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Calculating NPV and IRR

Let's take a look at calculating the NPV and the IRR in our financial model. Quite often this is going to be the output of your financial model. You got all of your calculations behind it. You then know what your cash flow is going to be. Usually the evaluation method if it is a project we think about investing in. The NPV is really what we want to know. Let's take a look how we calculate that in Excel.

So how to do this in chapter 6 of the book and there is a file called NPV_ IRR, and WACC and on the front page it got list of cash flows, so we have calculated the cost of capital in this case. So lets say our cost of capital is 9.78%, so we linking that through. Our NPV what we basically doing here now is saying that it costing us 9.78% to have that money. So basically we are going to get 3 million dollars in 5 five years time. That is not the same as getting 3 millions today. Because it costing us 9.78% every single year that we wait for that money.

So we need to discount it back and workout what that is money worth in today's dollars. So you can do it in long hand but very it's really a lot easier to do using the NPV function in Excel and makes a really-really easy for us and we going do that in a minute but just something you need to be aware of when you do-if you are going to use NPV function its quite a simplistic what is basically assumes. It takes the cash amount and seems that it happens at the end of the period which is not always the case and we know when you got a project usually you have to make all the spend upfront beginning the revenue through out the year, majority the revenue happens at the end of the year.

So what we going calculate here is reassume everything happens at the end the period which is pretty simplistic… So just bear that in mind when you using the NPV function it is quite a simple way of calculating it. We will do this and we will go on it and have a look at the X-NPV function which is little more complexes which might give you slightly more accurate calculation if you know the timing of your cash flows. But first of all, let's just go in and use the basic NPV function.

So just go in and find your NPV. It is very-very simple formula to use. So you rate is 9.78% and your value just highlight the whole lot like that. Here you go so 371,000 dollars theoretically. So that serious of cash flows even though I highlight the whole lot and looks at the sum of the bottom here 1.9 million dollars but it really only worth 371 because it costing us 9.78% to have that money available to us in the first place.

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Now the IRR is a similar sort of concept. The IRR is basically saying "how much – what is the return?" So if I'm going to get that series of funds over the next five years, what is that on an annual basis as an average return? So, the function is really-really easy. So – IRR - not even going to use the function wizard here. IRR like that, so its 13.3%. Now if you'll notice that that is actually higher than our cost of capital. Our cost of capital is 9.78% and our IRR is even higher than that. So let me ask you a question. If your NPV were zero, what would your IRR be? So your IRR is going to be exactly what your cost of capital would be.

If your NPV were set to zero, your return would be exactly 9.78%. And that's because of that relationship between the NPV and the IRR. Just to prove that point, if you know how to do a goal-seek, if you don't just watch me and we'll go through it together. So I'm just going to use a goal-seek just to prove that point.

So a goal-seek will work to pull something backwards, so I need to change something – let's say I'm going to change that. And I want to set my NPV to zero by changing, let's say that cell there. I'm going to go in and use a goal-seek. Goal-seek. I'm going to set my NPV to zero by changing this cell here. So, okay, there we go. So that is set to exactly zero and you can see that my- in this case if my NPV were zero, my IRR is exactly what my cost of capital is and that's because of the relationship between the two.

So what your NPV is saying "If I require 9.78% return what do I have left over?" If I have nothing left over, that means that my rate of return must have been exactly 9.78%.

I'm just going to cancel out of that and go back to the way it was. Just going into the IRR, I didn't use the function wizard for the IRR, but if you had you might have noticed that there's a guess function in there. So if you leave that blank - most of the time you don't need to worry too much about the guess – if you leave it blank it's going to default it to 10%, and the reason that they have there is that sometimes there can be multiple results of – multiple answers for the IRR, and this will only really happen when your cash flows goes positive-negative-positive. If it goes up and down like that, and there can sometimes be multiple results, and what the guess is saying is "what is the closest that you want it to be?" and if you don't put anything in there it'll say- it'll assume 10%, so most of the time you don't need to worry about it. But just in case you're wondering, that's what the guess is for.

Ok let's have a look at the X-NPV and the X-IRR, so as I mentioned with the ordinary NPV, it assumes that everything happens at the end of the period. Now that, is very simplistic, not always the case. So, in the next example here what I have done is, I have taken a 1.9 million dollars and just changed the timing of the cash flow. Just a little bit. So I said I have basically split out that first amount there into two different amounts and so if I go in and use the X-NPV now, now this is one of those new functions that's only available in the lighter versions so if you are using one of the old versions, you won't have access to this.

So if we go to X-NPV , so my rate again is going to be 9.78% my values, almost there, and my corresponding dates and then put in the dates that those values occur in, there we go, and so that's taking into account the timing of the cash flow. So it doesn't assume that

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everything happens at the end of the period. So that's just another option for if for doing your NPV calculations, Its, if you know what your timings are it's a little bit more accurate just be a little bit careful though when you are using this formula what I have done here actually not exactly comparing like with like because in my first example here I am assuming that overfunds are received at end of the period and I am standing at the beginning of 2013 in this case.

However in the 2nd case I am assuming that I am standing my current date is the 1st of June, 13 so your starting point, is you're not exactly comparing like with like so you're starting point is ever so slightly different but, but yeah using the second method is slightly more accurate and then we'll use the XIRR which works in a very similar way - values, dates and again don't worry about the guess; there we go and we end up with a very slight slightly different XIRR. So that's just a few technical examples of how to build NPV, how to use the NPV function, the IRR, the X-NPV and the X-IRR. So you can use those in your Financial Modules."

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