

Study Notes

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F3 candidates have typically struggled to answer questions on whether to buy or to lease assets. As with several other decision-making processes, a methodical, step-by-step approach is key

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The choice between leasing and buying an asset can be viewed as a finance decision. The decision to invest in that asset will normally have been made already. The investment decision will have involved calculating the net present value (NPV) of all the relevant cash flows arising from acquiring and using the asset. When that decision is being considered, the usual assumption is that the asset will be purchased. Most exam questions involving a lease-or-buy choice indicate that the investment decision has been made already and a positive NPV has been found, so acquiring the asset will benefit the company.

The tax treatment that I will use in this article to compare the purchasing and leasing approaches is the one that has been applied by the examiner for F3 in recent questions on the topic, but students should note that the tax treatment of finance leases will vary from one country to another. You should be careful, therefore, to read and follow the particular tax treatment outlined in each question.



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The best way to make a fair comparison between the cost of acquiring the asset through purchase and the cost of acquiring it through a finance lease is to take the following approach:

- Calculate the NPV of the cost to buy the asset. The cash flows that need to be included in this calculation are the initial asset cost, the tax savings that will arise as a result of buying the asset and any residual value that's expected to arise. The tax savings should be worked out in accordance with the tax regime detailed in the question.
- Calculate the NPV of the cost to lease the asset. A question will normally indicate that the implied interest and the accounting depreciation will be tax allowable. The cash flows that must be included, therefore, are the periodic lease charge and the

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tax relief on the implied interest and the accounting depreciation. If ownership of the asset passes to the lessee, any residual value should also be included. (In reality, the residual value at the end of a finance lease is likely to be negligible.) Note that the examiner's approach here has changed in recent years. Students may encounter past questions and examples where tax relief is granted on the periodic lease charge rather than on the implied interest and accounting depreciation. You must not let this difference in approaches confuse you. An exam question will normally state that tax relief is available on either the lease payment or the implied interest together with accounting depreciation. You should be clear about which approach you are required to use and not muddle the two.

The acquisition option with the lower NPV of cost is, therefore, the less expensive method of obtaining the asset.

All of the cash flows that will arise from actually operating the asset are usually ignored. So the labour costs of operating the asset and the cost of the materials used are left out of the analysis and only the cash flows that arise directly from its acquisition are included. This is because the operational cash flows will already have been considered in the original investment decision. But these costs can be ignored only if they are exactly the same under each finance scheme being considered. To the extent that a cost differs between financing schemes, you must account for this.

The discount rate to use when calculating the NPVs is the lessee's after-tax cost of debt. This assumes that leasing is seen as a substitute for borrowing to buy the asset, and that leasing and borrowing carry a sim-

ilar level of risk. I'd recommend using the sum-of-digits approach, as it's quicker and easier than the actuarial method

SAMPLE QUESTION

A construction company has conducted an investment appraisal on a four-year project and has decided to proceed with the investment. The project involves the acquisition of plant and machinery that could be purchased for \$280,000. The assets are expected to have a negligible residual value at the end of the project.

Alternatively, the assets could be leased using a finance lease for \$85,000 a year, payable in advance. Under such an arrangement the lessee would be responsible for all maintenance costs during the term of the lease. After the lease period expires, ownership of the assets would pass to the construction company. The implied interest and straight-line accounting depreciation will be tax allowable.

The company is subject to tax at 22 per cent, payable one year in arrears. Tax depreciation allowances are available to the purchaser of business assets at 40 per cent a year on a reducing-balance basis. The company is able to borrow at an annual interest rate of 9 per cent.

You are required to determine whether it would be cheaper for the company to lease the assets or to buy them.

ilar level of risk.

With all this in mind, let's try the sample question provided in the panel, right. The first calculation should be to work out the post-tax cost of debt. This involves taking the pre-tax cost and adjusting for the fact that interest is tax deductible. In a simple case of perpetual debt, which we have in this question, the post-tax cost = pre-tax cost \times (1 - tax rate). In this instance it's $0.09 \times (1 - 0.22) = 0.07 = 7.0\%$. On occasion, a yield-to-maturity calculation may be required to obtain a figure for the cost of debt.

To work out the NPV of the cost to buy, we need to calculate the tax savings on the tax depreciation allowances (see table 1). In doing so, we assume that the asset is purchased at the start of year one. Hence it will first give rise to a tax saving in the year-one tax computation, which is calculated at the end of that year. That saving will become a cash flow at the end of year two in this case, as the question states that the tax is paid one year in arrears.

1: TAX SAVINGS ON TAX DEPRECIATION ALLOWANCES

\$000	Tax written-down value	Tax saving at 22%	Timing
Initial cost	280.0		
Year 1: 40%	(112.0)	24.6	End of Y2
	168.0		
Year 2: 40%	(67.2)	14.8	End of Y3
	100.8		
Year 3: 40%	(40.3)	8.9	End of Y4
	60.5		
Year 4: balancing allowance	(60.5)	13.3	End of Y5
Residual value	0.0		

2: CASH FLOW TABLE FOR ASSET PURCHASE

\$000	Start	End of year 1	End of year 2	End of year 3	End of year 4	End of year 5
Initial cost	(280.0)					
Tax savings			24.6	14.8	8.9	13.3
Net cash flows	(280.0)		24.6	14.8	8.9	13.3
7% discount factors	1	0.935	0.873	0.816	0.763	0.713
Present values	(280.0)		21.5	12.1	6.8	9.5
Net present value						(230.1)

The next stage is to set out the cash flows arising from buying the asset in a cash flow table (see table 2). From this we can see that the NPV of the cost to buy the asset is about \$230,100. Note that no interest or repayment of capital cash flows are shown in the cash flow table. This is because the discount rate used reflects the cost of borrowing.

Next we need to calculate the NPV of the cost to lease the asset. The implied interest in the periodic lease charge can be calculated using either of the following two methods:

- The sum-of-digits method. There are four lease payments of \$85,000, so the total to be paid is \$340,000. Because the asset cost is \$280,000, the interest implied in the lease must be \$60,000 (\$340,000 – \$280,000). This implied interest must be spread across the number of years for which interest is to be paid. Because the last lease payment will be paid in advance for year four, this is in effect the end of year three, so the interest needs to be spread over three years. The sum-of-digits

3: TAX RELIEF CALCULATION

\$000	Year 1	Year 2	Year 3	Year 4
Allowable interest	30.0	20.0	10.0	
Accounting depreciation (280/4 years)	70.0	70.0	70.0	70.0
Total tax-allowable costs	100.0	90.0	80.0	70.0
Tax savings at 22%	22.0	19.8	17.6	15.4
Receivable at end of year	2	3	4	5

4: NPV OF COST FOR LEASING OPTION

\$000	Start	End of year 1	End of year 2	End of year 3	End of year 4	End of year 5
Lease charge	(85.0)	(85.0)	(85.0)	(85.0)		
Tax savings brought forward			22.0	19.8	17.6	15.4
Net cash flows	(85.0)	(85.0)	(63.0)	(65.2)	17.6	15.4
7% discount factors	1	0.935	0.873	0.816	0.763	0.713
Present values	(85.0)	(79.5)	(55.0)	(53.2)	13.4	11.0
Net present value						(248.3)

formula is then used: $(n \times [n + 1]) \div 2$, where n is the number of years. So in this instance it's $(3 \times [3 + 1]) \div 2 = 6$. Hence the sum-of-digits calculation has told us to work in sixths. In the first year we take $\frac{3}{6}$, as we want to spread the interest over three years. The numerator then declines each year. The interest to be allowed each year can therefore be calculated as: $\$60,000 \times \frac{3}{6} = \$30,000$ in year one; $\$60,000 \times \frac{2}{6} = \$20,000$ in year two; and $\$60,000 \times \frac{1}{6} = \$10,000$ in year three. Now the tax relief and the NPV can be calculated (see tables 3 and 4).

- The actuarial method. The first step is to estimate the interest rate implied in the lease. To do this we need to find the discount rate that makes the future lease charges to be paid equivalent to the net cost of the assets. As the lease charge is paid in advance, their net cost is \$280,000 less the initial lease charge of \$85,000, which is \$195,000. This \$195,000 is then repaid by the remaining three equal annual instalments of \$85,000. The relevant three-year cumulative present value factor is $\$195,000 \div \$85,000 = 2.294$. From the tables, the three-year cumulative present value factor at 14 per cent is 2.322 and at 15 per cent it is 2.283. Hence the implied interest cost is between 14 per cent and 15 per cent. The interest cost can be calculated by interpolation: $\{[(2.322 - 2.294) \div (2.322 - 2.283)] \times (0.15 - 0.14)\} + 0.14 \approx 14.7$ per cent. (In the exam you may choose to simply use the nearest percentage cost, which would be 15 ▶)

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5: INTEREST ELEMENT CALCULATION FOR EACH YEAR

\$000	Opening balance	Interest at 14.7%	Repayment	Closing balance
Year 1	195.0	28.7	(85.0)	138.7
Year 2	138.7	20.4	(85.0)	74.1
Year 3	74.1	10.9	(85.0)	0.0

6: TAX RELIEF CALCULATION

\$000	Year 1	Year 2	Year 3	Year 4
Allowable interest	28.7	20.4	10.9	
Accounting depreciation (280/4 years)	70.0	70.0	70.0	70.0
Total tax-allowable costs	98.7	90.4	80.9	70.0
Tax savings at 22%	21.7	19.9	17.8	15.4
Receivable at end of year	2	3	4	5

per cent in this case. While it's better to use the more accurate figure, it's more important to finish the question in the time you have while showing that you know the technique.) This rate of 14.7 per cent is then used to calculate the interest element for each year (see tables 5, 6 and 7). In this instance, the final closing balance in table 5 has neatly arrived at zero. In reality, a small figure may remain here as a result of rounding errors. There's no need to worry about this.

The examiner has indicated that she is happy for F3 candidates to use either approach when calculating the implied interest. I'd recommend using the sum-of-digits approach, as it's usually quicker and easier than the actuarial method.

However, there may be instances when the implied interest rate or actual interest are provided in the question, in which case there would be no need to use the simple sum of digits method.

In either calculation you can see that, after the implied interest has been calculated for each year, the accounting depreciation for each year is calculated. The implied interest and the accounting depreciation are then combined to give the total tax-allowable cost. The tax saving on this tax-allowable cost is then calculated, given the relevant corporate tax rate, and then the timing of the savings is consid-

7: NPV OF COST CALCULATION

\$000	Start	End of year 1	End of year 2	End of year 3	End of year 4	End of year 5
Lease charge	(85.0)	(85.0)	(85.0)	(85.0)		
Tax savings brought forward			21.7	19.9	17.8	15.4
Net cash flows	(85.0)	(85.0)	(63.3)	(65.1)	17.8	15.4
7% discount factors	1	0.935	0.873	0.816	0.763	0.713
Present values	(85.0)	(79.5)	(55.3)	(53.1)	13.6	11.0
Net present value						(248.3)

ered. Lastly, the lease charge and the tax savings are combined in a cash flow table and discounted to calculate the NPV of cost.

This approach ensures that the finance element of the lease cost is treated in the same way as the interest on debt finance if the company were to buy/borrow. In both financing options, tax relief is also given on the capital cost of the asset.

In this case, both methods give the same NPV of the cost to lease of \$248,300. (Small differences may arise in other questions, but these aren't important.) So our solution indicates that buying the asset would be the cheaper option in this case.

In the sample question, the tax savings are receivable one year in arrears, so the tax cash flows are shown one year later than when the underlying taxable income or allowance arises. Again, it's important to read the question carefully, because you may sometimes be informed that the tax is paid or received as it arises – in which case no one-year tax delay is required.

As well as comparing the cost to buy and the cost to lease, a company would also consider other factors before making its decision. Purchasing the asset offers the company the following potential advantages over leasing:

- In reality, buying may prove to be cheaper, especially where the asset has a long life.
- Ownership of the asset gives the company total control over how that asset is used. A finance lease may impose restrictions.
- Depending on the tax regime of the country concerned, buying may confer tax advantages such as 100 per cent first-year allowances.
- Assuming that the purchase can be funded from cash, buying an asset avoids the periodic lease charge, which increases fixed operating expenses.

On the other hand, acquiring an asset through a finance lease may well prove to be the better option. Possible reasons for this are as follows:

- The leasing firm may be able to buy the asset at a lower cost owing to its bulk purchasing power.
- The leasing firm may be subsidised by the manu-

8: RECALCULATING THE NPV OF THE LEASING COST

\$000	Start	End of year 1	End of year 2	End of year 3	End of year 4	End of year 5
Initial cost	(280.0)					
Tax savings			24.6	14.8	8.9	13.3
Maintenance cost		(1.8)	(1.8)	(1.8)	(1.8)	
Tax saving on maintenance cost at 22%			0.4	0.4	0.4	0.4
Net cash flows	(280.0)	(1.8)	23.2	13.4	7.5	13.7
7% discount factors	1	0.935	0.873	0.816	0.763	0.713
Present values	(280.0)	(1.7)	20.3	10.9	5.7	9.8
Net present value						(235.0)

facturer of the asset in order to promote the use of its products.

- The leasing firm may be able to finance the acquisition of the asset at a more attractive interest rate than the potential lessee could achieve.
- Depending on the relevant national tax regime, leasing may confer tax advantages.
- Leasing is a highly competitive trade that tends to force down prices.
- In effect, leasing provides a source of finance. This is useful if the company is struggling to raise funds in other ways.
- Leasing rarely requires restrictive covenants or security, which may be required if debt is raised.
- Even if funds are borrowed to buy an asset, the lender will normally require the borrower to provide a significant deposit towards the asset's purchase cost. Leasing may in effect finance 100 per cent of the amount required.
- Leasing may be administratively less complex than borrowing.

In some cases, leasing may offer other benefits. For instance, the lease charge may include insurance and/or maintenance. If this is the case, the buy/borrow NPV calculation needs to be adjusted to include the insurance and/or maintenance costs that would be incurred if the asset were bought rather than leased. For questions based on a simple tax regime where the lessee is given tax relief on the lease payment, this adjustment to the buy/borrow NPV computation is the only adjustment required. However, for a finance lease where tax relief is based on implied interest and depreciation, the lease NPV computation also needs to be adjusted in order to deduct the maintenance element from the lease payment before calculating the interest element of the lease payment. Students should be aware of this complication but exam questions requiring an adjustment to take account of maintenance would be unlikely in the context of a finance lease taxed under implied interest regulations.

It is important to remember that the finance decision is separate from the investment decision and should therefore be considered independently. The investment decision considers whether you should proceed with the investment. The finance decision considers exactly what form of debt finance will minimise the cost associated with acquiring the use of the asset concerned. Complex financing methods are often suggested as potentially cheaper ways to obtain assets. These may then be used to show that a project which is currently not worthwhile could create a positive NPV. This is often done using the adjusted present value (APV) approach. But, if you are told that a company has already decided to undertake a project, you would not be required to revisit its investment decision to account for a cheap form of funding. This is because the cheap funding could only increase the benefit of proceeding with the investment – it wouldn't alter the investment decision.

So, as a rule of thumb, consider the investment decision first. If this shows a positive NPV, then go on to look at the most appropriate form of financing. If the investment decision shows a negative NPV, you would need to consider whether a cheaper form of finance would alter that decision. Fortunately, there is not space to examine both leasing and APV in the same 25-mark exam question, so you shouldn't have to worry about that in a lease-or-buy question.

Exam practice

In order to ensure that you have learned from this article, you should rework the sample question, but this time you should assume that the asset cost is \$290,000; that the lease charge will be paid in arrears; and that the tax is payable as it arises. All the other information is unchanged. Completing this exercise will be a good test of your knowledge and may well prove useful in the exam. The answers will be published in the online student magazine, Velocity (www.cimaglobal.com/velocity).