Lecture 12: After-tax analysis

Capital Cost Tax Factor (CCTF)

On Tuesday, we noted that spending a dollar of the company's income on a depreciable asset would lead to some reduction in taxes, owing to depreciation. This can be considered equivalent to getting a reduction in the cost of the asset, by an amount known as the Capital Cost Tax Factor.

We can deduce an expression for this factor as follows *(warning! this analysis makes the simplification that the cost of an asset can be added to the company's book value for that asset class immediately, whereas since 1981, the law has been that only 50% of the cost can be added in during the year of purchase, with the rest being deferred to the next year.)*

Suppose the company's tax rate is **i%**, and I spend $1 on an asset which the law allows me to depreciate at a rate **d%**. Suppose also that the corporate tax rate is **t%**.

Then the taxes I would have paid on that $1 would have been **t**, but are now reduced to **(1-d)t**, saving me an amount **td**.

However, this is a saving at the end of the year, so its present value is only **td/(1+i)**.

In the following year, my taxes are reduced by a factor **td(1-d)**, with a present worth of **td(1-d)/(1+i)^2**. And in the same way, I will get smaller and smaller reductions in my taxes every year from here to eternity. Adding all these up, they come to the surprisingly simple sum of

td/(i+d)

So the effective cost of the asset has been reduced by a factor

CCTF=1-td/(i+d)

If we now repeat this analysis, taking the post-1981 law into account, we obtain a slightly modified factor,

CCTF=1-(1+0.5i)/(1+i)*td/(i+d)

Note: do not attempt to memorise either of these formulae. Should you need them in an exam, they will be provided on a formula sheet.

Example of an After-Tax Analysis

A machine has an undepreciated capital cost of $10,000, and has 5 years remaining in its physical life (which is also how long its function will be needed.) Its operating costs are $19,000/year. When the five years are up, its salvage value will be $1,000.

A new machine of advanced design can perform the same function with an annual operating cost of $12,000. The new machine costs $24,000, and will have a salvage value of $6,000 in five years.

If we sell the old machine now, we'll only get $8,000 for it.

The company pays taxes at 52%, and requires an after-tax rate of return of 20%. Both machines are in Class 8 (declining balance at 20% depreciation per year.) Should the old machine be replaced?

We will calculate the after-tax present worth of replacing the old machine.

There is an immediate expenditure of (24,000-8,000): the cost of the new one, less the salvage value of the old one. But this expenditure is on a depreciable asset, so its effective after-tax cost is reduced by the CCTF. (The money recovered from the salvage is also reduced by the CCTF, since it's deducted from the total amount of money in that class.) So the initial expenditure is

(24,000-8,000)CCTF

Next, there are the savings in operating cost. This is an addition to income, so it's taxed at 52%. Reducing this annual payment to the present gives us

(19,000-12,000)(1-0.52)(P/A,0.2,5)

Lastly, the value of the salvage in 5 years time has increased from 1,000 to 6,000. To get the after-tax value of this salvage, we multiply by the CCTF (since we're losing that amount from the asset class, and therefore lose the associated depreciation allowance.) Moving this sum to the present gives us

(6,000-1,000)CCTF(P/F,0.2,5)

The CCTF can be calculated to be 0.76 -- that is, we're effectively paying for the new machine with 76-cent dollars. After some calculator-bashing, this works out to a present after-tax value of -$580; so the old machine should be kept on.

Second Example of an After-Tax Analysis

Suppose the old machine from the last example suddenly breaks down. By coincidence, a representative of Acme Leaseco comes by the same day and offers to lease one of the new machines to the company at $10,000/year. The operating costs for the new machine will be the same whether we lease or buy it.

This doesn't look like too good a deal -- after all, if we buy the machine outright, the leasing fees saved would pay for it in two and a bit years, whereas we expect it to last for five years and then give us salvage value. However, leasing often comes out well from an after-tax analysis, because the lease costs are a direct deduction from our pre-tax income -- thus, we're paying the lease costs with 48-cent dollars.

*So, working out the present worth, after taxes, of leasing instead of buying, we have an immediate saving of $24,000*CCTF, followed by an annual payout of $10,000(1-0.52)(P/A,0.2,5), followed by the loss of $6,000 in salvage income, with a present value of*

*6,000*CCTF*(P/F,0.2,5)*

The net present worth of these three sums is:

*24,000*CCTF-10,000*(1-0.52)(P/A,00.2,5)-6,000*CCTF*(P/F,0.2,5) = $2,000*

So leasing turns out to be a considerable saving.

Depletion

Resource companies are particularly concerned with the type of depreciation known as *depletion*. As you'll remember, this may be treated differently in internal accounting than it is on the tax form. Typically, the company books will record the depletion allowance as

(cost of property)*(units sold in the year)/(total no. of units)

For tax purposes, the upper limit on depletion in any given year is around 25% of the taxable income derived from the property in that year.

Capital Gains and Losses

Everything a company owns, except goods held for sale to customers, counts as a capital asset. For example, the photocopy machines of a photoshop are capital assets, but the stocks of photocopy paper are not. Selling a capital asset for a profit yields a *capital gain*. Capital gains are typically taxed at a lower rate than other income; while the exact figures vary from year to year, the capital gains tax is about 25%, while the corporate income tax is around 50%.

Carryback and Carryforward

A corporation can carry non-capital losses back to any time in the previous three years, or forward to the following five years. Capital losses can be carried forward forever. Thus, for example, a company that made profits of 50,000, 75,000 and 25,000 in the past three years can, if it makes a 175,000 loss this year, claim a refund of all taxes paid over the past three years, and retain a 25,000 loss against which to discount future profits.

As an additional example, consider a company that purchases a machine for $50,000, and is able to sell it five years later for $60,000. How much tax do they owe on the transaction, assuming the asset is in Class 8 (declining balance depreciation at 20%)

*We distinguish two cases: if the company has other machines in Class 8, the $60,000 will be deducted from the class CCA total in years to come, and the company just owes 25% capital gains tax on the $10,000 profit. If, on the other hand, the company has no other Class 8 assets (which is rather unlikely), this is a recapture of the CCA previously allowed for the machine, and the company now has to pay the income tax that it previously avoided through depreciation. The total avoided is 50,000 - 50,000*(0.8)^5, and this total will now be taxed at 50% (plus the 0.25*$10,000 capital gains tax.)*

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