

## Chapter 21

### Long-Term Debt and Leasing

#### Answers to Concept Review Questions

1. What factors should a manager consider when deciding on the amount and type of long-term debt to be used to finance a business?

*A manager must consider if the debt financing should be private – loan or private placement – or a registered public offering. The manager needs to look at the transactions costs associated with each option, matched with the use of the funds – how much money is needed immediately? Will more money be needed in the near future? Several years down the road? Should the financing be long or short term? How much should be borrowed? Transactions costs decrease per dollar borrowed, but the risk to the lender increases with size.*

2. What factors should a manager consider when negotiating the covenants in a long-term debt agreement?

*A manager does not want to have covenants that are too restrictive or that will constrain operations. Yet, managers want sufficient covenants so that bondholders feel protected and will lower the cost of debt because of those protections. Protective covenants reduce the risk of the loan and may allow a riskier borrower to obtain debt.*

3. How can managers estimate their firms' cost of long-term debt prior to meeting with a lender?

*A manager should first look at the equivalent risk-free rate – 10 year Treasury bond if the firm is borrowing for 10 years, 20 year Treasury if borrowing for 20 years, etc. The managers should add on a risk premium (also known as spread to the treasury curve). If managers can approximate the firm's bond rating, they can look up rates for bonds of that maturity.*

4. Suppose that a specialty retail firm takes out a term loan from a bank. Which do you think the bank would prefer to receive as collateral, a claim on the firm's inventory or its receivables?

*The lender would probably prefer receivables to inventory. Specialty inventory might be difficult to sell and might not realize full value. Receivables are more likely to be collected and would be preferable as collateral for a loan.*

5. A problem with collateral is that its value is positively correlated with the borrower's ability to repay. Explain.

*Collateral is all or part of a firm's assets. If the firm is financially distressed and potentially unable to pay its debts, it is because the cash flows generated by the assets are not sufficient for the firm's needs. The assets' value is determined by the present value of their future expected cash flows. As the cash flows decline, the value of the assets (collateral) will also decline. As a firm becomes more financially distressed, its market value (value of its debt plus equity) also declines.*

6. What aspect of syndicated lending is most attractive to the lenders?

*The dispersion of risk is attractive to syndicated lenders. A single lender does not bear all of the risk of a large loan; it is shared by a group of lenders. This leaves the lender less vulnerable if the borrower defaults.*

7. Why are syndicated loans especially useful for financing takeovers?

*Syndicated loans are valuable to companies involved in corporate takeovers because they allow the firm to borrow large sums quickly and relatively discretely. The acquiring firm may not want the takeover to be publicized to avoid other potential bidders from stepping in and possibly bidding up the price of the target company.*

8. How do project finance loans differ from other types of syndicated loans?

*Project finance loans are extended to stand-alone (vehicle) companies created for the sole purpose of constructing and operating a single project. These loans are almost always limited or non-recourse credits, backed only by the assets and cash flows of the project, not by the parent firm. This has the advantage of making it easy for the lender to separate out the project cash flows from the rest of the firm, and perhaps value the assets more easily, but it also means the lender cannot attach the non-project assets of the sponsoring company if the vehicle company defaults on the loan.*

9. What factors should a manager consider when choosing between a term loan and a bond issue for funding long-term debt?

*Generally bank loans are short to intermediate term. A firm looking for very long term financing may prefer corporate bonds. Again, the firm needs to consider the costs of each type of financing, disclosure requirements, restrictive covenants, etc. to determine which choice of financing works best for the firm, given its collateral, its present and future financing needs and its cash flow levels and stability.*

10. What factors might influence the choice between a bond issue with a sinking fund requirement and a serial bond issue?

*A portion of a serial bond issue matures each year, with differing interest rates attached to the bonds maturing at different times. They cannot be retired at the option of the issuer, but they do allow systematic retirement of the debt. In a bond with a sinking fund,*

*the sinking fund may be of the type in which a set amount of bonds is retired yearly, similar to serial bonds. However, the bond issue would carry a single interest rate. Or, the sinking fund could be of the type where the firm puts a certain amount of money into an escrow account, unable to be used for the firm's investments or operations, but earning interest for the firm while waiting for the bond issue to mature. Again the firm will want to consider the cost of debt and transactions costs in making a decision between the two types of bonds.*

11. What factors, other than the current interest rate at which new debt could be sold, should a manager consider when deciding to refund a bond issue?

*The manager will need to look at the call premium – what amount above the face value of the bonds will be paid to bondholders because the bonds are called before maturity. What are the transactions costs associated with calling the old bond issue and issuing new bonds? Do the savings from a lower interest rate compensate for the up-front costs of calling and reissuing bonds on a discounted cash flow basis? If the answer is yes, the bonds should be refunded.*

12. Why is it considered important whether a lease is classified as an *operating lease* or as a *financial (or capital) lease*?

*The classification of a lease as financial or operating affects where that lease appears on the firm's financial statements. An operating lease is an expense, and will appear with the firm's other operating expenses on its balance sheet. A financial lease will appear on the firm's balance sheet with the asset under "Other Assets" and the obligation under "Other Liabilities."*

13. What factors should be considered when deciding between leasing an asset and borrowing funds to purchase the asset?

*The firm needs to look at the tax implications of the lease vs. buy decision. In an operating lease, the lessor owns the asset and receives the tax benefit of depreciating that asset. Presumably some of that savings will be passed on in the form of a lower lease payment for the lessee. But if the cost of the lease is too high, the firm might be better off borrowing the money and purchasing the asset. Only a discounted cash flow analysis comparing the options can answer the question of which option is more advantageous for the firm.*

### **Answers to Self-Test Problems**

- ST21-1.** The initial proceeds per bond, the size of the issue, the initial maturity of the bond, and the years remaining to maturity are shown in the following table for a number of bonds. In each case, the firm is in the 35 percent tax bracket, and the bond has a \$1,000 par value.

Bond	Proceeds per Bond	Size of Issue	Initial Maturity of Bond	Years Remaining to Maturity
A	\$ 975	50,000 bonds	10 years	5 years
B	1,020	25,000	20	15
C	1,000	100,000	25	12

- Indicate whether each bond was sold at a discount, at a premium, or at its par value.
- Determine the total discount or premium for each issue.
- Determine the annual amount of discount or premium amortized for each bond.
- Calculate the unamortized discount or premium for each bond.
- Determine the after-tax cash flow associated with the retirement now of each of these bonds, using the values developed in part (d).

*Premium/discount per bond = Proceeds per bond – Par value per bond*

*Total Premium/discount = Premium/discount per bond x Size of issue (# of bonds)*

*Annual premium/discount amortized per bond = Prem/disc per bond ÷ Initial maturity (in years)*

*[Premiums added to earnings each year, so increase taxable income and taxes paid; Discounts deducted from earnings each year, so reduce taxable income and taxes paid]*

*Unamortized premium/discount per bond = Annual prem/disc per bond x Number years remaining*

*After-tax cash flow = [– (Unamortized pre/disc per bond x Size of issue x Corporate tax rate)]*

*[Retiring premium bonds: remaining prem realized as income, increasing taxes payable;*

*Retiring discount bonds: remaining disc deducted from income, reducing taxes payable]*

Bond	Premium (+) or discount (–) per bond	Total prem or disc per bond	Annual prem or disc per bond	Unamortized prem or disc per bond	After-tax cash flows from retiring issue
A	–\$25.00	–\$1,250,000	–\$2.50	–\$12.50	+\$218,750
B	+20.00	+500,000	+1.00	+15.00	–131,250
C	0	0	0	0	0

**ST21-2.** The principal, coupon interest rate, and interest overlap period are shown in the following table for a number of bonds.

Bond	Principal	Coupon Interest Rate	Interest Overlap Period
A	\$ 15,000,000	6.5%	2 months
B	20,000,000	7.0	3
C	15,000,000	6.0	4
D	100,000,000	8.0	6

- Calculate the dollar amount of interest that must be paid for each bond during the interest overlap period.
- Calculate the after-tax cost of overlapping interest for each bond if the firm is in the 40 percent tax bracket.

*Interest payable during overlap = Coupon rate x Principal x [Months overlap ÷ 12]*

*After-tax cost of overlapping interest = Interest during overlap period x (1 – Tax rate)*

Bond	Calculation of interest payable during overlap period	Interest payable during overlap period	After-tax cost of overlapping interest
A	$\$15,000,000 \times 0.065 \times [2 \div 12]$	\$162,500	\$97,500
B	$20,000,000 \times 0.07 \times [3 \div 12]$	350,000	210,000
C	$15,000,000 \times 0.06 \times [4 \div 12]$	300,000	180,000
D	$100,000,000 \times 0.08 \times [6 \div 12]$	4,000,000	2,400,000

**ST21-3.** Well-Sprung Corporation is considering offering a new \$100 million bond issue to replace an outstanding \$100 million bond issue. The firm wishes to do this to take advantage of the decline in interest rates that has occurred since the original issue. The two bond issues are described in what follows. The firm is in the 30 percent tax bracket.

**Old bonds.** The outstanding bonds have a \$1,000 par value and an 8.5 percent coupon interest rate. They were issued five years ago with a 20-year maturity. They were initially sold at a \$30 per bond discount, and a \$750,000 flotation cost was incurred. They are callable at \$1,085.

**New bonds.** The new bonds would have a 15-year maturity, a par value of \$1,000, and a 7.0 percent coupon interest rate. It is expected that these bonds can be sold at par for a flotation cost of \$600,000. The firm expects a 3-month period of overlapping interest while it retires the old bonds.

- Calculate the initial investment that is required to call the old bonds and issue the new bonds.
- Calculate the annual cash flow savings, if any, expected from the proposed bond-refunding decision.

- c. If the firm uses its after-tax cost of debt of 4.9 percent to evaluate low-risk decisions, find the net present value (NPV) of the bond-refunding decision. Would you recommend the proposed refunding? Explain your answer.

*Steps in bond refunding decision: (1) Calculate the initial investment required to call the old bond issue and float the new one; (2) Find the annual cash flow savings from the new versus old bond issue, and; (3) Find the net present value of the refunding decision. Answers to parts a-f of this problem will be determined with this procedure.*

**(1) Finding the Initial Investment for the Bond Refunding Decision**

(a) Call premium

Before tax [ $(\$1,085 - \$1,000) \times 100,000$  bonds] \$8,500,000

Less: Taxes ( $0.30 \times \$8,500,000$ ) (2,550,000)

After-tax cost of call premium \$5,950,000

(b) Floatation cost of new bond 650,000

(c) Overlapping interest on old bond

$0.085 \times \$100,000,000 \times 3/12 \times (1 - 0.3)$  1,487,500

(d) Tax savings from unamortized discount on old bond

$-\$30 \div 20 \times 15 \times 100,000 \times 0.30$  (675,000)

(e) Tax savings from un-amortized floatation of old bond

$(15 \div 20 \times \$750,000 \times 0.30)$  (168,750)

Initial investment \$7,243,750

**(2) Finding the Annual Cash Flow Savings for Bond Refunding Decision**

Old bond

(a) Interest cost

Before tax ( $0.085 \times \$100,000,000$ ) \$8,500,000

Less: Taxes ( $0.30 \times \$8,500,000$ ) (2,550,000)

After-tax interest cost \$5,950,000

(b) Tax savings from amortization of discount

$-\$30 \div 20 \times 100,000 \times 0.30$  (45,000)

(c) Tax savings from amortization of floatation cost

$[(\$750,000 \div 20) \times 0.30]$  (11,250)

(1) Annual after-tax debt payment \$5,893,750

New bond

(d) Interest cost

Before tax ( $0.070 \times \$100,000,000$ ) \$7,000,000

Less: Taxes ( $0.30 \times \$7,000,000$ ) (2,100,000)

After-tax interest cost \$4,900,000

(e) Tax savings from amortization of floatation cost

$[(\$600,000 \div 15) \times 0.30]$  (12,000)

(2) Annual after-tax debt payment \$4,888,000

Annual cash flow savings [(1) - (2)] \$1,005,750

**(3) Finding the Net Present Value of the Bond Refunding Decision**

(a) Present value of annual cash flow [from part (2)]

$$\begin{array}{r}
 \$1,005,750 \times PVA_{4.9\%,15 \text{ years}} = \$1,005,750 \times 10.450 \quad \$10,510,264 \\
 (b) \text{ Less: Initial investment (from (1))} \quad (7,243,750) \\
 (c) \text{ Net present value (NPV) of refunding} \quad \underline{\$3,266,514}
 \end{array}$$

Decision: The proposed refunding is recommended because the NPV of refunding of \$3,266,514 is greater than \$0.

**ST21-4.** Strident Corporation is attempting to determine whether to lease or purchase a new telephone system. The firm is in the 40 percent tax bracket, and its after-tax cost of debt is currently 4.5 percent. The terms of the lease and the purchase are as follows:

**Lease.** Annual beginning-of-year lease payments of \$22,000 are required over the 5-year life of the lease. The lessor will pay all maintenance costs; the lessee will pay insurance and other costs. The lessee will exercise its option to purchase the asset for \$30,000 paid along with the final lease payment.

**Purchase.** The \$100,000 cost of the telephone system can be financed entirely with a 7.5 percent loan requiring annual end-of-year payments of \$24,716 for five years. The firm in this case will depreciate the equipment under MACRS using a 5-year recovery period. (See Table 9.1 for applicable MACRS percentages.) The firm will pay \$3,500 per year for a service contract that covers all maintenance costs; the firm will pay insurance and other costs. The firm plans to keep the equipment and use it beyond its 5-year recovery period.

- Calculate the after-tax cash outflows associated with each alternative.
- Calculate the present value of each cash outflow stream using the after-tax cost of debt.
- Which alternative, lease or purchase, would you recommend? Why?

*Leasing the research equipment*

*Beginning of period lease payment: \$22,000*

*After-tax lease payment = 22,000 × (1 − 0.4) = \$13,200*

*N = 5 years*

*After-tax cost of debt: 4.5%*

*Present value of lease cash flows, beginning of years 1-5 (end of years 0-4):*

$$\begin{aligned}
 & -\$13,200 - 13,200/1.045 - 13,200/(1.045)^2 - 13,200/(1.045)^3 - 13,200/(1.045)^4 = \\
 & \underline{\underline{-\$85,712}}
 \end{aligned}$$

*Purchasing the equipment*

*\$100,000 equipment cost*

*Depreciation, based on MACRS table:*

*Year 1: 20% × 100,000 = \$20,000*

Year 2:  $32\% \times 100,000 = \$32,000$   
 Year 3:  $19.2\% \times 100,000 = \$19,200$   
 Year 4:  $11.52\% \times 100,000 = \$11,520$   
 Year 5:  $11.52\% \times 100,000 = \$11,520$   
 Year 6:  $5.76\% \times 100,000 = \$ 5,760$

Loan interest and principal:

Year	Principal balance	Payment	Interest	Principal	Ending Principal
1	\$100,000	\$24,716	\$7,500	\$17,216	\$82,784
2	82,784	\$24,716	6,209	18,508	64,276
3	64,276	\$24,716	4,821	19,896	44,380
4	44,380	\$24,716	3,329	21,388	22,992
5	22,992	\$24,716	1,724	22,992	0

Loan cash flows:

Note that there are no inflows (revenues) given for the project. The cash inflows are the tax shields from depreciation and interest, the amount paid times the tax rate of 40%.

Maintenance costs: \$3,500

After-tax cost of maintenance:  $\$3,500 \times (1 - 0.4) = \$2,100$

After-tax cash outflows associated with purchasing the telephone system

End of year	Loan payments (1)	Maint. costs (2)	Deprec (3)	Interest (4)	Total deductions 2+3+4=(5)	Tax shields 0.40x5=(6)	After-tax cash outflows 1+2-6=(7)
1	\$24,716	\$3,500	20,000	\$7,500	\$31,000	\$12,400	\$15,816
2	\$24,716	\$3,500	32,000	6,209	41,709	16,684	11,532
3	\$24,716	\$3,500	19,200	4,821	27,521	11,008	17,208
4	\$24,716	\$3,500	11,520	3,329	18,349	7,340	20,876
5	\$24,716	\$3,500	11,520	1,724	16,744	6,698	21,518

Discounting the after-tax cash outflows at 4.5%: -\$75,547

Since the present value of the after-tax cash outflows for the purchase alternative, -\$75,547, is less than for the lease alternative, -\$85,712, it is less costly to purchase than to lease the equipment. This ignores the depreciation deduction for the purchase option for year 6, as well as year-6 maintenance payments made under the lease option after the asset is purchased in year 5.