

## 1

## Leasing

## LEARNING OBJECTIVES

- Know typical lease types and terms
- Understand the accounting, tax, and legal consequences of leasing
- Decide whether to buy or lease an asset
- Evaluate the reasons for leasing

## notation

<i>APR</i>	annual percentage rate	$r_D$	debt cost of capital
<i>FCF</i>	free cash flow	$T_c$	marginal corporate income tax rate
<i>L</i>	lease payments		
<i>NPV</i>	net present value		

To implement an investment project, a firm must acquire the necessary property, plant, and equipment. As an alternative to purchasing these assets outright, the firm can lease them. You are probably familiar with leases if you have leased a car or rented an apartment. These consumer rentals are similar to the leases used by businesses: The owner retains title to the asset, and the firm pays for its use of the asset through regular lease payments. When firms lease property, plant, or equipment, the leases generally exceed one year. This chapter focuses on such long-term leases.

If you can purchase an asset, you can probably lease it. Commercial real estate, computers, trucks, copy machines, airplanes, and even power plants are examples of assets that firms can lease rather than buy. Equipment leasing is a rapidly growing industry, with more than one-half of the world's leasing now being done by companies in Europe and Asia. In 2008, more than 30% of the productive assets acquired by U.S. companies were procured through leasing contracts, for a total leasing volume exceeding \$250 billion. Eighty-five percent of U.S. companies lease all or some of their equipment, and more than 25% of the world's jet fleet, by dollar value, is leased.<sup>1</sup> The top aircraft leasing company by fleet size at the start of 2013 was GE Capital Aviation

<sup>1</sup>Beacon Funding ([www.beaconfunding.com/vendor\\_programs/statistics.aspx](http://www.beaconfunding.com/vendor_programs/statistics.aspx)).

Services. GE owns and manages over 1670 aircraft, the world's largest commercial airplane fleet.<sup>2</sup> GE leases these commercial aircraft to some 230 airline customers in over 75 countries.

As you will learn, leases are not merely an alternative to purchasing; they also function as an important financing method for tangible assets. In fact, long-term leasing is the most common method of equipment financing. How do companies such as GE Capital Aviation Services set the terms for their leases? How do their customers—the commercial airlines—evaluate and negotiate these leases? In this chapter, we first discuss the basic types of leases and provide an overview of the accounting and tax treatment of leases. We next show how to evaluate the lease-versus-buy decision. Firms often cite various benefits to leasing as compared to purchasing property and equipment, and we conclude the chapter with an evaluation of their reasoning.

## 1.1 The Basics of Leasing

**lessee** the party in a lease who is liable for periodic payments in exchange for the right to use the asset

**lessor** the party in a lease who is the owner of the asset, and who is entitled to the lease payments

**sales-type lease** a lease in which the lessor is the manufacturer (or a primary dealer) of the asset

**direct lease** a lease in which the lessor is not the manufacturer, but is often an independent company that specializes in purchasing assets and leasing them to customers

**sale and leaseback** a lease in which the lessee receives cash from the sale of the asset and then makes lease payments to retain the use of the asset

**leveraged lease** a lease in which the lessor borrows from a bank or other lender to obtain the initial capital for the purchase, using the lease payments to pay the interest and principal on the loan

A lease is a contract between two parties: the *lessee* and the *lessor*. The **lessee** is liable for periodic payments in exchange for the right to use the asset. The **lessor** is the owner of the asset, who is entitled to the lease payments in exchange for lending the asset.

Most leases involve little or no upfront payment. Instead, the lessee commits to make regular lease (or rental) payments for the term of the contract. At the end of the contract term, the lease specifies who will retain ownership of the asset and at what terms. The lease also specifies any cancellation provisions, the options for renewal and purchase, and the obligations for maintenance and related servicing costs.

### Examples of Lease Transactions

Many types of lease transactions are possible based on the relationship between the lessee and the lessor. In a **sales-type lease**, the lessor is the manufacturer (or a primary dealer) of the asset. For example, IBM both manufactures and leases computers. Similarly, Xerox leases its copy machines. Manufacturers generally set the terms of these leases as part of a broader sales and pricing strategy, and they may bundle other services or goods (such as software, maintenance, or product upgrades) as part of the lease.

In a **direct lease**, the lessor is not the manufacturer, but is often an independent company that specializes in purchasing assets and leasing them to customers. For example, Ryder System, Inc., owns more than 135,000 commercial trucks, tractors, and trailers, which it leases to small businesses and large enterprises throughout the world. In many instances of direct leases, the lessee identifies the equipment it needs first and then finds a leasing company to purchase the asset.

If a firm already owns an asset it would prefer to lease, it can arrange a **sale and leaseback** transaction. In this type of lease, the lessee receives cash from the sale of the asset and then makes lease payments to retain the use of the asset. In 2002, San Francisco Municipal Railway (Muni) used the \$35 million in proceeds from the sale and leaseback of 118 of its light-rail vehicles to offset a large operating budget deficit. The purchaser, CIBC World Markets of Canada, received a tax benefit from depreciating the rail cars, something Muni could not do as a public transit agency.

With many leases, the lessor provides the initial capital necessary to purchase the asset, and then receives and retains the lease payments. In a **leveraged lease**, however, the lessor borrows from a bank or other lender to obtain the initial capital for the purchase, using the

<sup>2</sup>GE Capital Aviation Services Global Fact Sheet (<http://www.gecas.com/en/docs/GECASFSJ2013.pdf>).

**special-purpose entity (SPE)** an entity created by the lessee for the sole purpose of obtaining the lease

**synthetic lease** a lease that is designed to obtain specific accounting and tax treatment

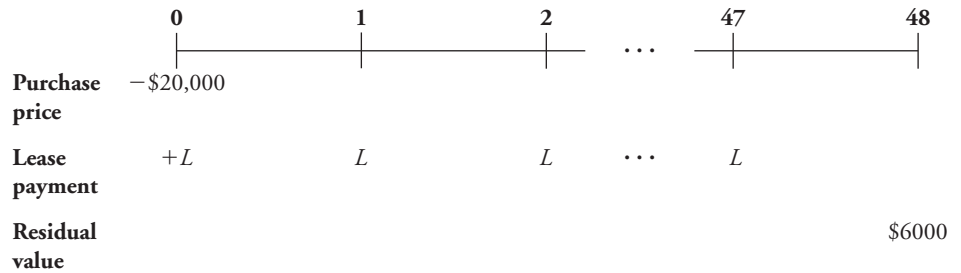
**residual value** the leased asset's market value at the end of the lease

lease payments to pay the interest and principal on the loan. Also, in some circumstances, the lessor is not an independent company but rather a separate business partnership, called a **special-purpose entity (SPE)**, which is created by the lessee for the sole purpose of obtaining the lease. SPEs are commonly used in **synthetic leases**, which are designed to obtain specific accounting and tax treatment (discussed further in Section 1.2).

### Lease Payments and Residual Values

Suppose your business needs a new \$20,000 electric forklift for its warehouse operations, and you are considering leasing the forklift for four years. In this case, the lessor will purchase the forklift and allow you to use it for four years (48 months). At that point, you will return the forklift to the lessor. How much should you expect to pay for the right to use the forklift for the first four years of its life?

The cost of the lease will depend on the asset's **residual value**, which is its market value at the end of the lease. Suppose the residual value of the forklift in four years will be \$6000. If lease payments of amount  $L$  are made monthly, then the lessor's cash flows from the transaction are as follows (note that lease payments are typically made at the beginning of each payment period):



In a perfect capital market (where lessors compete with one another in initiating leases), the lease payment should be set so that the NPV of the transaction is zero and the lessor breaks even:

$$PV(\text{Lease Payments}) = \text{Purchase Price} - PV(\text{Residual Value}) \tag{1.1}$$

In other words, *in a perfect market, the cost of leasing is equivalent to the cost of purchasing and reselling the asset.*

Thus, the amount of the lease payment will depend on the purchase price, the residual value, and the appropriate discount rate for the cash flows.

#### EXAMPLE 1.1 Lease Terms in a Perfect Market

##### PROBLEM

Suppose the purchase price of the forklift is \$20,000, its residual value in four years is certain to be \$6000, and there is no risk that the lessee will default on the lease. If the risk-free interest rate is a 6% APR with monthly compounding, what would be the monthly lease payment for a four-year lease in a perfect capital market?

##### SOLUTION

##### PLAN

Because all cash flows are risk free, we can discount them using the risk-free interest rate of  $6\%/12 = 0.5\%$  per month using Eq. 1.1. Once we know the  $PV$  of the monthly lease payments, we can solve for the payment as the cash flow in an annuity due.

(Continued)

**EXECUTE**

$$PV(\text{Lease Payments}) = \$20,000 - \$6000/1.005^{48} = \$15,277.41$$

Because the first lease payment starts today, we can view the lease as an initial payment of  $L$  plus a 47-month annuity of  $L$ . Thus, using the annuity formula, we need to find  $L$  so that

$$15,277.41 = L + L \times \frac{1}{0.005} \left( 1 - \frac{1}{1.005^{47}} \right) = L \times \left[ 1 + \frac{1}{0.005} \left( 1 - \frac{1}{1.005^{47}} \right) \right]$$

Solving for  $L$ , we get

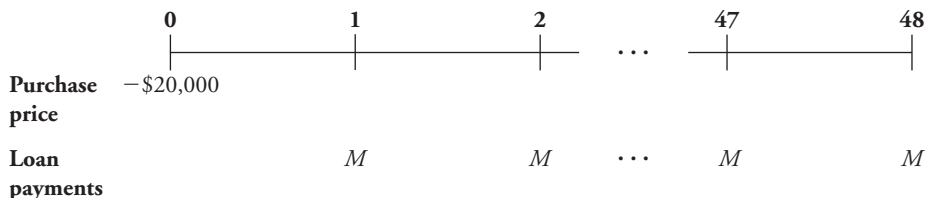
$$L = \frac{15,277.41}{1 + \frac{1}{0.005} \left( 1 - \frac{1}{1.005^{47}} \right)} = \$357.01 \text{ per month}$$

**EVALUATE**

If the lessee pays \$357.01 per month, starting immediately, the  $PV$  of the 48 lease payments will equal the price of the forklift less the  $PV$  of its residual value at the end of the lease.

**Leases Versus Loans**

Alternatively, you could obtain a four-year loan for the purchase price and buy the forklift outright. If  $M$  is the monthly payment for a fully amortizing loan, the lender's cash flows will be as follows:



Assuming the loan is fairly priced, the loan payments would be such that

$$PV(\text{Loan Payments}) = \text{Purchase Price} \tag{1.2}$$

Comparing Eq. 1.2 with Eq. 1.1, we see that while with a standard loan we are financing the entire cost of the asset, with a lease we are financing only the cost of the economic depreciation of the asset during the term of the lease. Because we are getting the entire asset when we purchase it with the loan, the loan payments are higher than the lease payments.

**EXAMPLE 1.2**  
Loan Payments in a Perfect Market

**PROBLEM**

Suppose that you purchase the forklift for \$20,000 by borrowing the purchase price using a four-year annuity loan. What would the monthly loan payment be in a perfect capital market where the risk-free interest rate is a 6% APR with monthly compounding, assuming no risk of default? How does this compare with the lease payment of Example 1.1?

**SOLUTION**

**PLAN**

Because all cash flows are risk free, we can discount them using the risk-free interest rate of  $6\%/12 = 0.5\%$  per month. Because loan payments are made at the end of each month, using the annuity formula to value the loan payments.

**EXECUTE**

Eq. 1.2 becomes

$$M \times \frac{1}{0.005} \left( 1 - \frac{1}{1.005^{48}} \right) = 20,000$$

Solving for  $M$  gives the loan payments:

$$M = \frac{20,000}{\frac{1}{0.005} \left( 1 - \frac{1}{1.005^{48}} \right)} = \$469.70 \text{ per month}$$

**EVALUATE**

Of course, while the lease payments are lower, with the lease, we have the use of the forklift for four years only. With the loan, we own the forklift for its entire life.

**Calculating Auto Lease Payments**

Rather than use the annuity formula to calculate the lease payments, as we did in Example 1.1, in many cases, practitioners use the following approximation to calculate the lease payments:

$$L = \underbrace{\frac{\text{Purchase Price} - \text{Residual Value}}{\text{Term}}}_{\text{Average Depreciation}} + \underbrace{\left( \frac{\text{Purchase Price} + \text{Residual Value}}{2} \right) \times \text{Interest Rate}}_{\text{Financing Cost}}$$

where the purchase price includes any fees charged on the lease (and is net of any down payment), the term is the number of payment periods, and the interest rate is for a payment period. The idea behind this approximation is that the first term is the average depreciation over a payment period and the second term is the interest cost associated with the average value of the asset. The sum is what you have to pay to use the asset over one payment period.

Despite its simplicity, this formula is very accurate for lease terms up to five years and interest rates up to 10%. Using it to calculate the lease payments in Example 1.1 gives

$$\frac{20,000 - 6000}{48} + \left( \frac{20,000 + 6000}{2} \right) \times 0.005 = \$356.67$$

which is within \$1 of the amount calculated in Example 1.1.

This approximation for the lease payment is used to calculate the payment on automobile leases. In that case, the formula is often stated as

$$L = \frac{\text{Purchase Price} - \text{Residual Value}}{\text{Term}}$$

$$+ (\text{Purchase Price} + \text{Residual Value}) \times \text{Money Factor}$$

leaving many first-time car lessees wondering why they have to pay interest on *both* the purchase price and the residual value. In reality, all that has happened is that the factor of 2 is subsumed into the money factor; that is, the money factor is half the interest rate.

The monthly loan payments in Example 1.2 exceed the lease payments in Example 1.1. This difference does not mean the lease is superior to the loan. While the lease payments are lower, with the lease, we have use of the forklift for four years only. If we purchase the forklift using the loan, we own it after four years and can sell it for its residual value of \$6000. Alternatively, if we lease the forklift and want to keep it after the lease terminates, we can purchase it for its fair market value of \$6000. Once we consider the benefit of this residual value, by the Law of One Price, the total cost of purchasing with either the loan or the lease is the same. That is, combining Eq. 1.1 and Eq. 1.2, we have

$$PV(\text{Lease Payments}) + PV(\text{Residual Value}) = PV(\text{Loan Payments}) \quad (1.3)$$

In other words, *in a perfect market, the cost of leasing and then purchasing the asset is equivalent to the cost of borrowing to purchase the asset.*<sup>3</sup>

## End-of-Term Lease Options

In Example 1.1, we assumed that at the end of the lease the forklift would be returned to the lessor, who would then obtain its residual market value of \$6000. In reality, other lease terms are possible. In many cases, the lease allows the lessee to obtain ownership of the asset for some price.

**fair market value (FMV) lease** a lease that gives the lessee the option to purchase the asset at its fair market value at the termination of the lease

**\$1.00 out lease (finance lease)** a lease in which ownership of the asset transfers to the lessee at the end of the lease for a nominal cost of \$1.00

**fixed price lease** a lease in which the lessee has the option to purchase the asset at the end of the lease for a fixed price that is set upfront in the lease contract

**fair market value cap lease** a lease in which the lessee can purchase the asset at the minimum of its fair market value and a fixed price (the “cap”)

- A **fair market value (FMV) lease** gives the lessee the option to purchase the asset at its fair market value at the termination of the lease. (Depending on the asset, determining its fair market value may be complicated. The lease will typically stipulate a procedure for doing so, and it often will require estimates of the fair market value to be provided by an independent third party.) With perfect capital markets, there is no difference between an FMV lease and a lease in which the assets are retained by the lessor, because acquiring the asset at its fair market value is a zero-NPV transaction.
- In a **\$1.00 out lease** (also known as a **finance lease**), ownership of the asset transfers to the lessee at the end of the lease for a nominal cost of \$1.00. Thus, the lessee will continue to have use of the asset for its entire economic life. The lessee has effectively purchased the asset by making the lease payments. As a result, this type of lease is in many ways equivalent to financing the asset with a standard loan.
- In a **fixed price lease**, the lessee has the option to purchase the asset at the end of the lease for a fixed price that is set upfront in the lease contract. This type of lease is very common for consumer leases (such as for autos). Notice that this kind of lease gives the lessee an option: At the end of the lease, if the market value of the asset exceeds the fixed price, the lessee can buy the asset at below its market value; if the market value of the asset does not exceed the fixed price, however, the lessee can walk away from the lease and purchase the asset for less money elsewhere. Consequently, the lessor will set a higher lease rate to compensate for the value of this option to the lessee.
- In a **fair market value cap lease**, the lessee can purchase the asset at the minimum of its fair market value and a fixed price (the “cap”). The lessee has the same option as in a fixed price lease, although the option in this case is easier to exercise because the lessee does not have to find a similar asset elsewhere to buy when the fixed price exceeds the market value.

### EXAMPLE 1.3

#### Lease Payments and End-of-Lease Options

#### PROBLEM

Compute the lease payments for the forklift lease of Example 1.1 if the lease is (a) a fair market value lease, (b) a \$1.00 out lease, or (c) a fixed price lease that allows the lessee to buy the asset at the end of the lease for \$4000.

#### SOLUTION

#### PLAN

With the FMV lease, the lessee can buy the forklift for its fair market value of \$6000 at the end of the lease. The lessor obtains a residual value of \$6000, either from the forklift itself or from the payment from the lessee. Thus, the lease payments will be unchanged from Example 1.1, or \$357 per month.

<sup>3</sup> For a theoretical analysis of competitive lease pricing, see M. Miller and C. Upton, “Leasing, Buying, and the Cost of Capital Services,” *Journal of Finance* 31(3) (1976): 761–786; and W. Lewellen, M. Long, and J. McConnell, “Asset Leasing in Competitive Capital Markets,” *Journal of Finance* 31(3) (1976): 787–798.

With the \$1.00 out lease, the lessor receives essentially no residual value. Thus, the lease payments themselves will have to compensate the lessor for the full \$20,000 purchase price.

With the fixed price lease, because the forklift will be worth \$6000 for certain, the lessee will exercise the option to purchase it for \$4000. As a result, the lessor will receive only \$4000 at the end of the lease.

### EXECUTE

The lease payments for the \$1.00 out lease must have a PV of \$20,000, so they are

$$L = \frac{20,000}{1 + \frac{1}{0.005} \left( 1 - \frac{1}{1.005^{47}} \right)} = \$467.36 \text{ per month}$$

For the fixed price lease to have an NPV of zero, the present value of the lease payments must be  $\$20,000 - \$4000/1.005^{48} = \$16,851.61$ . Therefore, the lease payment will be

$$L = \frac{16,851.61}{1 + \frac{1}{0.005} \left( 1 - \frac{1}{1.005^{47}} \right)} = \$393.79 \text{ per month}$$

### EVALUATE

The \$1.00 out lease payments are slightly less than the loan payments of \$470 per month calculated in Example 1.2 because the lease payments occur at the beginning—rather than the end—of the month. The fixed-price lease payment exceeds that of the FMV lease due to the lessee's ability to buy the asset at a discount at the end of the lease.

## Other Lease Provisions

Leases are privately negotiated contracts and can contain many more provisions than are described here. For example, they may include early cancellation options that allow the lessee to end the lease early (perhaps for a fee). They may contain buyout options that allow the lessee to purchase the asset before the end of the lease term. Clauses may allow the lessee to trade in and upgrade the equipment to a newer model at certain points in the lease. Each lease agreement can be tailored to fit the precise nature of the asset and the needs of the parties at hand.

These features of leases will be priced as part of the lease payment. Terms that give valuable options to the lessee raise the amount of the lease payments, whereas terms that restrict these options will lower them. Absent market imperfections, leases represent another form of zero-NPV financing available to a firm, and the Modigliani-Miller Propositions apply: Leases neither increase nor decrease firm value, but serve only to divide the firm's cash flows and risks in different ways.<sup>4</sup>

### Concept Check

1. In a perfect capital market, how is the amount of a lease payment determined?
2. What types of lease options would raise the amount of the lease payment?

<sup>4</sup> For an analysis of options embedded in lease contracts, see J. McConnell and J. Schallheim, "Valuation of Asset Leasing Contracts," *Journal of Financial Economics* 12(2) (1983): 237–261; and S. Grenadier, "Valuing Lease Contracts: A Real-Options Approach," *Journal of Financial Economics* 38(3) (1995): 297–331.



## 1.2 Accounting, Tax, and Legal Consequences of Leasing

We have seen that with perfect capital markets, leasing represents yet another zero-NPV financing alternative for a firm. Thus, the decision to lease is often driven by real-world market imperfections related to leasing's accounting, tax, and legal treatment.<sup>5</sup> In particular, when a firm leases an asset, a number of important questions arise: Should the firm list the asset on its balance sheet and deduct depreciation expenses? Should the firm list the lease as a liability? Can the lease payments be deducted for tax purposes? In the event of bankruptcy, is the leased asset protected from creditors? As we will see in this section, the answers to these questions depend on how the lease is structured.

### Lease Accounting

When publicly traded firms disclose leasing transactions in their financial statements, they must follow the recommendations of the Financial Accounting Standards Board (FASB). For lessees, the FASB distinguishes two types of leases based on the lease terms, and this classification determines the lease's accounting treatment:

**operating lease** a lease that is viewed as a rental for accounting purposes. The lessee reports the entire lease payment as an operating expense

**capital lease (finance lease)** a lease that is viewed as an acquisition for accounting purposes. The asset acquired is listed on the lessee's balance sheet

- An **operating lease** is viewed as a rental for accounting purposes. In this case, the lessee reports the entire lease payment as an operating expense. The lessee does not deduct a depreciation expense for the asset and does not report the asset, or the lease payment liability, on its balance sheet. Operating leases are disclosed in the footnotes of the lessee's financial statements.
- A **capital lease** (also called a **finance lease**) is viewed as an acquisition for accounting purposes. The asset acquired is listed on the lessee's balance sheet, and the lessee incurs depreciation expenses for the asset. In addition, the present value of the future lease payments is listed as a liability, and the interest portion of the lease payment is deducted as an interest expense.<sup>6</sup>

The different accounting treatment for each type of lease will affect the firm's balance sheet as well as its debt-equity ratio, as shown in Example 1.4.

### EXAMPLE 1.4 Leasing and the Balance Sheet

#### PROBLEM

Harbord Cruise Lines currently has the following balance sheet (in millions of dollars):

Assets		Liabilities	
Cash	100	Debt	900
Property, Plant, and Equipment	1500	Equity	700
<b>Total Assets</b>	<b>1600</b>	<b>Total Debt plus Equity</b>	<b>1600</b>

Harbord is about to add a new fleet of cruise ships. The price of the fleet is \$400 million. What will Harbord's balance sheet look like if (a) it purchases the fleet by borrowing the \$400 million, (b) it acquires the fleet through a \$400 million capital lease, or (c) it acquires the fleet through an operating lease?

<sup>5</sup> Anyone who has ever considered leasing a car will be familiar with one such imperfection. In most states, lessees do not pay sales tax on the purchase price of the car, only on the lease payments, which usually means lessees can avoid paying a substantial part of the sales tax purchasers must pay.

<sup>6</sup> The accounting treatment of a capital lease for the lessor will depend on whether it is a sales-type lease, a direct lease, or a leveraged lease (a direct lease in which the lessor obtains more than 60% debt financing to purchase the asset, and the debt is non-recourse in that it is backed solely by the income from the asset).



## SOLUTION

### PLAN

For parts (a) and (b), the balance sheet consequences are the same: The fleet becomes a new asset of the firm, and the \$400 million becomes an additional liability. If the fleet is acquired through an operating lease, as described in part (c), there is no change in the original balance sheet.

### EXECUTE

For (a) and (b):

Assets		Liabilities	
Cash	100	Debt	1300
Property, Plant, and Equipment	1900	Equity	700
<b>Total Assets</b>	<b>2000</b>	<b>Total Debt plus Equity</b>	<b>2000</b>

Note that the firm's debt-equity ratio increases in this case (from  $900/700 = 1.29$  to  $1300/700 = 1.86$ ).

For part (c), there is no change to the balance sheet: The fleet is not listed as an asset, and the lease is not viewed as a liability. Thus, the apparent leverage ratio is unchanged.

### EVALUATE

The capital lease has the same effect on the firm's balance sheet and leverage ratio as does buying the asset by borrowing, because the lease provides close to the same benefits as owning the assets. The operating lease, however, does not affect the balance sheet or its leverage.

### Operating Leases at Alaska Air Group

Alaska Air Group, Inc., was incorporated in 1985 as a holding company with two main subsidiaries: Alaska Airlines, Inc., and Horizon Air Industries. Alaska Airlines is a major airline with flights throughout the United States. Horizon Air is a regional airline concentrated in the Pacific Northwest. Typical for airlines, Alaska Air Group leases many of its aircraft, as is summarized in the following table:

	Owned	Leased	Total
Alaska Airlines	90	34	124
Horizon Air	33	29	62

Source: Alaska Air Group, Inc., December 2012 10-K.

Alaska Airlines leases almost one-third of its aircraft, and Horizon Air leases more than half of its aircraft. These leases are

almost exclusively operating leases. (In many cases, the lessors are trusts established by a third party specifically to purchase, finance, and lease aircraft to Alaska Air Group.) In addition, Alaska Air Group leases the majority of its airport and terminal facilities.

Because these leases are operating leases, Alaska Air Group reports the entire lease payment as an operating expense. During 2008, Alaska Air Group reported aircraft rent expenses of \$116 million relative to operating revenues of \$4.7 billion. The firm did not deduct a depreciation expense for its leased aircraft, and these aircraft did not show up as an asset on its balance sheet (although Alaska Air Group does report the value of the aircraft that it owns as assets on its balance sheet). And though the lease obligations are not listed as a liability, if they were they would more than double Alaska Air Group's reported debt.

Because capital leases increase the apparent leverage on the firm's balance sheet, firms sometimes prefer to have a lease categorized as an operating lease to keep it off the balance sheet. In its Statement of Financial Accounting Standards No. 13 (FAS13), the FASB provides specific criteria that distinguish an operating lease from a capital lease. The lease is treated as a capital lease for the lessee and must be listed on the firm's balance sheet if it satisfies any of the following conditions:

1. Title to the property transfers to the lessee at the end of the lease term.
2. The lease contains an option to purchase the asset at a bargain price that is substantially less than its fair market value.
3. The lease term is 75% or more of the estimated economic life of the asset.

4. The present value of the minimum lease payments at the start of the lease is 90% or more of the asset's fair market value.

These conditions are designed to identify situations in which the lease provides the lessee with use of the asset for a large fraction of its useful life. For example, a \$1.00 out lease satisfies the second condition and so would be ruled a capital lease for accounting purposes. Firms that prefer to keep a lease off-balance-sheet will often structure lease contracts to avoid these conditions.

### EXAMPLE 1.5

#### Operating Versus Capital Leases

#### PROBLEM

Consider a seven-year fair market value lease for a \$12.5 million Gulfstream jet with a remaining useful life of 10 years. Suppose the monthly lease payments are \$175,000 and the appropriate discount rate is a 6% APR with monthly compounding. Would this lease be classified as an operating lease or a capital lease for the lessee? What if the lease contract gave the lessee the option to cancel the contract after five years?

#### SOLUTION

##### PLAN

We compute the present value of the monthly lease payments at the beginning of the lease using the annuity formula with a monthly interest rate of  $6\%/12 = 0.5\%$  and  $7 \times 12 - 1 = 83$  monthly payments after the initial payment. If the *PV* of the lease payments exceeds 90% of the value of the jet, it will be classified as a capital lease. If the contract can be canceled after five years, then the lease will only be a capital lease if the *PV* of the lease payments over the first five years is greater than 90% of the value of the jet.

##### EXECUTE

$$PV(\text{Lease Payments}) = 175,000 \times \left[ 1 + \frac{1}{0.005} \left( 1 - \frac{1}{1.005^{83}} \right) \right] = \$12.04 \text{ million}$$

Because the present value of the lease payments is  $12.04/12.50 = 96.3\%$  of the value of the jet, the lease satisfies condition 4 and so it is a capital lease.

If the lessee can cancel the contract after five years, then the minimum number of lease payments is 60 under the contract. In this case,

$$PV(\text{Lease Payments}) = 175,000 \times \left[ 1 + \frac{1}{0.005} \left( 1 - \frac{1}{1.005^{59}} \right) \right] = \$9.10 \text{ million}$$

This is only  $9.10/12.5 = 73\%$  of the value of the jet. As no other conditions for a capital lease are satisfied, the lease would be classified as an operating lease.

##### EVALUATE

Simply by adding a cancellation option, the lease can be classified as an operating lease, such that it would have no impact on the balance sheet of the lessee.

## The Tax Treatment of Leases

The categories used to report leases on the financial statements affect the values of assets on the balance sheet, but they have no direct effect on the cash flows that result from a leasing transaction. The IRS has its own classification rules that determine the tax treatment of a lease. Because the tax treatment does affect the cash flows, these rules are more significant from a financial valuation perspective.

The IRS separates leases into two broad categories: true tax leases and non-tax leases. These categories are roughly equivalent to operating and capital leases, although the defining criteria are not identical.

**true tax lease** a lease in which the lessor receives the depreciation deductions associated with the ownership of the asset. The lessee can deduct the full amount of the lease payments as an operating expense, and these lease payments are treated as revenue for the lessor

**non-tax lease** a lease in which the lessee receives the depreciation deductions. The lessee can also deduct the interest portion of the lease payments as an interest expense. The interest portion of the lease payment is interest income for the lessor

In a **true tax lease**, the lessor receives the depreciation deductions associated with the ownership of the asset. The lessee can deduct the full amount of the lease payments as an operating expense, and these lease payments are treated as revenue for the lessor.

Although the legal ownership of the asset resides with the lessor, in a **non-tax lease**, the lessee receives the depreciation deductions. The lessee can also deduct the interest portion of the lease payments as an interest expense. The interest portion of the lease payment is interest income for the lessor.

IRS Revenue Ruling 55-540 provides the conditions that determine the tax classification of a lease. If the lease satisfies any of these conditions, it is treated as a non-tax lease:

1. The lessee obtains equity in the leased asset.
2. The lessee receives ownership of the asset on completion of all lease payments.
3. The total amount that the lessee is required to pay for a relatively short period of use constitutes an inordinately large proportion of the total value of the asset.
4. The lease payments greatly exceed the current fair rental value of the asset.
5. The property may be acquired at a bargain price in relation to the fair market value of the asset at the time when the option may be exercised.
6. Some portion of the lease payments is specifically designated as interest or its equivalent.<sup>7</sup>

As with the accounting criteria, these rules attempt to identify cases in which a lease is likely to provide the lessee with use of the asset for a large fraction of its useful life. These rules are somewhat vague and are designed to provide the IRS with sufficient latitude to prevent the use of leases solely for tax avoidance.

For example, suppose a \$200,000 asset was required to be depreciated by \$20,000 per year for 10 years for tax purposes. By acquiring the asset through a four-year \$1.00 out lease with payments of \$50,000 per year, a firm could receive the same \$200,000 total deduction at a faster rate if the lease were categorized as a true tax lease.<sup>8</sup> The IRS rules prevent this type of transaction by categorizing such a lease as a non-tax lease (via conditions 3 and 5).

## Leases and Bankruptcy

Recall from Chapter 16 that when a firm files for bankruptcy under Chapter 11 of the U.S. bankruptcy code, its assets are protected from seizure by the firm's creditors while existing management is given the opportunity to propose a reorganization plan. Even secured lenders are prevented from taking the assets that serve as collateral for their loans during this period, which can last from a few months to several years. Instead, bankruptcy law permits the firm to continue to use the assets in an effort to remain a going concern.

The treatment of leased property in bankruptcy will depend on whether the lease is classified as a security interest or a true lease by the bankruptcy judge. If the lease is

<sup>7</sup>IRS Revenue Ruling 55-540, 1955. Additional considerations exist for the tax treatment for the lessor if the lease is a leveraged lease.

<sup>8</sup>This transaction would have the opposite tax consequence for the lessor: The lease payments would be taxed as revenues, but the cost of the asset would be depreciated at the slower rate. However, there can be an advantage if the lessor is in a lower tax bracket than the lessee.

## Synthetic Leases

Synthetic leases are designed to be treated as an operating lease for accounting purposes and as a non-tax lease for tax purposes. With a synthetic lease, the lessee is able to deduct depreciation and interest expenses for tax purposes, just as if it had borrowed to purchase the asset, but does not need to report the asset or the debt on its balance sheet.

To obtain this accounting and tax treatment, synthetic leases have typically been structured by creating a special-purpose entity that will act as the lessor and obtain financing, acquire the asset, and lease it to the firm. To ensure that the lease qualifies as an operating lease, the lease is structured so that it (1) provides a fixed purchase price at the end of the lease term based on an initial appraised value (and so is not a bargain price), (2) has a term less than 75% of the economic life of the asset (which is renewable under certain conditions), and (3) has minimum lease payments with a present value less than 90% of the fair value of the property. In addition, to avoid balance sheet consolidation, the owner of record of the SPE must make an initial minimum equity investment of 3% that remains at risk during the entire lease term.

The lease can qualify as a non-tax lease by designating some portion of the lease payments as interest.

A major motivation for such leases appears to be that they allow firms to use debt while avoiding the accounting consequences of debt. In particular, by keeping the debt off the balance sheet, the firm's debt-equity ratio is improved, its return on assets is generally raised, and, if the lease payments are less than the interest and depreciation expenses, its reported earnings per share will be higher.

These types of transactions were used and abused by Enron Corporation to boost its earnings and hide its liabilities prior to its downfall. In the wake of the Enron scandal, the FASB has significantly tightened the requirements for SPEs, raising the at-risk equity investment of the SPE to 10% and requiring that ownership truly be independent from the lessor. Investors have also reacted skeptically to such deals, forcing many firms to avoid synthetic leases or unwind structures that were already in place. For example, in 2002, Krispy Kreme Doughnut Corporation reversed its decision to use a synthetic lease to fund a new \$35 million plant after an article critical of the transaction was published in *Forbes* magazine.

**security interest** a lease where the lessee is assumed to have effective ownership of the asset and the asset is protected against seizure

**true lease** a lease where in bankruptcy the lessor retains ownership rights over the asset

deemed to be a **security interest**, the firm is assumed to have effective ownership of the asset and the asset is protected against seizure. The lessor is then treated as any other secured creditor and must await the firm's reorganization or ultimate liquidation.

If the lease is classified as a **true lease** in bankruptcy, then the lessor retains ownership rights over the asset. Within 120 days of filing Chapter 11, the bankrupt firm must choose whether to assume or reject the lease. If it assumes the lease, it must settle all pending claims and continue to make all promised lease payments. If it rejects the lease, the asset must be returned to the lessor (with any pending claims of the lessor becoming unsecured claims against the bankrupt firm).

Thus, if a lease contract is characterized as a true lease in bankruptcy, the lessor is in a somewhat superior position than a lender if the firm defaults. By retaining ownership of the asset, the lessor has the right to repossess it if the lease payments are not made, even if the firm seeks bankruptcy protection. While a benefit to the lessor, this right of repossession limits the options for the firm in the event of financial distress.<sup>9</sup>

Whether a transaction is classified as a true lease or a security interest will depend on the facts of each case, but the distinction is very similar to the accounting and tax distinctions made earlier. Operating and true tax leases are generally viewed as true leases by the courts, whereas capital and non-tax leases are more likely to be viewed as a security interest. In particular, leases for which the lessee obtains possession of the asset for its remaining economic life (either within the contract or through an option to renew or purchase at a nominal charge) are generally deemed security interests.<sup>10</sup>

<sup>9</sup>For an analysis of the consequences of this treatment of leases for a firm's borrowing capacity, see A. Eisfeldt and A. Rampini, "Leasing, Ability to Repossess, and Debt Capacity," *Review of Financial Studies*, 22 (4): 1621–1657, 2008.

<sup>10</sup>See Article 1 of the Uniform Commercial Code, Section 1-203 at [www.law.upenn.edu/bll/ulc/ulc.htm#ucc1](http://www.law.upenn.edu/bll/ulc/ulc.htm#ucc1).

**Concept Check**

3. How is a \$1.00 out lease characterized for accounting and tax purposes?
4. Is it possible for a lease to be treated as an operating lease for accounting purposes and as a non-tax lease for tax purposes?

## 1.3 The Leasing Decision

How should a firm decide whether to buy or lease an asset? Recall that in a perfect market the decision is irrelevant, so the real-world decision depends on market frictions. In this section, we consider one important market friction—taxes—and evaluate the financial consequences of the leasing decision from the perspective of the lessee. We show how to determine whether it is more attractive to lease an asset or to buy it and (potentially) finance the purchase with debt. First, we consider a true tax lease, then we turn to non-tax leases at the end of the section.

### Cash Flows for a True Tax Lease

If a firm purchases a piece of equipment, the expense is a capital expenditure. Therefore, the purchase price can be depreciated over time, generating a depreciation tax shield. If the equipment is leased and the lease is a true tax lease, there is no capital expenditure, but the lease payments are an operating expense.

Let's compare the cash flows arising from a true tax lease with those arising from a purchase using an example. Emory Printing needs a new high-speed printing press. It can purchase one for \$50,000 in cash. The machine will last five years, and it will be depreciated for tax purposes using straight-line depreciation over that period.<sup>11</sup> This means that Emory can deduct \$10,000 per year for depreciation. Given its tax rate of 35%, Emory will therefore save \$3500 per year in taxes from the depreciation deduction.

Alternatively, Emory can lease the machine instead of purchasing it. A five-year lease contract will cost \$12,500 per year. Emory must make these payments at the beginning of each year. Because the lease is a true tax lease, Emory deducts the lease payments as an operating expense when they are paid. Thus, the after-tax cost of each lease payment is  $(1 - 35\%) \times 12,500 = \$8125$ . The lease contract does not provide for maintenance or servicing of the machine, so these costs are identical whether the machine is leased or purchased.

Table 1.1 shows the free cash flow consequences of buying and leasing. Here, we consider only the cash flows that differ as a result of leasing versus buying. We do not need to consider cash flows that would be the same in both situations, such as the sales revenues generated by having the machine and maintenance expenses. We have also assumed the machine has no residual value after five years if it is purchased. If any of these differences

**TABLE 1.1**  
Cash Flow (\$) Consequences from Leasing Versus Buying

	Year	0	1	2	3	4	5
<b>Buy</b>							
1	Capital Expenditures	(50,000)	—	—	—	—	—
2	Depreciation Tax Shield at 35%	—	3,500	3,500	3,500	3,500	3,500
3	<b>Free Cash Flow (Buy)</b>	(50,000)	3,500	3,500	3,500	3,500	3,500
<b>Lease</b>							
4	Lease Payments	(12,500)	(12,500)	(12,500)	(12,500)	(12,500)	—
5	Income Tax Savings at 35%	4,375	4,375	4,375	4,375	4,375	—
6	<b>Free Cash Flow (Lease)</b>	(8,125)	(8,125)	(8,125)	(8,125)	(8,125)	—

<sup>11</sup>In practice, a more accelerated depreciation schedule would be used for tax purposes. We use straight-line depreciation here for simplicity.

existed, we would include them in the cash flows. Recall from Eq. 9.7 of Chapter 9 that free cash flow (FCF) can be calculated as EBITDA less taxes, capital expenditures, and increases in net working capital, plus the depreciation tax shield (i.e., tax rate  $\times$  depreciation expense). Thus, if Emory buys, the only change to FCF is from capital expenditures and the depreciation tax shield, and if Emory leases, the only change is a reduction in EBITDA, and therefore taxes, from the lease payment.

Note that the cash flows of leasing differ from buying. A purchase requires a large initial outlay followed by a series of depreciation tax credits. In contrast, the cost of a leased machine is more evenly spread out over time.

### Lease Versus Buy (an Unfair Comparison)

Is it better for Emory to lease or buy the printing press? To begin to answer this question, let's compare the present value of the cash flows in each transaction (or, equivalently, we can compute the NPV of the difference between the cash flows). To compute the present value, we need to determine the cost of capital.

The appropriate cost of capital depends, of course, on the risk of the cash flows. Lease payments are a fixed obligation of the firm. If Emory fails to make the lease payments, it will default on the lease. The lessor will seek the remaining lease payments and, in addition, will take back the printing press. In that sense, a lease is similar to loan secured with the leased asset as collateral. Moreover, as discussed in Section 1.2, in a true lease the lessor is in an even better position than a secured creditor if the firm files for bankruptcy. Thus, *the risk of the lease payments is no greater than the risk of secured debt*, so it is reasonable to discount the lease payments at the firm's secured borrowing rate.

The tax savings from the lease payments and from depreciation expenses are also low-risk cash flows, as they are predetermined and will be realized as long as the firm generates positive income.<sup>12</sup> Therefore, a common assumption in practice is to use the firm's borrowing rate for these cash flows as well.

If Emory's borrowing rate is 8%, the cost of buying the machine has present value

$$\begin{aligned} PV(\text{Buy}) &= -50,000 + \frac{3500}{1.08} + \frac{3500}{1.08^2} + \frac{3500}{1.08^3} + \frac{3500}{1.08^4} + \frac{3500}{1.08^5} \\ &= -\$36,026 \end{aligned}$$

The cost of leasing the machine has present value

$$\begin{aligned} PV(\text{Lease}) &= -8125 - \frac{8125}{1.08} - \frac{8125}{1.08^2} - \frac{8125}{1.08^3} - \frac{8125}{1.08^4} \\ &= -\$35,036 \end{aligned}$$

Thus, leasing is cheaper than buying, with a net savings of  $\$36,026 - \$35,036 = \$990$ .

The preceding analysis ignores an important point, however. When a firm enters into a lease, it is committing to lease payments that are a fixed future obligation of the firm. If the firm is in financial distress and cannot make the lease payments, the lessor can seize the machine. Moreover, the lease obligations themselves could trigger financial distress. Therefore, when a firm leases an asset, it is effectively adding leverage to its capital structure (whether or not the lease appears on the balance sheet for accounting purposes).

Because leasing is a form of financing, we should compare it to other financing options that Emory may have. Rather than buy the asset outright, Emory could borrow funds

<sup>12</sup>Even if income is negative, these tax benefits may still be obtained through carryback or carryforward provisions that allow the firm to apply these credits against income generated in past or future years.



(or reduce its planned cash balances, and thereby increase its net debt) to finance the purchase of the machine, thus matching the leverage of the lease. If Emory does borrow, it will also benefit from the interest tax shield provided by leverage. This tax advantage may make borrowing to buy the machine more attractive than leasing. Thus, to evaluate a lease correctly, we should compare it to purchasing the asset using an equivalent amount of leverage. In other words, the appropriate comparison is not lease versus buy, but rather lease versus borrow.

### Lease Versus Borrow (the Right Comparison)

To compare leasing to borrowing, we must determine the amount of the loan that leads to the same level of fixed obligations that Emory would have with the lease. We call this loan the **lease-equivalent loan**. That is, the lease-equivalent loan is the loan that is required on the purchase of the asset that leaves the purchaser with the same obligations as the lessee would have.<sup>13</sup>

**lease-equivalent loan** the loan that is required on the purchase of the asset that leaves the purchaser with the same obligations as the lessee would have

**The Lease-Equivalent Loan.** To compute the lease-equivalent loan in Emory's case, we first compute the difference between the cash flows from leasing versus buying, which we refer to as the *incremental free cash flow of leasing*. As Table 1.2 shows, relative to buying, leasing saves cash upfront but results in lower future cash flows. The incremental free cash flow in years 1 through 5 represents the effective leverage the firm takes on by leasing.

**TABLE 1.2**  
Incremental Free Cash Flows of Leasing Versus Buying

	Year	0	1	2	3	4	5
<b>Lease vs. Buy (\$)</b>							
1	FCF Lease (Line 6, Table 1.1)	(8,125)	(8,125)	(8,125)	(8,125)	(8,125)	—
2	Less: FCF Buy (Line 3, Table 1.1)	50,000	(3,500)	(3,500)	(3,500)	(3,500)	(3,500)
3	<b>Lease-Buy</b>	<b>41,875</b>	<b>(11,625)</b>	<b>(11,625)</b>	<b>(11,625)</b>	<b>(11,625)</b>	<b>(3,500)</b>

Alternatively, Emory could take on this same leverage by purchasing the printing press and taking on a loan with these same after-tax debt payments. How much could Emory borrow by taking on such a loan? Because the future incremental cash flows are the after-tax payments Emory will make on the loan, the initial balance on the lease-equivalent loan is the present value of these cash flows using Emory's after-tax cost of debt:

$$\text{Loan Balance} = PV[\text{Future FCF of Lease Versus Buy at } r_D(1 - T_c)] \quad (1.4)$$

Using Emory's after-tax borrowing cost of 8% (1 - 35%) = 5.2%, the initial loan balance is

$$\text{Loan Balance} = \frac{11,625}{1.052} + \frac{11,625}{1.052^2} + \frac{11,625}{1.052^3} + \frac{11,625}{1.052^4} + \frac{3,500}{1.052^5} = \$43,747 \quad (1.5)$$

Eq. 1.5 implies that if Emory is willing to take on the future obligations implied by leasing, it could instead buy the printing press and borrow \$43,747. This exceeds the savings in year 0 from leasing of \$41,875 shown in Table 1.2. Thus, by buying and borrowing using the lease-equivalent loan, Emory saves an additional \$43,747 - 41,875 = \$1,872 initially, and so leasing the machine is unattractive relative to this alternative.

We verify this result explicitly in the spreadsheet in Table 1.3. There, we compute the cash flows that result from buying the machine and borrowing using the lease-equivalent loan. Line 1 shows the lease-equivalent loan balance, which we compute at each date by

<sup>13</sup>See S. Myers, D. Dill, and A. Bautista, "Valuation of Financial Lease Contracts," *Journal of Finance* 31(3) (1976): 799-819, for a development of this method.



**TABLE 1.3**  
**Cash Flows from**  
**Buying and**  
**Borrowing Using the**  
**Lease-Equivalent**  
**Loan**

	Year	0	1	2	3	4	5
<b>Lease-Equivalent Loan (\$)</b>							
1	Loan Balance (PV at 5.2%)	43,747	34,397	24,561	14,213	3,327	—
<b>Buy with Lease Equivalent Loan (\$)</b>							
2	Net Borrowing (Repayment)	43,747	(9,350)	(9,836)	(10,348)	(10,886)	(3,327)
3	Interest (at 8%)		(3,500)	(2,752)	(1,965)	(1,137)	(266)
4	Interest Tax Shield at 35%		1,225	963	688	398	93
5	Cash Flows of Loan (After-Tax)	43,747	(11,625)	(11,625)	(11,625)	(11,625)	(3,500)
6	FCF Buy	(50,000)	3,500	3,500	3,500	3,500	3,500
7	Cash Flows of Borrow + Buy	(6,253)	(8,125)	(8,125)	(8,125)	(8,125)	—

applying Eq. 1.4. Line 2 shows the initial borrowing and principal payments of the loan (computed as the change in the loan balance from the prior year). Line 3 shows the interest due each year (8% of the prior loan balance), and line 4 computes the interest tax shield (35% of the interest amount). Line 5 then totals the after-tax cash flows of the loan, which we combine with the free cash flow from buying the printing press, to compute the total cash flow from buying and borrowing on line 7.

Comparing the cash flows from buying the printing press and financing it with the lease-equivalent loan (line 7 of Table 1.3) with the cash flows of the lease (line 1 of Table 1.2), we see that in both cases Emory has a net future obligation of \$8125 per year for four years. But while the leverage is the same for the two strategies, the initial cash flow is not. With the lease, Emory will pay \$8125 initially; with the loan, Emory will pay the purchase price of the printing press minus the amount borrowed, or  $\$50,000 - \$43,747 = \$6,253$ . Again, we see that borrowing to buy the machine is cheaper than the lease, with a savings of  $\$8125 - \$6,253 = \$1,872$ . For Emory, the lease is not attractive. If Emory is willing to take on that much leverage, it would be better off doing so by borrowing to purchase the printing press, rather than leasing it.

**A Direct Method.** Now that we have seen the role of the lease-equivalent loan, we can directly compare leasing with an equivalent debt-financed purchase. Because the incremental cash flows from leasing versus borrowing are relatively safe, it is appropriate to use the cost of debt, adjusted for taxes, as the discount rate. So  $r = r_D(1 - T_c)$ . Thus, *we can compare leasing to buying the asset using equivalent leverage by discounting the incremental cash flows of leasing versus buying using the after-tax borrowing rate.*

In Emory's case, discounting the incremental free cash flow in Table 1.2 at Emory's after-tax borrowing cost of  $8\% \times (1 - 35\%) = 5.2\%$ , we get

$$\begin{aligned} PV(\text{Lease Versus Borrow}) &= 41,875 - \frac{11,625}{1.052} - \frac{11,625}{1.052^2} - \frac{11,625}{1.052^3} - \frac{11,625}{1.052^4} - \frac{3,500}{1.052^5} \\ &= -\$1,872 \end{aligned}$$

Note that this is precisely the difference we calculated earlier.

**The Effective After-Tax Lease Borrowing Rate.** We can also compare leasing and buying in terms of an effective after-tax borrowing rate associated with the lease. This is given by the IRR of the incremental lease cash flows in Table 1.2, which we can calculate as 7%:

$$41,875 - \frac{11,625}{1.07} - \frac{11,625}{1.07^2} - \frac{11,625}{1.07^3} - \frac{11,625}{1.07^4} - \frac{3,500}{1.07^5} = 0$$

Thus, the lease is equivalent to borrowing at an after-tax rate of 7%. This option is not attractive compared to the after-tax rate of only  $8\% \times (1 - 35\%) = 5.2\%$  that Emory pays on its debt. Because we are borrowing (positive followed by negative cash flows), a lower IRR is better. But be careful with this approach—as discussed in Chapter 8, if the cash flows alternate signs more than once, the IRR method cannot be relied upon.

### Evaluating a True Tax Lease

In sum, when evaluating a true tax lease, we should compare leasing to a purchase that is financed with equivalent leverage. We suggest the following approach:

1. Compute the *incremental cash flows* for leasing versus buying, as we did in Table 1.2. Include the depreciation tax shield (if buying) and the tax deductibility of the lease payments if leasing.
2. Compute the NPV of leasing versus buying using equivalent leverage by discounting the incremental cash flows at the *after-tax borrowing rate*.

If the NPV computed in Step 2 is negative, then leasing is unattractive compared to traditional debt financing. In this case, the firm should not lease, but rather should acquire the asset using an optimal amount of leverage (based on the trade-offs and techniques discussed in Part 6).

If the NPV computed in Step 2 is positive, then leasing does provide an advantage over traditional debt financing and should be considered. Management should recognize, however, that while it may not be listed on the balance sheet, the lease increases the firm's effective leverage by the amount of the lease-equivalent loan.<sup>14</sup>

### EXAMPLE 1.6 Evaluating New Lease Terms

#### PROBLEM

Suppose Emory rejects the lease we analyzed, and the lessor agrees to lower the lease rate to \$11,800 per year. Does this change make the lease attractive?

#### SOLUTION

#### PLAN

The incremental cash flows with the lower lease rate are shown in the following table:

	Year	0	1	2	3	4	5
<b>Buy</b>							
1	Capital Expenditures	(50,000)	—	—	—	—	—
2	Depreciation Tax Shield at 35%	—	3,500	3,500	3,500	3,500	3,500
3	<b>Free Cash Flow (Buy)</b>	(50,000)	3,500	3,500	3,500	3,500	3,500
<b>Lease</b>							
4	Lease Payments	(11,800)	(11,800)	(11,800)	(11,800)	(11,800)	—
5	Income Tax Savings at 35%	4,130	4,130	4,130	4,130	4,130	—
6	<b>Free Cash Flow (Lease)</b>	(7,670)	(7,670)	(7,670)	(7,670)	(7,670)	—
<b>Lease vs. Buy</b>							
7	<b>Lease–Buy</b>	<b>42,330</b>	<b>(11,170)</b>	<b>(11,170)</b>	<b>(11,170)</b>	<b>(11,170)</b>	<b>(3,500)</b>

We can recompute the NPV of leasing versus borrowing using the cash flows from the lower lease rate.

(Continued)

<sup>14</sup>If financial distress or other costs of leverage are large, the firm may wish to offset some of this increase in leverage by reducing other debt of the firm.

**EXECUTE**

Using Emory's after-tax borrowing cost of 5.2%, the gain from leasing versus an equivalently leveraged purchase is

$$\begin{aligned} NPV(\text{Lease Versus Borrow}) &= 42,330 - \frac{11,170}{1.052} - \frac{11,170}{1.052^2} - \frac{11,170}{1.052^3} - \frac{11,170}{1.052^4} - \frac{3500}{1.052^5} \\ &= 42,330 - 42,141 \\ &= \$189 \end{aligned}$$

Therefore, the lease is attractive at the new terms.

**EVALUATE**

By reducing the lease payments by \$700 (\$455 after-tax) each, the lease becomes more attractive than borrowing and buying. It is important to re-evaluate the decision when the lease terms change.

**Evaluating a Non-Tax Lease**

Evaluating a non-tax lease is much more straightforward than evaluating a true tax lease. For a non-tax lease, the lessee still receives the depreciation deductions (as though the asset was purchased). Only the interest portion of the lease payment is deductible, however. Thus, in terms of cash flows, a non-tax lease is directly comparable to a traditional loan. Therefore, it is attractive if it offers a better interest rate than would be available with a loan. To determine whether it does offer a better rate, we can discount the lease payments at the firm's *pretax* borrowing rate and compare it to the purchase price of the asset.

**EXAMPLE 1.7****Comparing a Non-Tax Lease with a Standard Loan****PROBLEM**

Suppose the lease in Example 1.6 is a non-tax lease. Would it be attractive for Emory in this case?

**SOLUTION****PLAN**

Instead of purchasing the machine for \$50,000, Emory will pay lease payments of \$11,800 per year. That is, Emory is effectively borrowing \$50,000 by making payments of \$11,800 per year. Given Emory's 8% borrowing rate, we can calculate how much Emory could borrow if it made payments of \$11,800 per year on a standard loan. If that amount is more than \$50,000, then it would be better off borrowing than leasing.

**EXECUTE**

$$PV(\text{Lease Payments}) = 11,800 + \frac{11,800}{1.08} + \frac{11,800}{1.08^2} + \frac{11,800}{1.08^3} + \frac{11,800}{1.08^4} = \$50,883$$

**EVALUATE**

By making the same payments on a loan, Emory could raise more than \$50,000. Thus, the lease is not attractive at these terms if it is a non-tax lease.

For both the true tax lease and the non-tax lease, we have ignored the residual value of the asset, any differences in the maintenance and service arrangements with a lease versus a purchase, and any cancellation or other lease options. If these features are present, they should also be included when comparing leasing versus a debt-financed purchase.

**Concept Check**

5. What discount rate should be used for the incremental lease cash flows to compare a true tax lease to borrowing?
6. How can we compare a non-tax lease to borrowing?

**1.4**

**Reasons for Leasing**

In Section 1.3, we saw how to determine whether a lease is attractive for the potential lessee. A similar but reverse argument can be used from the standpoint of the lessor. The lessor could compare leasing the equipment to lending the money to the firm so that it can purchase the equipment. Under what circumstances would leasing be profitable for both the lessor and the lessee? If a lease is a good deal for one of the parties, is it a bad deal for the other? Or are there underlying economic sources of value in a lease contract?

**Valid Arguments for Leasing**

For a lease to be attractive to both the lessee and the lessor, the gains must come from some underlying economic benefits that the leasing arrangement provides. Here, we consider some valid reasons for leasing.

**Tax Differences.** With a true tax lease, the lessee replaces depreciation and interest tax deductions with a deduction for the lease payments. Depending on the timing of the payments, one set of deductions will have a larger present value. A tax gain occurs if the lease shifts the more valuable deductions to the party with the higher tax rate. Generally speaking, if the asset’s tax depreciation deductions are more rapid than its lease payments, a true tax lease is advantageous if the lessor is in a higher tax bracket than the lessee. In contrast, if the asset’s tax depreciation deductions are slower than its lease payments, there are tax gains from a true tax lease if the lessor is in a lower tax bracket than the lessee.

**EXAMPLE 1.8**  
Exploiting Tax Differences Through Leasing

**PROBLEM**

Suppose Emory is offered a true tax lease for the printing press at a lease rate of \$11,800 per year. Show that this lease is profitable for Emory as well as for a lessor with a 15% tax rate and an 8% borrowing cost.

**SOLUTION**

**PLAN**

We already evaluated the lease with these terms in Example 1.6. There, we found that the NPV of leasing versus borrowing was \$189 for Emory. Now we need to consider the lease from the standpoint of the lessor. The lessor will buy the printing press and then lease it to Emory. We can calculate the incremental cash flows for the lessor from buying and leasing, evaluate them at the after-tax rate, and compute the NPV for the lessor. (Using the after-tax rate for the lessor implies that the lessor will borrow against the future free cash flows of the transaction.)

**EXECUTE**

	Year	0	1	2	3	4	5
<b>Buy</b>							
1	Capital Expenditures	(50,000)	—	—	—	—	—
2	Depreciation Tax Shield at 15%	—	1,500	1,500	1,500	1,500	1,500
3	<b>Free Cash Flow (Buy)</b>	(50,000)	1,500	1,500	1,500	1,500	1,500
<b>Lease</b>							
4	Lease Payments	11,800	11,800	11,800	11,800	11,800	—
5	Income Tax at 15%	(1,770)	(1,770)	(1,770)	(1,770)	(1,770)	—
6	<b>Free Cash Flow (Lease)</b>	10,030	10,030	10,030	10,030	10,030	—
<b>Lessor Free Cash Flow</b>							
7	<b>Buy and Lease</b>	<b>(39,970)</b>	<b>11,530</b>	<b>11,530</b>	<b>11,530</b>	<b>11,530</b>	<b>1,500</b>

(Continued)

Evaluating the cash flows at the after-tax rate of  $8\% \times (1 - 15\%) = 6.8\%$ , we find the NPV =  $\$341 > 0$  for the lessor.

### EVALUATE

Both sides gain from the transaction due to the difference in tax rates. The gain comes from the fact that for Emory, the lease provides more accelerated tax deductions than the company would receive from depreciating the printing press. Because Emory is in a higher tax bracket than the leasing company, shifting the faster tax deductions to Emory is advantageous.

**Reduced Resale Costs.** Many assets are time consuming and costly to sell. If a firm only needs to use the asset for a short time, it is probably less costly to lease it than to buy and resell the asset. In this case, the lessor is responsible for finding a new user for the asset, but lessors are often specialized to do so and so face much lower costs. For example, car dealerships are in a better position to sell a used car at the end of a lease than a consumer is. Some of this advantage can be passed along through a lower lease rate. In addition, while owners of assets are likely to resell them only if the assets are “lemons,” a short-term lease can commit the user of an asset to return it regardless of its quality. In this way, leases can help mitigate the adverse selection problem in the used goods market.<sup>15</sup>

**Efficiency Gains from Specialization.** Lessors often have efficiency advantages over lessees in maintaining or operating certain types of assets. For example, a lessor of office copy machines can employ expert technicians and maintain an inventory of spare parts required for maintenance. Some types of leases may even come with an operator, such as a truck with a driver (in fact, the term “operating lease” originated from such leases). By offering assets together with these complementary services, lessors can achieve efficiency gains and offer attractive lease rates. In addition, if the value of the asset depends upon these additional services, then a firm that purchases the asset would be dependent on the service provider, who could then raise the price for services and exploit the firm.<sup>16</sup> By leasing the asset and the services as a bundle, the firm maintains its bargaining power by retaining its flexibility to switch to competing equipment.

**Reduced Distress Costs and Increased Debt Capacity.** As noted in Section 1.2, assets leased under a true lease are not afforded bankruptcy protection and can be seized in the event of default. In addition, the lessor may be better able to recover the full economic value of the asset (by releasing it) than a lender would. Because of the higher recovery value in the event of default, a lessor may be able to offer more attractive financing through the lease than an ordinary lender could. Recent studies suggest that this effect is important for small firms and firms that are capital constrained.<sup>17</sup>

<sup>15</sup>For evidence of this effect, see T. Gilligan, “Lemons and Leases in the Used Business Aircraft Market,” *Journal of Political Economy* 112(5) (2004): 1157–1180.

<sup>16</sup>This concern is often referred to as the *hold-up problem*. The importance of the hold-up problem in determining the optimal ownership of assets was identified by B. Klein, R. Crawford, and A. Alchian, “Vertical Integration, Appropriable Rents, and the Competitive Contracting Process,” *Journal of Law and Economics* 21 (1978): 297–326.

<sup>17</sup>See S. Sharpe and H. Nguyen, “Capital Market Imperfections and the Incentive to Lease,” *Journal of Financial Economics* 39(2–3) (1995): 271–294; J. Graham, M. Lemmon, and J. Schallheim, “Debt, Leases, Taxes, and the Endogeneity of Corporate Tax Status,” *Journal of Finance* 53(1) (1998): 131–162; and A. Eisfeldt and A. Rampini (referenced in Footnote 9).

**Transferring Risk.** At the beginning of a lease, there may be significant uncertainty about the residual value of the leased asset, and whoever owns the asset bears this risk. Leasing allows the party best able to bear the risk to hold it. For example, small firms with a low tolerance for risk may prefer to lease rather than purchase assets.

**Improved Incentives.** When the lessor is the manufacturer, a lease in which the lessor bears the risk of the residual value can improve incentives and lower agency costs. Such a lease provides the manufacturer with an incentive to produce a high-quality, durable product that will retain its value over time. In addition, if the manufacturer is a monopolist, leasing the product gives the manufacturer an incentive not to overproduce and lower the product's residual value, as well as an ability to restrict competition from sales of used goods.

Despite these potential benefits, significant agency costs may also be associated with leasing. For leases in which the lessor retains a substantial interest in the asset's residual value, the lessee has less of an incentive to take proper care of an asset that is leased rather than purchased.<sup>18</sup>

### Suspect Arguments for Leasing

Some reasons that lessees and lessors cite for preferring leasing to purchasing are difficult to justify economically. While they may be important in some circumstances, they deserve careful scrutiny.

**Avoiding Capital Expenditure Controls.** One reason some managers will choose to lease equipment rather than purchase it is to avoid the scrutiny from superiors that often accompanies large capital expenditures. For example, some companies may place limits on the dollar amounts a manager can invest over a certain period; lease payments may fall below these limits, whereas the cost of the purchase would not. By leasing, the manager avoids having to make a special request for funds. This reason for leasing is also apparent in the public sector, where large assets are often leased to avoid asking the government or the public to approve the funds necessary to purchase the assets. However, the lease may cost more than the purchase, wasting stockholder or taxpayer dollars in the long run.

**Preserving Capital.** A common argument made in favor of leasing is that it provides “100% financing” because no down payment is required, so the lessee can save cash to use for other needs. Of course, the firm can also borrow to purchase an asset (possibly using the asset as collateral). For most large corporations, the amount of leverage the firm can obtain through a lease is unlikely to exceed the amount of leverage the firm can obtain through a loan. Thus, this benefit is likely to exist only for small or highly capital-constrained firms.

**Reducing Leverage Through Off-Balance-Sheet Financing.** By carefully avoiding the four criteria that define a capital lease for accounting purposes, a firm can avoid listing the long-term lease as a liability. Because a lease is equivalent to a loan, the firm can increase its actual leverage without increasing the debt-to-equity ratio on its balance sheet. But whether they appear on the balance sheet or not, lease commitments are liabilities for the firm. As a result, they will have the same effect on the risk and return characteristics of the firm as other forms of leverage do. Most financial analysts and sophisticated investors

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<sup>18</sup>As an example, auto manufacturers require individuals who lease their cars to provide proper maintenance. Without such requirements, individuals would be tempted to avoid paying for oil changes and other maintenance near the end of the lease term. Of course, there are other ways lessees may abuse their cars (driving at excessive speeds, for example) that cannot be easily controlled.

understand this fact and consider operating leases (which must be listed in the footnotes of the financial statements) to be additional sources of leverage.

**Concept Check**

7. What are some of the potential gains from leasing if the lessee plans to hold the asset for only a small fraction of its useful life?
8. If a lease is not listed as a liability on the firm's balance sheet, does it mean that a firm that leases rather than borrows is less risky?

**MyFinanceLab**

Here is what you should know after reading this chapter. MyFinanceLab will help you identify what you know, and where to go when you need to practice.

Key Points and Equations	Key Terms	Online Practice
<p><b>1.1 The Basics of Leasing</b></p> <ul style="list-style-type: none"> <li>• A lease is a contract between two parties: the lessee and the lessor. The lessee is liable for periodic payments in exchange for the right to use the asset. The lessor, who is the owner of the asset, is entitled to the lease payments in exchange for lending the asset.</li> <li>• Many types of lease transactions are possible depending on the relationship between the lessee and the lessor.</li> <li>• In a sales-type lease, the lessor is the manufacturer or primary dealer of the asset.</li> <li>• In a direct lease, the lessor is an independent company that specializes in purchasing assets and leasing them to customers.</li> <li>• If a firm already owns an asset it would prefer to lease, it can arrange a sale and leaseback transaction.</li> <li>• In a perfect market, the cost of leasing is equivalent to the cost of purchasing and reselling the asset. Also, the cost of leasing and then purchasing the asset is equivalent to the cost of borrowing to purchase the asset.</li> <li>• In many cases, the lease provides options for the lessee to obtain ownership of the asset at the end of the lease. Some examples include fair market value leases, \$1.00 out leases, fixed price leases, and fair market value cap leases.</li> </ul>	<p>\$1.00 out lease (finance lease), p. 6</p> <p>direct lease, p. 2</p> <p>fair market value cap lease, p. 6</p> <p>fair market value (FMV) lease, p. 6</p> <p>fixed price lease, p. 6</p> <p>lessee, p. 2</p> <p>lessor, p. 2</p> <p>leveraged lease, p. 2</p> <p>residual value, p. 3</p> <p>sale and leaseback, p. 2</p> <p>sales-type lease, p. 2</p> <p>special-purpose entity (SPE), p. 3</p> <p>synthetic lease, p. 3</p>	<p>MyFinanceLab Study Plan Web Chapter 1.1</p>
<p><b>1.2 Accounting, Tax, and Legal Consequences of Leasing</b></p> <ul style="list-style-type: none"> <li>• The FASB recognizes two types of leases based on the lease terms: operating leases and capital leases. Operating leases are viewed as rentals for accounting purposes. Capital leases are viewed as purchases.</li> </ul>	<p>capital (finance) lease, p. 8</p> <p>non-tax lease, p. 11</p> <p>operating lease, p. 8</p> <p>security interest, p. 12</p> <p>true lease, p. 12</p> <p>true tax lease, p. 11</p>	<p>MyFinanceLab Study Plan Web Chapter 1.2</p>



- The IRS separates leases into two broad categories: true tax leases and non-tax leases. With a true tax lease, the lessee deducts lease payments as an operating expense. A non-tax lease is treated as a loan for tax purposes, so the lessee must depreciate the asset and can expense only the interest portion of the lease payments.
- In a true lease, the asset is not protected in the event that the lessee declares bankruptcy, and the lessor can seize the asset if lease payments are not made. If the lease is deemed a security interest by the bankruptcy court, then the asset is protected and the lessor becomes a secured creditor.

### 1.3 The Leasing Decision

- To evaluate the leasing decision for a true tax lease, managers should compare the cost of leasing with the cost of financing using an equivalent amount of leverage.
- Compute the incremental cash flows for leasing versus buying.
- Compute the NPV by discounting the incremental cash flows at the after-tax borrowing rate.
- The cash flows of a non-tax lease are directly comparable to the cash flows of a traditional loan, so a non-tax lease is attractive only if it offers a better interest rate than a loan.

lease-equivalent loan,  
p. 15

MyFinanceLab Study  
Plan Web Chapter 1.3

### 1.4 Reasons for Leasing

- Good reasons for leasing include tax differences, reduced resale costs, efficiency gains from specialization, reduced bankruptcy costs, risk transfer, and improved incentives.
- Suspect reasons for leasing include avoiding capital expenditure controls, preserving capital, and reducing leverage through off-balance-sheet financing.

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## CRITICAL THINKING



1. Why would a firm enter into a sale and leaseback transaction?
2. What are the main differences between fair market value, \$1 out, fixed-price, and fair market value cap leases?
3. How are operating leases different from capital leases?
4. Which classification of a lease is more important for cash flows and valuation: that of the FASB or the IRS?
5. What is the advantage of a synthetic lease?

6. Why does it matter whether the lease is classified as a security interest or as a true lease?
7. Why is leasing versus buying an unfair comparison?
8. What are the main steps in evaluating a true tax lease?
9. Explain why preserving capital and reducing leverage are suspect reasons for leasing.

**PROBLEMS**

*Problems in this chapter are available in MyFinanceLab. An asterisk (\*) indicates problems with a higher level of difficulty.*

**The Basics of Leasing**

1. Suppose an H1200 supercomputer has a cost of \$200,000 and will have a residual market value of \$60,000 in five years. The risk-free interest rate is 5% APR with monthly compounding.
  - a. What is the risk-free monthly lease rate for a five-year lease in a perfect market?
  - b. What would be the monthly payment for a five-year \$200,000 risk-free loan to purchase the H1200?
2. Suppose the risk-free interest rate is 5% APR with monthly compounding. If a \$2 million MRI machine can be leased for seven years for \$22,000 per month, what residual value must the lessor recover to break even in a perfect market with no risk?
3. Consider a five-year lease for a \$400,000 bottling machine, with a residual market value of \$150,000 at the end of the five years. If the risk-free interest rate is 6% APR with monthly compounding, compute the monthly lease payment in a perfect market for the following leases:
  - a. A fair market value lease
  - b. A \$1.00 out lease
  - c. A fixed price lease with an \$80,000 final price

**Accounting, Tax, and Legal Consequences of Leasing**

4. Acme Distribution currently has the following items on its balance sheet:

Assets		Liabilities	
Cash	20	Debt	70
Property, Plant, and Equipment	175	Equity	125

How will Acme's balance sheet change if it enters into an \$80 million capital lease for new warehouses? What will its book debt-equity ratio be? How will Acme's balance sheet and debt-equity ratio change if the lease is an operating lease?

5. Your firm is considering leasing a \$50,000 copier. The copier has an estimated economic life of eight years. Suppose the appropriate discount rate is 9% APR with monthly compounding. Classify each lease below as a capital lease or operating lease:
  - a. A four-year fair market value lease with payments of \$1150 per month
  - b. A six-year fair market value lease with payments of \$790 per month
  - c. A five-year fair market value lease with payments of \$925 per month
  - d. A five-year fair market value lease with payments of \$1000 per month and an option to cancel after three years with a \$9000 cancellation penalty

### The Leasing Decision

6. Craxton Engineering will either purchase or lease a new \$756,000 fabricator. If purchased, the fabricator will be depreciated on a straight-line basis over seven years. Craxton can lease the fabricator for \$130,000 per year for seven years. Craxton's tax rate is 35%. (Assume the fabricator has no residual value at the end of the seven years.)
  - a. What are the free cash flow consequences of buying the fabricator?
  - b. What are the free cash flow consequences of leasing the fabricator if the lease is a true tax lease?
  - c. What are the incremental free cash flows of leasing versus buying?
7. Riverton Mining plans to purchase or lease \$220,000 worth of excavation equipment. If purchased, the equipment will be depreciated on a straight-line basis over five years, after which it will be worthless. If leased, the annual lease payments will be \$55,000 per year for five years. Assume Riverton's borrowing cost is 8%, its tax rate is 35%, and the lease qualifies as a true tax lease.
  - a. If Riverton purchases the equipment, what is the amount of the lease-equivalent loan?
  - b. Is Riverton better off leasing the equipment or financing the purchase using the lease-equivalent loan?
  - c. What is the effective after-tax lease borrowing rate? How does this compare to Riverton's actual after-tax borrowing rate?
8. Suppose Clorox can lease a new computer data processing system for \$975,000 per year for five years. Alternatively, it can purchase the system for \$4.25 million. Assume Clorox has a borrowing cost of 7% and a tax rate of 35%, and the system will be obsolete at the end of five years.
  - a. If Clorox will depreciate the computer equipment on a straight-line basis over the next five years, and if the lease qualifies as a true tax lease, is it better to finance the purchase of the equipment or to lease it?
  - b. Suppose that if Clorox buys the equipment, it will use accelerated depreciation for tax purposes. Specifically, suppose it can expense 20% of the purchase price immediately and can take depreciation deductions equal to 32%, 19.2%, 11.52%, 11.52%, and 5.76% of the purchase price over the next five years. Compare leasing with purchase in this case.
- \*9. Suppose Procter and Gamble (P&G) is considering purchasing \$15 million in new manufacturing equipment. If it purchases the equipment, P&G will depreciate it on a straight-line basis over five years, after which the equipment will be worthless. P&G will also be responsible for maintenance expenses of \$1 million per year. Alternatively, it can lease the equipment for \$4.2 million per year for the five years, in which case the lessor will provide necessary maintenance. Assume P&G's tax rate is 35% and its borrowing cost is 7%.
  - a. What is the NPV associated with leasing the equipment versus financing it with the lease-equivalent loan?
  - b. What is the break-even lease rate—that is, what lease amount could P&G pay each year and be indifferent between leasing and financing a purchase?
10. Western Airlines is considering a new route that will require adding an additional Boeing 777 to its fleet. Western can purchase the airplane for \$225 million or lease it for \$25 million per year. If it purchases the airplane, its seating can be optimized, and the new route is expected to generate profits of \$50 million per year. If leased, the route will only generate profits of \$35 million per year. Suppose the appropriate

cost of capital is 12.5% and that, if purchased, the plane can be sold at any time for an expected resale price of \$225 million. Ignore taxes.

- a. As a one-year decision, does purchasing or leasing the plane have higher NPV?
- b. Suppose the funds to purchase or lease the plane will come from equity holders (for example, by reducing the amount of Western's current dividend). Western also has one-year debt outstanding, and there is a 10% (risk-neutral) probability that over the next year Western will declare bankruptcy and its equity holders will be wiped out. Otherwise, the debt will be rolled over at the end of the year. Is purchasing or leasing the plane more attractive to equity holders?
- c. At what probability of default would equity holder's preference for leasing versus purchasing the plane change?

### Reasons for Leasing

- \*11. Suppose Netflix is considering the purchase of computer servers and network infrastructure to facilitate its move into video-on-demand services. In total, it will purchase \$48 million in new equipment. This equipment will qualify for accelerated depreciation: 20% can be expensed immediately, followed by 32%, 19.2%, 11.52%, 11.52%, and 5.76% over the next five years. However, because of the firm's substantial loss carryforwards, Netflix estimates its marginal tax rate to be 10% over the next five years, so it will get very little tax benefit from the depreciation expenses. Thus, Netflix considers leasing the equipment instead. Suppose Netflix and the lessor face the same 8% borrowing rate, but the lessor has a 35% tax rate. For the purpose of this question, assume the equipment is worthless after five years, the lease term is five years, and the lease qualifies as a true tax lease.
- a. What is the lease rate for which the lessor will break even?
  - b. What is the gain to Netflix with this lease rate?
  - c. What is the source of the gain in this transaction?