Engineering Economic Analysis
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Lecture 38
Effect of Method of Depreciation on Income Taxes

Welcome to the lecture on income tax analysis. So in this lecture we will talk about the effect of depreciation on income taxes.

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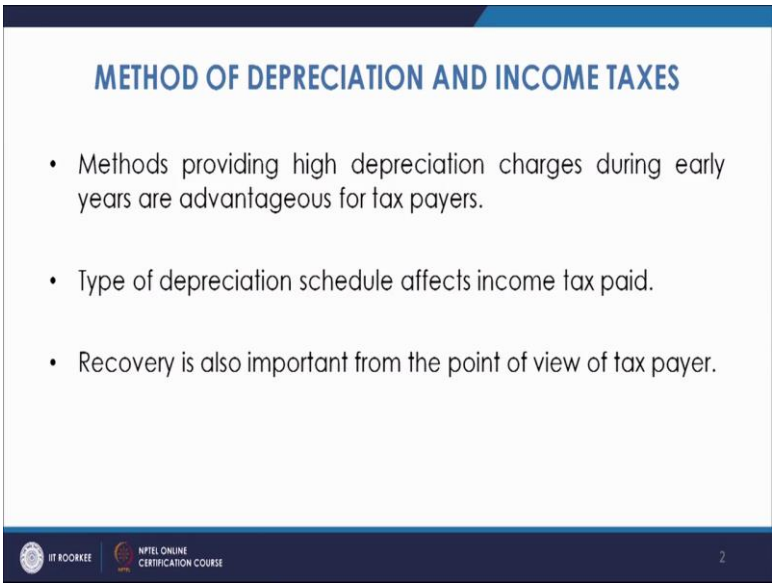

We have already studied different depreciation methods, in that we had also discussed that the depreciation on the assets basically it is because of the loss in its value and the manufacturer gets its benefit during the tax paying. So basically there are different methods of depreciation calculation and the method of calculating depreciation affects what way you pay the taxes, what way the cash flows are affected.

So the type of depreciation schedule affects the income tax which is paid. We will see one example, in that we will try to see how the selection of different depreciative session schedule affects the income tax amount to be paid.

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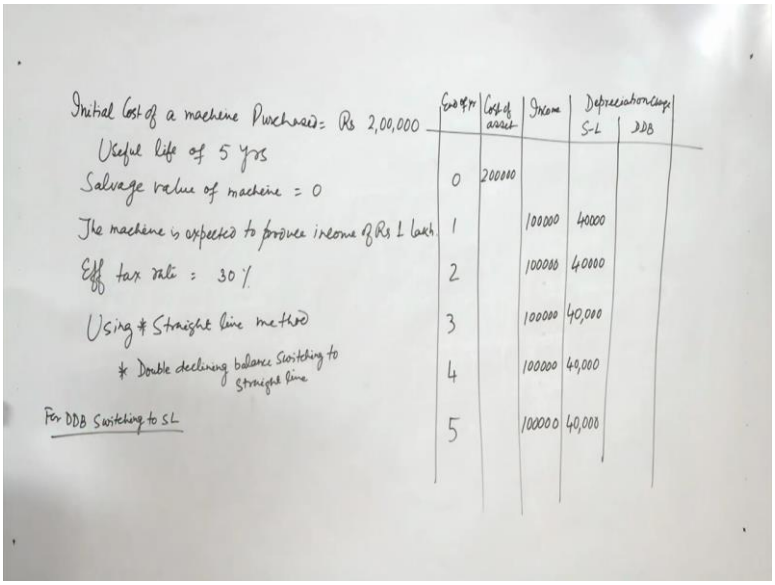

So let us say, initial cost of a machine purchased is Rs. 200,000. So the company has purchased a machine of Rs. 200,000, the machine has a useful life of 5 years. Basically after 5 years the salvage value of the machine will be taken as 0. The machine is expected to produce income of Rs. 1,00,000 every year 1,00,000. Now the effective tax rate for income tax calculation can be taken as for the life of the machine it will be taken as 30%.

Now in that case we have to see that how the depreciation schedule which is adopted, how it will affect the tax amount to be paid. So let us say we are using two depreciation schedules using straight-line method and another is accelerated method that is double declining balance switching to straight-line. So basically these are the two kinds of depreciation schedule and we have to see how that depreciation schedule adopted affects the tax calculation.

How much you tax because we are going to be the taxes during the years to come for 5 years. What will be in what case we are paying more amount of tax, so we have the value of the present worth of all the taxes paid. Now let us say we can have a table, in that we will calculate the tax calculation. So let us see it is year 0, 1, 2, 3, 4 and 5.

Now in this case in the straight-line method, so first of all first cost of asset in the 0th year, we are taking the asset as in amount of 2,00,000. Now we are to calculate the income, basically we have income every year 1,00,000. So income before depreciation in every year we have 1,00,000. Now in this case, the amount of the cost of the asset is to be depreciated using the two methods. So depreciation charge using the two methods will be calculated.

So depreciation charge will be using straight-line and using double declining balance. Now with that case we know that in straight-line method, we have constant amount of depreciation charge every year. So the straight-line method calculates the every year depreciation charge as 40,000.

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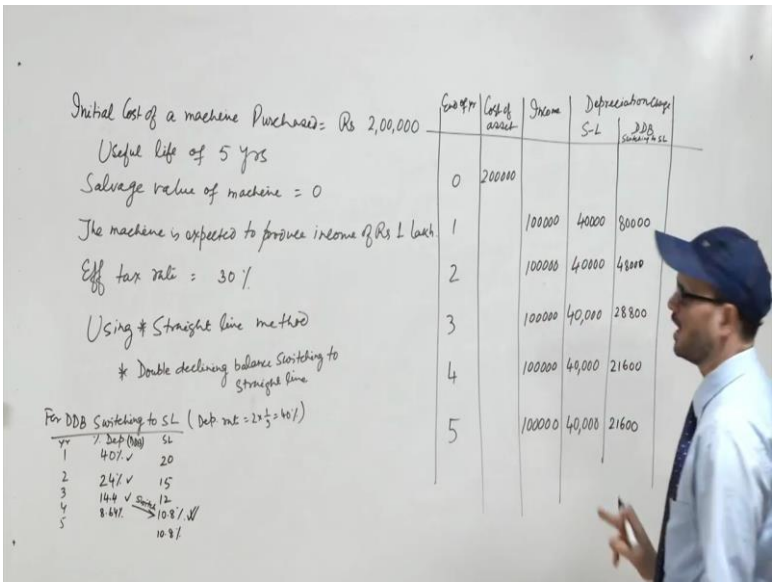

Now using the DDB method switching to straight-line for DDB switching to straight-line the percentage depreciation during the years 1, 2, 3, 4, 5 will be we can we have already done it. Basically the depreciation rate is depreciation rate is 2 into 1 by 5 that is 40%. So in the first year it is 40%, in the second year, you have basically the book value as 60.

so basically once we go for switching to straight-line, so this is by DDB and if you go by straight-line so in the straight-line basically we come 20 so this is taken. So you have book value of 60, so in the second year you have 24% and in the second year basically you have 4 years left, so 60 by 4 that is 15%, so still this is taken. In the third year your book value remaining is basically this is 64 36 so in the third year using DDB 40% of 36 that is 14 point 4.

And here you have 3 years remaining so it is 12, so again this is taken and in the fourth year basically you are having the book value as 21 point 6%, so in 21 point 6% using only DDB it will be 8 point 64%. Whereas 40 years remaining life, it is 10 point 8% so this is coming. So there is switch here and this will be further 10 point 8 here. So basically our depreciation schedule will be for DDB switching to straight-line is 40, 24, 14 point 4, 10 point 8 and 10 point 8.

So this is 40% of 20,000 **so** so it will be 80,000 then 24% of 2,00,000 so this is 48,000, then you 14 point 4% of 2,00,000 so 28,800 and rest two years it will be switching so it will be 21,600 and 21,600. So this is how the depreciation charge will be calculated using the DDB method switching to straight-line, so this is basically switching to straight-line and in this case this is the amount.

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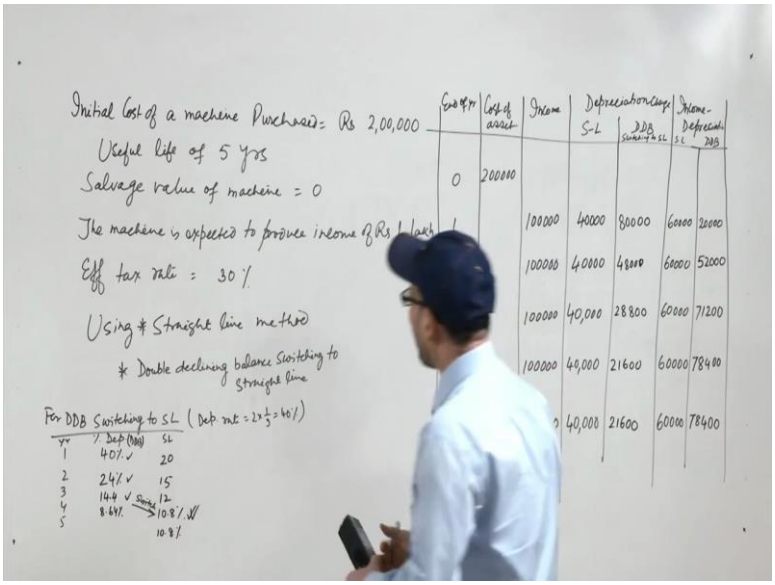

Now after paying the after having deduction of the depreciated amount what is the income? Basically what is income - depreciation? So the value using SL and using DDB switching to straight-line, now in this case using the straight-line this comes out to be 60,000. This is income - depreciation that is your taxable income basically and then in that case you have here, every year you have 60,000 in the case of straight-line.

And in the case of DDB switching to straight-line your amount is in the first year 20,000 is the taxable income, here it is 40,000, in this case it is 40,000. It was a mistake, in this case 1,00,000 - 48,000, so it will be 52,000, then 1,00,000 - 28,800 so it will be 71,200. 1,00,000 - 21,600, so it will be 78,400 and 78,400.

So this is the depreciation schedule, I mean amount of the money that is net income of the company or individual on which you have to pay the tax. So what will be the tax that will be paid by the person? So let us write the taxes. The tax which will be paid by the person in straight-line will be basically, so we have taken the effective tax rate as 30%. So it will be in the first year 18,000, so every year 18,000.

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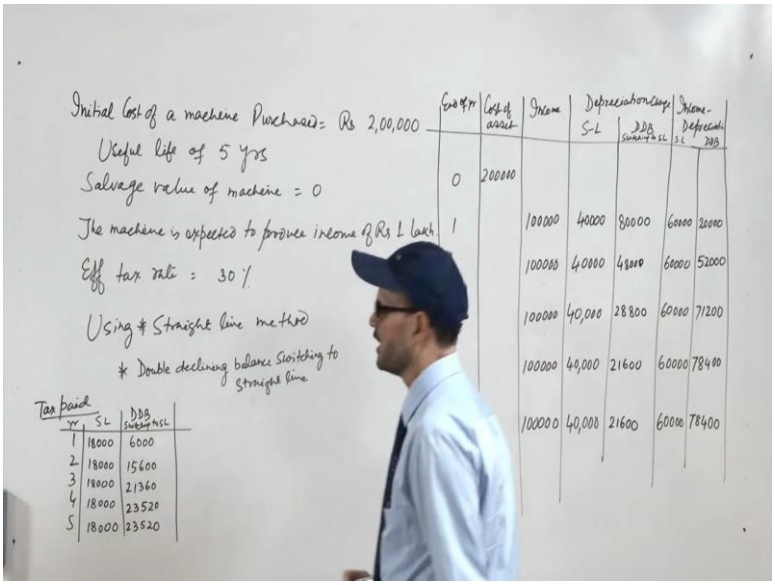

And in this case you have different. So let us see how this amount will be calculated. Now tax paid during the first, second, third, fourth and fifth year using straight line it will be income is 60,000, so here you are paying 30% effective tax rate is there so you are paying 18,000 every year. And using DDB you are paying 30% of the income, so using DDB switching to straight-line, in that case it will be 30% of 30,000 so 6000 in the first year.

Then 30% of 52,000 so 15600, 30% of 71,200 so 21,360, 30% of 78,400 so 23,520 and further 23,520. Now basically we are paying in the first year 18,000 where it is here 6000. In the second year 18,000 it is 15,600, from third year onwards we are paying more in case of DDB switching to straight-line.

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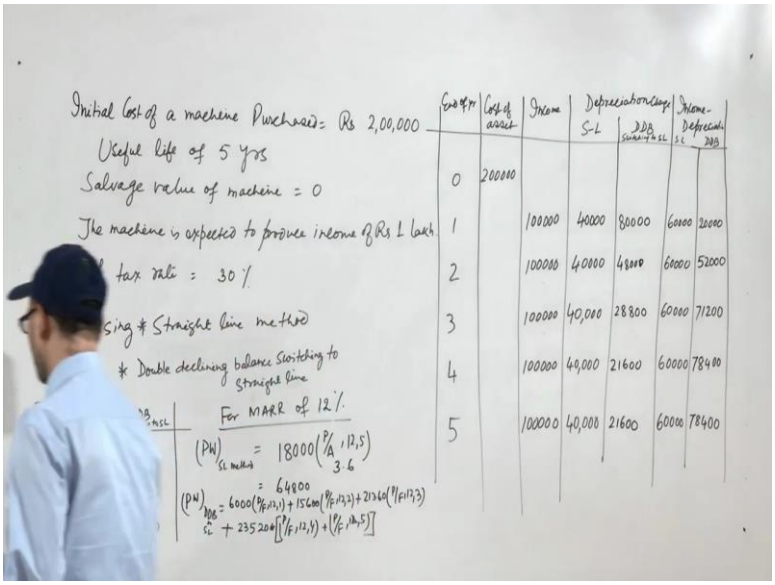

Now if MARR for MARR of 15%, if 15% is the rate of return expected, in that case we can only compare if we find the present worth of such investment or we can say MARR of 12%. We have to use the table of 12% in that case, so if you look at present worth using straight-line method it will be basically the 18,000 amount every year you are basically paying. So present worth means at 0 time 18,000 multiplied by P by A 12 5.

So P by A 12 5 we can get it from here, P by A 12 5 will be 3 point 60, so it will be sixty four thous so it will be 64,800. Now if we look at the present worth for this, it will be nothing but present worth for DDB switching to straight-line, it will be nothing but summation of so 6000 multiplied by P by F 12 1 + 15,600 multiplied by P by F 12 2 + 21,360 multiplied by P by F 12 3 + 23,520 multiplied by P by F 12 4 + P by F 12 5.

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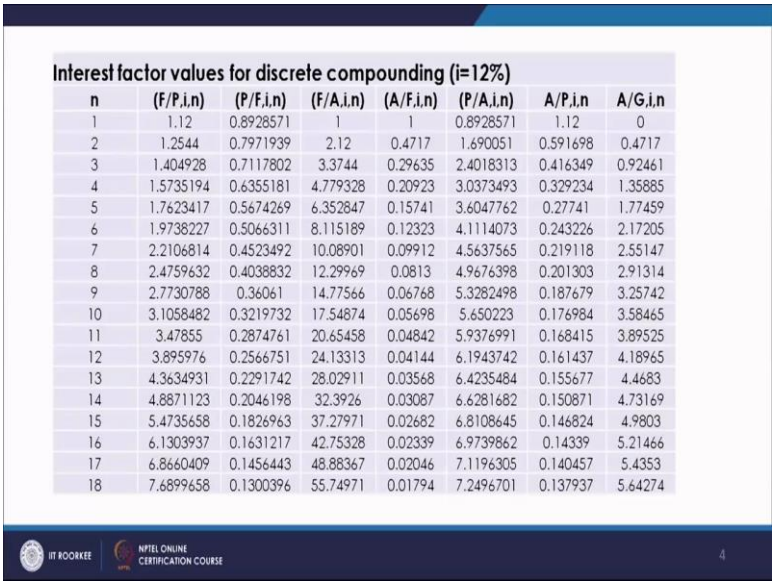

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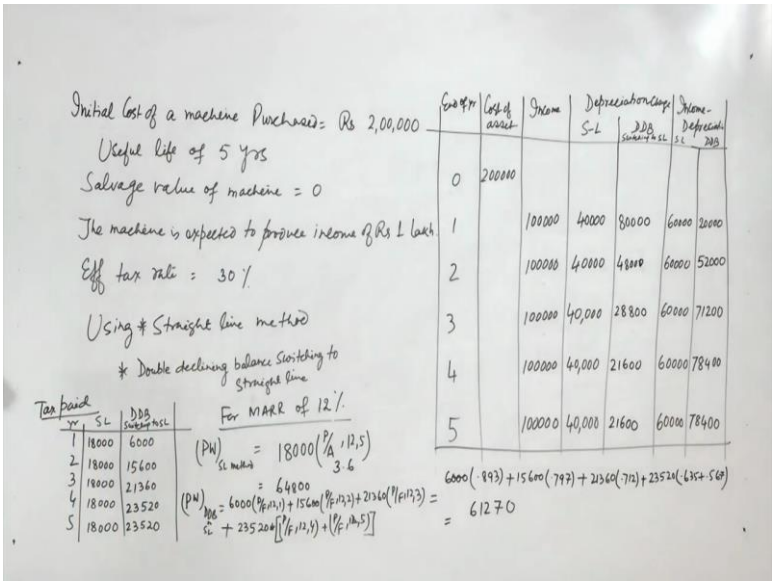

Now we have to compute these values, so P by F 12 1 is point 893. So we have to calculate these values, now if we compute these values, 6000 multiplied by point 893 + 15,600 multiplied by P by F 10 2, so it will be point 797+ 21360 multiplied by point 712 + 23520 multiplied by point 635 + point 567. So this week we did, we can have point 635 + point 567 multiplied by 23520 + 21360 multiplied by point 712 + 15600 multiplied by point 797 + 6000 multiplied by point 893.

So it is coming out to be equal to 61270. Now what we see here is that using the straight-line method, we have paid the present worth value of money as 64,800 whereas if use the accelerated method of depreciation, in that case we have we are paying 61270. So basically what we see is, if we use the accelerated why this difference has come?

What we see is, we are paying initially in the initial periods smaller amount in case of accelerated methods of depreciation. Now since there is time value of money whatever we are paying today the money value basically decreases because of its nature so the amount which is finally coming as the present worth today because of the time value of money, this is amount the smaller.

So we have the advantage in choosing that depreciation schedule where initially the larger depreciation is accounted for, you are paying initially less taxes rather than the schedule in which initially you have to pay more taxes by depreciating less point

Now next is capital gains and losses. So what do you mean by capital gains and losses? Basically we purchase a different type of assets for the functioning of the organisation. Now

these assets have certain lives, now if these assets are basically disposed either before its life or after its life or in other sense, if they are disposed at a value lesser than its book value in that case you are losing.

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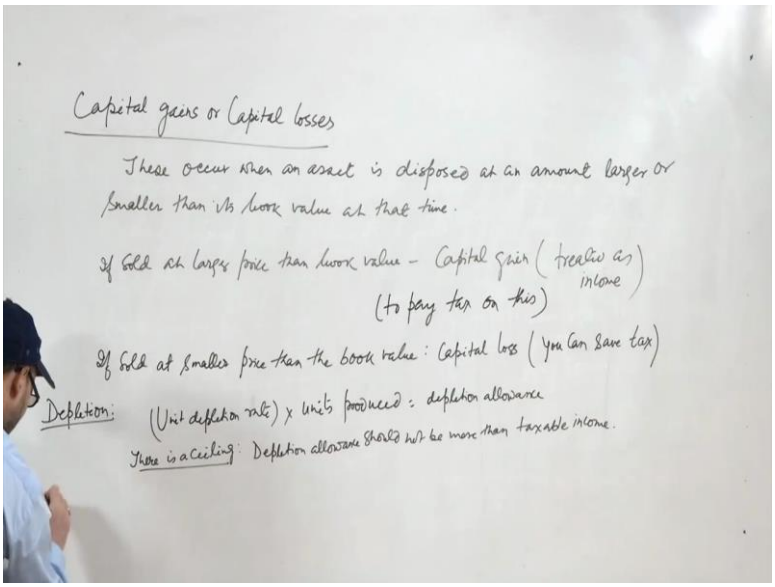

And if you are disposing this asset at a value larger than its book value then in fact it is a capital gain. So capital gains or capital losses, these occur when an asset is disposed at at an amount larger or smaller than its book value at that time. So suppose an asset which had certain life, at any point of time if it is disposed at an amount larger than its book value, in that case so if sold at larger price than book value, it is capital gain, so you have treated as income.

Now if so in that case it would be taken as the income and you have to pay the tax, so to pay tax on this. Similarly if sold at a smaller place than the book value, in that case it is known as a capital loss, so in that case you can save tax. Now basically in this case basically since this is treated as an income, you will have to pay the tax on whatever income you are getting.

And if you are disposing it a at a smaller price, in that case certain percentage you can show and you can get benefit in terms of the amount you are losing. So this is how the capital gains or losses are taken into account and they are basically affecting the tax flow analysis. Next is when we talked about depreciation in that case, there is depletion also. So as we have discussed earlier, the depletion is nothing but the depreciation of natural resources.

So here are also depending upon the units you are producing, the depletion amount which is there that can be take used so that you get the tax benefit on this. So what we see in depletion

is, since there is piece wise removal of natural resources, as the units are removed you need to get certain depletion allowance.

And basically first of all you get the value of unit depletion rate and once you get the unit depletion rate and that will be multiplied by units produced, that basically gives you the depletion allowance. And basically you get the tax rebate basically this amount has to be reduced from the gross income and the taxable income is achieved after this and you basically get some tax benefit on this.

But certainly there is another condition which is discussed about there is ceiling, there is a ceiling that the ceiling is that the depletion allowance should not be more than 50% of the taxable income. So this condition has to be kept in mind while taking the depletion allowance. One more aspect which needs to be kept in mind while discussing about the depreciation schedules is also the recovery period.

The recovery period, recovery period is also important. If the recovery period is less, in that case the amount which is paid by the taxpayer its worth basically at present time will be less. So for any taxpayer smaller recovery period is beneficial than a larger recovery period because as you go on increasing the recovery period basically the amount which is recovered will be at a later time.

And since you are getting the benefits of tax collection at a later time, because of the time value of money, the deductions which you get at an early time is beneficial for the taxpayer. So the taxpayer tries to keep the asset with smaller recovery period, in that case he has to pay less taxes. Certainly the asset loses its value in early time but on tax accounts he gets that benefit and resultant tax flow or cash flow.

Can be basically after comparison it can be seen that if you use the smaller recovery period it is better for a taxpayer. Thank you.