

## Analyzing Financial Leases

This memo summarizes Myers' approach to valuing financial leases.<sup>1</sup> The memo ignores salvage values and operating costs, which can be easily added to the results presented.

Assuming the objective is to maximize the market value of the firm, the value of a financial lease to the lessee can be expressed as the present value of the cash flows associated with leasing less the present value of the cash flows associated with ownership. The present value of the cash flows associated with leasing is simply - PV{After tax lease payments}

To calculate the present value of cash flows associated with ownership assume first the firm finances purchase of the asset entirely with equity. Then the present value of the cash flows are - Cash cost of asset +PV{Depreciation tax shields}.

Subtracting one present value from the other,

$$\text{Net benefit to leasing} = \text{Cash cost of asset} - \text{PV}\{\text{After tax lease payments} + \text{Depreciation tax shields}\}$$

However, this is not the whole story because it is reasonable to presume that if the firm leases, it will use up some of its scarce borrowing capacity. Indeed, the appropriate comparison is lease versus purchase financed with the same amount of debt implied by the lease. To determine the size of this "lease equivalent loan," assume the firm finances purchase of the asset with a loan requiring after tax interest and principal payments in each year precisely equal to the sum of after tax lease payments and depreciation tax shields. The amount a creditor would lend in return for these payments is just the present value of the payments. Letting  $B_0$  equal the equivalent loan amount,

$$B_0 = \sum_{t=0}^H \frac{(1-T)L_t + TDp_t}{(1+r^*)^t}$$

where  $L_t$  is the lease payment,  $Dp_t$  is depreciation,  $T$  is the marginal tax rate,  $H$  is the period of the lease or the depreciable life of the asset, whichever is longer, and  $r^*$  is the *after tax* borrowing rate. It is important to note that the payments we are concerned with here are principal plus *after tax* interest payments. This means that the appropriate discount rate is the *after tax* rate,  $r^*$ , where  $r^* = (1-T)r$ .

Including the cash flows associated with the equivalent loan,

$$\begin{aligned} \text{Ownership cash flows} &= - \text{Cash cost of asset} + \text{PV}\{\text{Depreciation tax shields}\} + B_0 \\ &\quad - \text{PV}\{\text{Principal and after tax interest payments on the loan } B_0\} \end{aligned}$$

Thus,

$$\begin{aligned} \text{Net benefit to leasing} &= \text{Cash cost of asset} - \text{PV}\{\text{After tax lease payments} + \text{Depreciation tax shields}\} \\ &\quad - B_0 + \text{PV}\{\text{Principal and after tax interest payments}\} \end{aligned}$$

But because

$$\text{PV}\{\text{After tax lease payments} + \text{Depreciation tax shields}\} = \text{PV}\{\text{Principal and after tax interest payments}\}$$

by construction, this expression simplifies to

$$\text{Net benefit to leasing} = \text{Cash cost of asset} - B_0$$

Or letting  $C$  equal the cash cost of the asset and representing  $B_0$  by the equation above,

$$\begin{aligned} \text{Net benefit} \\ \text{to leasing} \end{aligned} = C - \sum_{t=0}^H \frac{(1-T)L_t + TDp_t}{(1+r^*)^t}$$

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<sup>1</sup> Stewart C. Myers, David A. Dill and Alberto J. Bautista, "Valuation of Financial Lease Contracts," *Journal of Finance*, June 1976, p.799-819.

**An Example:**

Assume a company with a 50 percent marginal tax rate is considering leasing an asset that costs \$1,000. The lease consists of 5 annual payments of \$230 each, the first payable in advance. If the asset were purchased it would be depreciated on a straight-line basis for tax purposes and the company would be able to finance the purchase by borrowing at an interest rate of 10 percent.

Assuming the company has sufficient profits to take advantage of the tax shields, the loan that implies precisely the same indebtedness as the lease is

$$B_0 = \sum_{t=0}^4 \frac{(1 - 0.5) \times 230 + 0.5 \times 200}{(1 + 0.05)^t} = \$977.40$$

and the net benefit of the lease is:

$$V_0 = \$1,000 - B_0 = \$22.60$$

The table below compares the after-tax cash flows of leasing with those of ownership financed by the equivalent loan. Observe that the lease is \$22.60 cheaper than ownership in the initial year and that all subsequent cash flows for the two options are identical by design. Note that because the first payment on the equivalent loan is due at time 0, the effective amount borrowed is  $\$977.40 - [(1 - 0.05) \times 230 + 0.5 \times 200] = \$762.40$ .

<i>Period</i>	<i>0</i>	<i>1</i>	<i>2</i>	<i>3</i>	<i>4</i>
Leasing: Cash flows:					
Lease payments	-230.0	-230.0	-230.0	-230.0	-230.0
+ Tax savings	115.0	115.0	115.0	115.0	115.0
<b>Leasing Net Cash Flow</b>	<b>-115.0</b>	<b>-115.0</b>	<b>-115.0</b>	<b>-115.0</b>	<b>-115.0</b>
Purchase: Cash Flows:					
Purchase cost	-1000.0				
+Deprn tax shield	100.0	100.0	100.0	100.0	100.0
+Loan proceeds	762.4				
-Principal payment*		176.9	185.7	195.0	204.8
-Interest payment*	0.0	76.2	58.5	40.0	20.5
+Interest tax shield	0.0	38.1	29.3	20.0	10.2
<b>Purchase Net Cash Flow</b>	<b>-137.6</b>	<b>-115.0</b>	<b>-115.0</b>	<b>-115.0</b>	<b>-115.0</b>
<b>Net Benefit to Leasing</b>	<b>\$22.6</b>	<b>\$0.0</b>	<b>\$0.0</b>	<b>\$0.0</b>	<b>\$0.0</b>

**\*Loan Accounting**

Balance beginning of period	0.0	762.4	585.5	399.8	204.8
Payment, of which:		253.1	244.2	235	225.3
Interest @ 10%		76.2	58.5	40.0	20.5
Principal		176.9	185.7	195.0	204.8
Balance end of period	762.4	585.5	399.8	204.8	0.0