Accounting Concepts and Interview Questions: Net Operating Losses (NOLs) and Deferred Tax Assets (DTAs)

Welcome to our next lesson in this module on accounting concepts and interview questions. We are going to be discussing a somewhat more advanced topic here, that is net operating losses or NOLs, and deferred tax assets or DTAs.

Now, I say this is a somewhat more advanced topic, and it is. But the reason why we need to cover it now is because in some of the case studies, including some of the earlier ones in this course, we do feature these concepts and ideas and use them in financial models. So, it really helps to learn upfront how these work, so that you know in advance before you even get to those case studies.

As with the last lesson, we have a separate sheet here called "Detail. And then we have our standard three-statement model over here. And I'm going to explain how you can add this functionality for NOLs and deferred tax assets to it. But we're going to save that for the end, because it's really important to understand the basic mechanics of these items first, in a very, very simple model right here.

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The scenario here is that in addition to deferred tax liabilities, there are also deferred tax assets or DTAs, which are the opposite. DTLs mean that the company will have to pay more in cash taxes than book taxes in the future. DTAs mean that the company will have to pay less in cash taxes than book taxes in the future, so they represent potential future tax savings.

Now, there are many items that could make up a DTA. But the most important one for our purposes is the net operating loss, or NOL. And all this means is that if a company has lost money, so it has had negative pre-tax income in prior years, it can reduce its future taxable income with these losses and save money in the future.

Now, the exact rules around NOLs depend heavily on the country or region you're in. In some countries, there are expiration dates or requirements around their usage. So, we're not going to get into all the technical details here, we're just covering a fairly simple generic scenario that could apply anywhere for the most part.

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The idea here will be that a company suddenly turns profitable and starts recording positive pre-tax income, but it has had several years of prior losses before this that have accumulated to

its NOL balance. Let's go up to the mechanics in Excel, I have some notes over here on the side for the important line items, and then we'll go through it and see how this works.

So, at a basic level, we're going to apply the company's tax rate to its pre-tax income. Therefore, I'll take the pre-tax income, I'll put a negative sign in front, and then I'll multiply by the tax rate. I'll anchor this and then copy this across. And then we need to enter something for our beginning NOL balance. I'm going to say that our beginning balance here is $100.

This accumulated in prior years because, overall, we had around negative $100 in pre-tax income in a few years before this. And then in the years after that, the beginning balance each year will be the ending balance from the previous year. Now, for the NOLs created. So, this one is pretty simple if you think about it.

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If our pre-tax income is negative, then we add to this loss balance. If it is not negative, then we do nothing. If it's positive or zero, we don't get any losses accumulated because there are no losses to accumulate. So, we can represent this with a MAX(0 function. And I can say the maximum between zero and the negative of our pre-tax income right here.

And you can see how this works if I just copy it across. We have negative pre-tax income in Year 2, so we get an NOL created in Year 2, but we don't get anything in Year 1 or Year 3, because we have positive pre-tax income in those years. I'm not going to copy across the full thing for now, I'll save that for the end.

Then for the NOLs used. So, for this one, we'll enter a negative and we'll take the minimum between our beginning NOL balance right here and the NOLs created. I entered a plus sign here, but we don't need it, it's the same either way. I think it's a little easier to read without it, so I'll delete it. And then we want to take the MAX between our pre-tax income and zero. So, what is this formula saying?

[03:59]

As I see in the notes over here, we are applying either the lesser of the total remaining NOLs, so, the beginning balance plus whatever we created this year, or we're just taking the pre-tax income and saying that our NOLs can offset that entire balance, and we take whichever one there is less so that we never offset more than our NOL balance.

If the pre-tax income is negative, then that's what the MAX(0 here handles – it just sets it to zero because there's nothing to offset in that case. So, we have this, let's add these up now. And then, let's go down.

So, for the NOL-adjusted pre-tax income, the idea here is pretty simple. We want to take our pre-tax income, and then if we've actually been able to apply any NOLs to offset this, we add them. And really, we're subtracting them because we're adding a negative here. So, we're taking pre-tax income, and then we're reducing it by the NOLs that we've used.

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For the cash taxes payable, I'm going to take the negative between the MAX of our NOL-adjusted pre-tax income and zero. This will just ensure that if our NOL-adjusted pre-tax income is negative, then we just get a zero here. On the other hand, if it is positive, then we get that number and we put a negative sign in front, because we use negative signs for the income taxes in this model. And then we'll multiply it by the tax rate of 25% right up here. So, we have that.

And then for the last item here, the increase or decrease in the deferred tax asset. So, the deferred tax asset will decrease each year that we use NOLs, and then it will increase whenever we accumulate NOLs from taking these losses. So, to represent that, we can just sum up the NOLs created and NOLs used, and then multiply by our tax rate up here, the G7. I'll anchor that. And so, we have that.

Now for the starting deferred tax asset here, the standard practice is to take the beginning NOL balance and then multiply by the tax rate. And this is the amount that actually goes on the balance sheet.

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So, this NOL balance that we're tracking doesn't directly appear in the balance sheet, instead, this number times the tax rate, roughly speaking, is what appears on the balance sheet. So, let's enter that. And then for the deferred tax asset, let's just take this old number, and then we'll add the new number right here. So, we have that.

With all this in place, let's now copy this across and see what it looks like. And so there we have it. So, you can see what happens here. In the very first year, we have an NOL balance of $100. And that's enough to completely offset the pre-tax income for this year. So, we end up paying nothing in cash taxes, and our deferred tax asset, which was initially $25, goes down to zero.

Why? Because we've completely used up the NOL within that DTA, and there's nothing left, so it goes to zero. Now in Year 2, we have negative pre-tax income once again, and so we get $200 of NOLs created.

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We have negative $200 in NOL-adjusted pre-tax income, which means we pay nothing in cash taxes. And which also means that our DTA goes up by that $200 times 25%, or $50.

Then in Year 3, we have $300 in pre-tax income. We have income taxes, book income taxes of $75. And we can offset $200 of that pre-tax income, which means that we have $100 in adjusted, NOL-adjusted pre-tax income left. And as a result, we pay much less in taxes.

Because of these NOLS, we only pay $25 in taxes, whereas the income statement showed us that we paid $75 in taxes. And then at this point, we use up all of our NOLs, and so the deferred tax asset goes to zero. So, that's how it works.

In terms of the intuition here, and how some of this works on the cash flow statement and balance sheet, if the deferred tax asset increases, then the company's cash flow decreases. And on the balance sheet, the deferred tax asset is up, and the cash is down to balance it.

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The intuition is that, in this situation where we get an increase because the company is accumulating an NOL, it seems like from the income statement that the company actually gets a tax benefit. But in reality, that never happens, the company can pay something in taxes or can pay nothing in taxes. But it can't actually get something back from the government in the period where it has this negative pre-tax income.

So, if you look up here, for example, in Year 2, it looks like we actually have an income tax benefit because we have positive income taxes, but that can't possibly happen. So, the company actually just ends up paying nothing in cash taxes. That's why the deferred tax assets here increase, which will reduce cash flow on the cash flow statement.

And then if the DTA decreases, then the company's cash flow increases and on the balance sheet, the DTA is down, and the cash is up to balance it. The intuition here is simply that the NOL was used, so the company appears to have paid, say, $25 in taxes, but the company did not actually pay them out in cash if it used the NOL to reduce its pre-tax income to zero, for example, and it paid nothing as a result.

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So, that's a little bit about how it works. NOLs are not the same as deferred tax assets. The deferred tax asset represents only the tax savings potential from the NOLs. So, if you have a $100 NOL, that will be recorded as a $25 deferred tax asset. And the full amount of NOLs is actually shown "off-balance sheet" or kept "off-balance sheet" because it's not really shown anywhere unless you look in the notes of the company's filings.

With that all done, let's now go over to our three-statement model and see how this works. So, in this model, we can use a very similar setup and we can just add a little bit to our tax schedule that we set up in the previous lesson. We'll still keep these items for book and tax depreciation, but now we'll add a few extra items for the NOLs created, NOLs used, and then make sure that the cash taxes payable and deferred income taxes reflect NOLs as well.

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For the beginning NOL balance, I will just say zero. And then for the balance in the next year, I'll link it to the ending balance from Year 1. Then for the NOLs created, very similar formula, I will say that this is the MAX between zero and the negative of our cash taxable income right here.

For the NOLs used, again, similar idea and formula, the negative minimum between the beginning balance plus the NOLs created. So, that's one option. If this is less, we'll use this. But if it turns out that our cash taxable income is less, we will use that instead.

So, I'll say that this is the max between the D78 and 0. This is just to ensure that if the cash taxable income is somehow negative, then we just count it as a zero and just ignore it here. And then we can add these up. For the NOL-adjusted taxable income, we'll just take our cash taxable income, we will subtract the NOLs used.

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And then for the cash taxes payable, again, very similar idea, the negative MAX between zero and our NOL-adjusted taxable income times the tax rate up here at the top. And then for the deferred income taxes, same idea as in the previous lesson, it's just the cash taxes minus the book taxes. And these both have negative signs, so we can just do a simple subtraction like that. We have that. And let's copy this over.

So, as you can see right now, nothing really happens here. And the reason nothing happens here, of course, is because the company does not start off with any NOLs, and the company has a positive pre-tax income in both years. To test this a little bit more thoroughly, let's try

changing this. And let's make it so the company has a big loss in Year 1, and then a big recovery in Year 2.

So, I'll say $450 for G&A in Year 1, and then I'll say $150 for G&A in Year 2, so that we get a negative pre-tax income followed by a positive pre-tax income. So, you can see what happens to here.

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We get NOLs that accumulate in Year 1. Our deferred income taxes are a negative here because our deferred tax asset should go up. And then in Year 2, when we have $200 of pre-tax income, we can offset $100 of it with our NOL balance, so our taxable income is lower and our cash tax paid are only $25, as opposed to the $50 shown on the income statement.

However, you might have noticed that we have a small problem here, which is that on the cash flow statement, we're still linking to these deferred income taxes, and that's fine. The issue is that we haven't set up any link to the deferred tax asset on the balance sheet yet. In fact, right now, everything is just being linked to the deferred tax liabilities.

This is not wrong. An increase in a deferred tax asset is the same as a decrease in a deferred tax liability and vice versa. So, you could model it this way and it wouldn't be wrong. If you notice, the balance sheet still balances. However, it's slightly better practice to keep these positive where possible.

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So, one common solution for this type of problem is to go in and create this net deferred tax asset line item instead. And the net deferred tax asset just means that you take the deferred tax asset, subtract the deferred tax liability. If the company has more on the liabilities and equity side, you do the opposite. You could take the deferred tax liability, subtract the deferred tax asset, and call that the net deferred tax liability.

We tend to follow one of these treatments throughout the case studies on the site just to make everything simpler. The issue now is that if we remove the deferred tax liability, and we just make the deferred tax asset equal to whatever it was, zero minus the deferred tax liability, which was zero as well, and I copy and paste that as a value, then we can change the linking here and make it make a little bit more sense. So, I can delete this bit for the deferred tax liabilities. And then I can go in.

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And for the net deferred tax assets, I can take the old number, and then I can go over here. And I can now subtract the deferred income taxes, so it goes up by $25, and then in the next period, it goes down by $25 and reaches 0 as we accumulate NOLs and then use them up. And so that is how NOLs here work on the financial statements.

I will change this part back with the G&A expense, just so it's working properly, and the model is set up properly in the After file here. But I just wanted to change this temporarily so you can see it. That's about it.

So, let's do a recap and summary. Net operating losses and deferred tax assets are used in situations where the company has had losses in prior years or in the current period. It can then accumulate those losses and use them to reduce its taxable income as we're doing right here. We call this the NOL-adjusted pre-tax income. And then we base the cash taxes on that adjusted number as opposed to the number listed directly in the company's income statement.

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Now, as a result of doing this, we pay either nothing in cash taxes or some amount in cash taxes, and then we adjust the deferred tax asset accordingly. The deferred tax asset will decrease each year that we use NOLs, and it will increase whenever we accumulate NOLs from taking losses in one year.

You saw how it works on the financial statements here, we can just add it as another section in our tax schedule. One issue, though, is that when we calculate deferred income taxes like this after factoring in the NOLs, we get a bit of an odd scenario, because deferred income taxes can only link to one item on the balance sheet, you can't link it to both deferred tax assets and deferred tax liabilities. So, we solve that here by simply deleting deferred tax liabilities and just making a net deferred tax assets line item, which is usually the approach we use on the site as well.

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That's it for this lesson. And that is really it for part three of this module. Coming up next, we will look at some unusual or one-time events such as gains and losses, impairments, write-downs, mergers, and acquisitions, and more. And you will see how all of those work on the financial statements.