common, particularly in pricing models. It can be complex or it can be really simple. Let's take a look at using some different functions or what's the best way of calculating tiering tables.

It explains how to do all of this in chapter 9 in your book and if you open up the file called Tiering, there is an exercise that we are going to do together.

Here we have got a situation where we have got a pricing table, if somebody buys 5 units they pay $15 and if they buy between 6 and 50, they pay $12 and so on the price goes down. If somebody buys 63 items for example, we need to work out how much that's going to be and you could work that out manually by saying 63, you look down there and say okay $10.50 each.

Most people would jump straight in and use if statement. IF statement would work say,

IF it's less than 5 items, its $15;

IF it's less than 50 its $12; and

IF less than 150...so you are doing IF, IF, IF… which is fine but it's fairly complicated.

A much simpler way of doing it would be to use a close match, VLOOKUP which is looking down the side and it would pick up the closest.

This is where at the end of your VLOOKUP when it asks you for the range in the VLOOKUP. This is where you normally put in FALSE or 0 but if you put in 1 or TRUE it will return close match instead of exact match.

This is one of those very few situations where we use a close match instead of exact match in a VLOOKUP.

Alternatively, we can use a LOOKUP function, not a VLOOKUP or a HLOOKUP but plain old LOOKUP and the advantage is that two ranges are completely independent either vertically or horizontally.

We will be looking at LOOKUP just for some practice.

You can either use LOOKUP which is by definition a close match or we can use VLOOKUP which has got TRUE at the end of it.

Whichever option you go with which is absolutely fine, I am going to demonstrate using a LOOKUP.

We will go into the function wizard, look for the LOOKUP. Choose the first one, that one there and the LOOKUP value is going to be the criteria which is 63 in this case. Your LOOKUP vector is the range so this is the range what we are looking for and the result vector so it exists in that range there.

You have got two independent ranges on your LOOKUP function. We say okay and it has come up with $10.50. Good idea to always format everything correctly, so I'm going to just quickly go in and change my formatting and I'm going to need to use some absolute referencing. I'm going to highlight all of it, hit the "F4" and that's going to fix all of my ranges so that when I copy it down, it's all going to be anchored. Do that and then copy the whole lot down, you can drag it down like that or use your "CONTROL-C" or you can do your little double clicking like that. That's picking up the price and then we can just multiply it out like that. That is a fairly basic Tiering table.

Okay let's take a look at another practical example of using a Tiering or getting something into brackets can be helpful in your analysis in Excel. We have got an example here of the population data and we are using quite often we use demographic information in as part of our models and we have got a whole lot of really useful information. The problem is that there just is far too much of it.

If you open up a file called population projections and we have got a whole list of every single age bracket or age in Australia and we are going out over twenty years looking at the population projection of Australia but we have got every single year and what we want to do is put everybody into certain brackets and we are going to do this using a close match

LOOKUP. It's a practical exercise you guys can follow along, you can pause me while you are doing it or you can just watch while I do it.

In this situation here we have got, this is people who are zero and their age is going all the way down in column "B". On the LOOKUP tab, here are the age brackets and we want to put everybody into those ages and what I want to have is when they are from zero to eighteen they're going to be classified as a child. If they are eighteen to thirty-five they are going to be classified as a young adult for example, to do that I'm going to use a close match VLOOKUP or a LOOKUP function. I'm going to do a close match VLOOKUP just for a change. This is my criteria so go into here. I'll go in and find up VLOOKUP so we will say here's my criteria here, my array is down there, I am going to hit my F4 just to fix the ranges and its going to be the second column across which means of course that I can't insert any columns I could have used a LOOKUP instead. In this case, instead of normally we would say 0 for an exact match or FALSE I am going to type TRUE because let me show you if I put 0 and ask for an exact match in that case it will find it but when it comes down there it's only going to find the ones that fit exactly so I am going to ask it to give me a close match instead.

If I put a one instead of the zero or TRUE like that what it's going to do is it's going to look for a two for example, it's going to look down that range it will say zero too low, too low, too low, up, too high and it will go to the next one down. That's how a close match works, so you can just go in there and populate that.

That way you have managed to categorize everybody into their brackets and then you could use a pivot table or you could use a SUMIF formula to sum it together and to come up with instead of having a whole great big pile of information of everybody by year going from zero to the age of one hundred you will be able to just have to summarise it into brackets, that's another example of using a close match with a Tiering table can be helpful.

Let's take a look at doing next a progressive Tiering table which is just a little bit more complex. Here we've got the Australian tax tiers for 2010-11 and you can see there its calculating. What we need to do is for example if somebody earns a salary of that amount you can't just do a close match because a whole amount is the marginal tax rate is 37% but you can't do the whole amount at 37%. What you need to do is to calculate right up to that point and then look at the difference.

You basically need to break it into two separate sections so it's fairly complicated and you can either go through if you do need to do this as part of your role you can go through and create this formula. Alternatively, I have given you the completed version in this file so alternatively you can just use that as a template if you ever need to do one of these so that might be a good option. But I will take you through and explain how it works.

Basically split it up into two different sections so the lowest tier using a close match VLOOKUP or a LOOKUP formula is 80,000 and that tax amount is going to be about 17,500 and then you need to calculate the difference between a hundred and 123,000 and 80,000 is 43,000 and that is the amount that's going to be at marginal rate, you then add the 2 blocks together.

You basically end up doing 3 separate VLOOKUP's in one formula or you can do them in 3 separate columns. Just going back to your Tiering exercise I've actually given you the completed version if you right-hand click and can go unhide you will see that the completed version are in there so you can take a look of those if you like or you can have a go on your own.

I have given you the first option actually has, is it easier because has got the bracket calculation in there ready or the second option doesn't have it in there. If you want a more challenging exercise you can go with the second option. I am just going to jump straight to the completed version which is here and you can see how is been calculated there. You basically need to do it in three separate steps so you need to work out the threshold here you than need to add in the marginal, to look at the difference between 123,000 and 80,000 using the second VLOOKUP and then you need to calculate that at the 37% which is the marginal rate and that's what that formula is doing there.

That's a couple of examples on how using a close match VLOOKUP or HLOOKUP or a LOOKUP using a close match can help you with calculating Tiering tables which is a very common calculation in financial modelling.