

Working-Capital Management

Learning Objectives

 1 Describe the risk–return trade-off involved in managing working capital.	Managing Current Assets and Liabilities
 2 Describe the determinants of net working capital.	Determining the Appropriate Level of Working Capital
 3 Compute the firm's cash conversion cycle.	The Cash Conversion Cycle
 4 Estimate the cost of short-term credit.	Estimating the Cost of Short-Term Credit Using the Approximate Cost-of-Credit Formula
 5 Identify the primary sources of short-term credit.	Sources of Short-Term Credit

Early in its life as a publicly traded firm, the Dell Computer Corporation (DELL) experienced a period of declining sales that produced a serious cash shortfall. Moreover, the company realized that it had to accelerate its growth in order to move from the list of declining, second-tier manufacturers to the list of prospering, top-tier producers, and this required even more cash. The new Dell business model that emerged was designed to better manage the firm's working capital. Specifically, the model sought to lower inventory by 50 percent, improve lead time by 50 percent, reduce assembly costs by 30 percent, and reduce obsolete inventory by 75 percent.

The net result was that inventory dropped because Dell was aligning its inventory with sales and not holding inventories in anticipation of future sales. Furthermore, as its inventory disappeared, the company's profitability grew disproportionately because Dell avoided not only the carrying costs of holding inventories but also the losses associated with obsolete stock. Additionally, Dell was able to save money on purchasing components because the component prices were dropping 3 percent per month.

Because the firm's capital requirements to support its rapidly growing sales did not increase proportionately with sales, the company's financial needs were reduced. All this was brought about by better working-capital management.

Chapter 15 addresses two related topics: It introduces the principles involved in managing a firm's investment in working capital, and it presents a discussion of short-term financing. Traditionally, **working capital** is defined as the *firm's total investment in current assets*. **Net working capital**, on the other hand, is the *difference between the firm's current assets and its current liabilities*.

$$\text{Net working capital} = \text{currents assets} - \text{current liabilities} \quad (15-1)$$

Throughout this chapter, the term *working capital* refers to net working capital. In managing the firm's net working capital, we are also *managing the firm's liquidity*. This entails managing two related aspects of the firm's operations: (1) its investment in current assets, and (2) its use of short-term or current liabilities.

Short-term sources of financing include all forms of financing that have maturities of 1 year or less—that is, current liabilities. There are two major issues involved in analyzing a firm's use of short-term financing: (1) How much short-term financing should the firm use? and (2) What specific sources of short-term financing should the firm select? We use the hedging principle of working-capital management to address the first of these questions. We then address the second issue by considering three basic factors: (1) the effective cost of credit, (2) the availability of credit in the amount needed and for the period that financing is required, and (3) the influence of the use of a particular credit source on the cost and availability of other sources of financing.

Managing Current Assets and Liabilities

A firm's current assets consist of cash and marketable securities, accounts receivable, inventories, and other assets that the firm's managers expect to be converted to cash within a period of a year or less. Consequently, firms that choose to hold more current assets are, in general, more liquid than firms that do not. Similarly, current liabilities are liabilities that are payable in 1 year or less. Examples include accounts and notes payable.

The Risk–Return Trade-Off

Actually, firms that want to reduce their risk of illiquidity by holding more current assets do so by investing in larger cash and marketable securities balances. Holding larger cash and marketable securities balances has an unfortunate consequence, however. Because investments in cash and marketable securities earn relatively modest returns when compared with the firm's other investments, the firm that holds larger investments in these assets will reduce its overall rate of return. Thus, the increased liquidity must be traded off against the firm's reduction in return on investment. Managing this trade-off is an important theme of working-capital management.

The firm's use of current versus long-term debt also involves a risk–return trade-off. *Other things remaining the same, the greater the firm's reliance on short-term debt or current liabilities in financing its assets, the greater the risk of illiquidity.* However, the use of



b1 Describe the risk–return trade-off involved in managing working capital.

working capital a concept traditionally defined as a firm's investment in current assets.

net working capital the difference between the firm's current assets and its current liabilities.

current liabilities offers some very real advantages in that they can be less costly than long-term financing, and they provide the firm with a flexible means of financing its fluctuating needs for assets. However, if for some reason the firm has problems raising short-term funds or it should need funds for longer than expected, it can get into real trouble. Thus, a firm can reduce its risk of illiquidity through the use of long-term debt at the expense of a reduction in its return on invested funds. Once again we see that the risk–return trade-off involves an increased risk of illiquidity versus increased profitability.

The Advantages of Current Liabilities: Return

Flexibility Current liabilities offer the firm a flexible source of financing. They can be used to match the timing of a firm’s needs for short-term financing. If, for example, a firm needs funds for a 3-month period during each year to finance a seasonal expansion in inventories, then a 3-month loan can provide substantial cost savings over a long-term loan (even if the interest rate on short-term financing should be higher). The use of long-term debt in this situation involves borrowing for the entire year rather than for the period when the funds are needed, which increases the amount of interest the firm must pay. This brings us to the second advantage generally associated with the use of short-term financing.

Interest Cost In general, interest rates on short-term debt are lower than on long-term debt for a given borrower. This relationship was introduced in Chapter 2 and is referred to as the term structure of interest rates. For a given firm, the term structure might appear as follows.

LOAN MATURITY	INTEREST RATE
3 months	4.00%
6 months	4.60
1 year	5.30
3 years	5.90
5 years	6.75
10 years	7.50
30 years	8.25

Note that this term structure reflects the rates of interest applicable to a given borrower at a particular time. It would not, for example, describe the rates of interest available to another borrower or even those applicable to the same borrower at a different time.

The Disadvantages of Current Liabilities: Risk

The use of current liabilities, or short-term debt, as opposed to long-term debt subjects the firm to a greater risk of illiquidity for two reasons. First, short-term debt, because of its very nature, must be repaid or rolled over more often, so it increases the possibility that the firm’s financial condition might deteriorate to a point at which the needed funds might not be available.¹

A second disadvantage of short-term debt is the uncertainty of interest costs from year to year. For example, a firm borrowing during a 6-month period each year to finance a seasonal expansion in current assets might incur a different rate of interest each year. This rate reflects the current rate of interest at the time of the loan, as well as the lender’s perception of the firm’s riskiness. If fixed-rate, long-term debt were used, the interest cost would be stable for the entire period of the loan agreement.

Concept Check

- 1. How does investing more heavily in current assets (while not increasing the firm’s current liabilities) decrease both the firm’s risk and its expected return on its investment?
- 2. How does the use of current liabilities enhance profitability and also increase the firm’s risk of default on its financial obligations?

¹The dangers of such a policy are readily apparent in the experiences of firms that have been forced into bankruptcy. Penn Central, for example, went bankrupt when it had \$80 million in short-term debt that it was unable to finance (roll over).

Determining the Appropriate Level of Working Capital

Managing the firm's net working capital (its liquidity) involves interrelated decisions regarding its investments in current assets and use of current liabilities. Fortunately, a guiding principle exists that can be used as a benchmark for the firm's working-capital policies: the hedging principle, or principle of self-liquidating debt. This principle provides a guide to the maintenance of a level of liquidity sufficient for the firm to meet its maturing obligations on time.²

In Chapter 12 we discussed the firm's financing decision in terms of the choice between debt and equity sources of financing. There is, however, yet another critical dimension of the firm's financing decision. This relates to the maturity structure of the firm's debt. How should the decision be made about whether to use short-term (current) debt or longer-maturity debt? This is one of the fundamental questions addressed in this chapter and one that is critically important to the financial success of the firm.

The Hedging Principles

Very simply, the **hedging principle**, or **principle of self-liquidating debt**, involves *matching the cash-flow-generating characteristics of an asset with the maturity of the source of financing used to fund its acquisition*. For example, a seasonal expansion in inventories, according to the hedging principle, should be financed with a short-term loan or current liability. The rationale underlying the rule is straightforward. The funds are needed for a limited period, and when that time has passed, the cash needed to repay the loan will be generated by the sale of the extra inventory items. Obtaining the needed funds from a long-term source (longer than 1 year) would mean that the firm would still have the funds after the inventories they helped finance had been sold. In this case the firm would have "excess" liquidity, which it would either hold in cash or invest in low-yield marketable securities until the seasonal increase in inventories occurs again and the funds are needed. The result of all this would be lower profits.

Consider an example in which a firm purchases a new conveyor belt system, which is expected to produce cash savings to the firm by eliminating the need for two employees and, consequently, their salaries. This amounts to an annual savings of \$24,000. The conveyor belt costs \$250,000 to install and will last 20 years. If the firm chooses to finance this asset with a 1-year note, then it will not be able to repay the loan from the \$24,000 cash-flow-generated by the asset. In accordance with the hedging principle, the firm should finance the asset with a source of financing that more nearly matches the expected life and cash-flow-generating characteristics of the asset. In this case, a 15- to 20-year loan would be more appropriate.

Permanent and Temporary Assets

The notion of the hedging principle (matching the maturities of cash inflows and cash outflows) can be most easily understood when we think in terms of the distinction between permanent and temporary investments in assets, as opposed to the more traditional fixed and current asset categories. **Permanent investments** in an asset are *investments that the firm expects to hold for a period longer than 1 year*. Note that we are referring to the period the firm plans to hold an investment, not the useful life of the asset. For example, permanent investments are made in the firm's minimum level of current assets, as well as in its fixed assets. **Temporary investments**, by contrast, consist of *current assets that will be liquidated and not replaced within the current year*. Thus, some part of the firm's current assets is permanent and the remainder is temporary. For example, a seasonal increase in level of inventories is



² Describe the determinants of net working capital.

hedging principle (principle of self-liquidating debt) a working-capital management policy which states that the cash-flow-generating characteristics of a firm's investments should be matched with the cash-flow requirements of the firm's sources of financing. Very simply, short-lived assets should be financed with short-term sources of financing while long-lived assets should be financed with long-term sources of financing.

permanent investment investments that the firm expects to hold longer than 1 year. The firm makes permanent investments in fixed and current assets.

temporary investments a firm's investments in current assets that will be liquidated and not replaced within a period of 1 year or less. Examples include seasonal expansions in inventories and accounts receivable.

²A value-maximizing approach to the management of the firm's liquidity involves assessing the value of the benefits derived from increasing the firm's investment in liquid assets and weighing them against the added costs to the firm's owners resulting from investing in low-yield current assets. Unfortunately, the benefits derived from increased liquidity relate to the expected costs of bankruptcy to the firm's owners, and these costs are very difficult to measure. Thus, a "valuation" approach to liquidity management exists only in the theoretical realm.

a temporary investment: the buildup in inventories that will be eliminated when no longer needed. In contrast, the buildup in inventories to meet a long-term increasing sales trend is a permanent investment.

Temporary, Permanent, and Spontaneous Sources of Financing

Because total assets must always equal the sum of temporary, permanent, and spontaneous sources of financing, the hedging approach provides the financial manager with the basis for determining the sources of financing to use at any point.

What constitutes a temporary, permanent, or spontaneous source of financing? Temporary sources of financing consist of current liabilities. Short-term notes payable are the most common example of a temporary source of financing. Examples of notes payable include unsecured bank loans, commercial paper, and loans secured by accounts receivable and inventories. Permanent sources of financing include intermediate-term loans, long-term debt, preferred stock, and common equity.

Spontaneous sources of financing consist of trade credit and other accounts payable that arise *spontaneously* in the firm's day-to-day operations. For example, as the firm acquires materials for its inventories, **trade credit** is often *made available spontaneously or on demand from the firm's suppliers when it orders its supplies or more inventory of products to sell*. Trade credit appears on the firm's balance sheet as accounts payable, and the size of the accounts-payable balance varies directly with the firm's purchases of inventory items. In turn, inventory purchases are related to anticipated sales. Thus, part of the financing needed by the firm is spontaneously provided in the form of trade credit.

In addition to trade credit, wages and salaries payable, accrued interest, and accrued taxes also provide valuable sources of spontaneous financing. These expenses accrue throughout the period until they are paid. For example, if a firm has a wage expense of \$10,000 a week and pays its employees monthly, then its employees effectively provide financing equal to \$10,000 by the end of the first week following a payday, \$20,000 by the end of the second week, and so forth, until the workers are paid. Because these expenses generally arise in direct conjunction with the firm's ongoing operations, they, too, are referred to as spontaneous.

The Hedging Principle: A Graphic Illustration

The hedging principle can now be stated very succinctly: *Asset needs of the firm not financed by spontaneous sources should be financed in accordance with this rule: Permanent-asset investments are financed with permanent sources, and temporary investments are financed with temporary sources.*

trade credit credit made available by a firm's suppliers in conjunction with the acquisition of materials. Trade credit appears on the balance sheet as accounts payable.

CAUTIONARY TALE

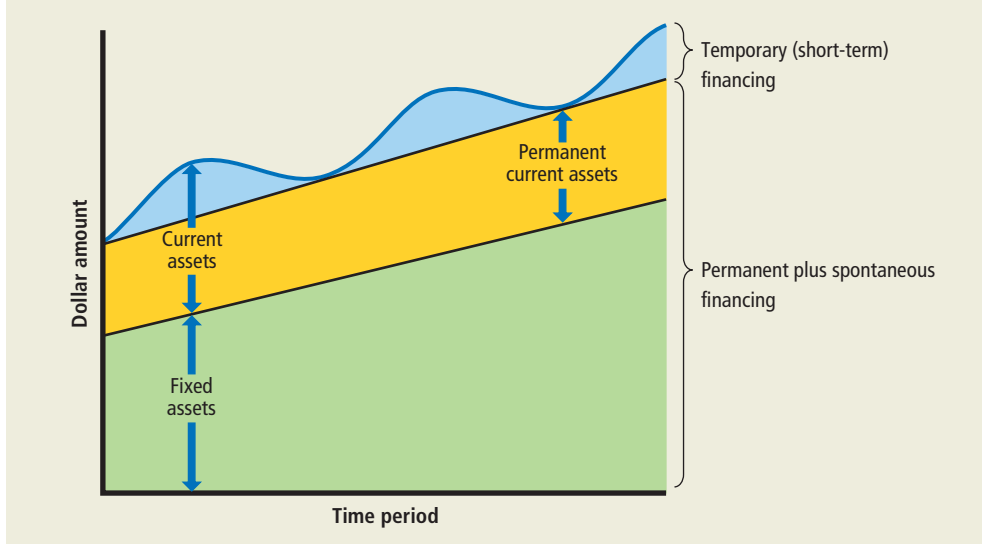
FORGETTING PRINCIPLE 3: RISK REQUIRES A REWARD

An important rule of thumb for financing a firm's assets is something called the hedging principle. Very simply, this principle suggests that the firm's long-term asset investments should be matched with long-term sources of financing such as long-term debt or equity. Similarly, the firm's temporary or short-term assets can be financed using short-term sources of financing. In fact, this principle has been summed up in the maxim "never finance long-term investments using short-term sources of financing."

When firms violate this basic principle, the immediate effect may actually be positive as the firm utilizes lower-cost short-term debt to finance its long-term investments. However, at some point, the music stops and the financing merry-go-round

stops. This is exactly what happened with many of the nation's banks during the financial crisis that began in 2007. These firms used short-term borrowing to finance their long-term investments. Moreover, these investments were heavily concentrated in loans and other securities that were tied to real estate. When problems developed in the real estate market that raised concerns about the value of these investments, the firms that were making these investments quickly found that they could no longer get favorable terms on their short-term borrowing.

The important lesson learned here is that matching up the maturity of the sources of financing with the type of investments being financed can be important to your financial health.

FIGURE 15-1 The Hedging Principle Illustrated

The hedging principle is depicted in Figure 15-1 and described in Table 15-1. Total assets are broken down into temporary- and permanent-asset investment categories. The firm's permanent investment in assets is financed by the use of permanent sources of financing (intermediate- and long-term debt, preferred stock, and common equity) or spontaneous sources (trade credit and other accounts payable). For illustration purposes, spontaneous sources of financing are treated as if their amount were fixed. In practice, of course, spontaneous sources of financing fluctuate with the firm's purchases and its expenditures for wages, salaries, taxes, and other items that are paid on a delayed basis. Its temporary investment in assets is financed with temporary (short-term) debt.

TABLE 15-1 The Hedging Principle Applied to Working-Capital Management

A firm's asset needs that are not financed by spontaneous sources of financing should be financed in accordance with the following "matching rule"—permanent-asset investments are financed with permanent sources, and temporary-asset investments are financed with temporary sources of financing.

Classification of a Firm's Investments in Assets	Definitions and Examples	Classification of a Firm's Sources of Financing	Definitions and Examples
Temporary investments	<i>Definition:</i> Current assets that will be liquidated and not replaced within the year. <i>Examples:</i> Seasonal expansions in inventories and accounts receivable.	Spontaneous financing	<i>Definition:</i> Financing that arises more or less automatically in response to the purchase of an asset. <i>Examples:</i> Trade credit that accompanies the purchase of inventories and other types of accounts payable created by the purchase of services (for example, wages payable).
		Temporary financing	<i>Definition:</i> Current liabilities other than spontaneous sources of financing. <i>Examples:</i> Notes payable and revolving credit agreements that must be repaid in a period less than 1 year.
Permanent investments	<i>Definition:</i> Current and long-term asset investments that the firm expects to hold for a period longer than 1 year. <i>Examples:</i> Minimum levels of inventory and accounts receivable the firm maintains throughout the year as well as its investments in plant and equipment.	Permanent financing	<i>Definition:</i> Long-term liabilities not due and payable within the year and equity financing. <i>Examples:</i> Term loans, notes, and bonds as well as preferred and common equity.

Concept Check

1. What is the hedging principle or principle of self-liquidating debt?
2. What are some examples of permanent and temporary investments in current assets?
3. Is trade credit a permanent, temporary, or spontaneous source of financing? Explain.

b³ Compute the firm's cash conversion cycle.

The Cash Conversion Cycle

Because firms vary widely with respect to their ability to manage their net working capital, there exists a need for an overall measure of effectiveness. An increasingly popular method for evaluating the efficient management of a firm's working capital involves minimizing working capital.

Minimizing working capital is accomplished by speeding up the collection of cash from sales, increasing inventory turns, and slowing down the disbursement of cash. We can incorporate all of these factors in a single measure called the *cash conversion cycle*.

The cash conversion cycle, or CCC, is simply the sum of days of sales outstanding and days of sales in inventory less days of payables outstanding:

$$\begin{array}{ccccccc} \text{Cash} & & \text{days of} & & \text{days of} & & \text{days of} \\ \text{conversion} & = & \text{sales} & + & \text{sales in} & - & \text{payables} \\ \text{cycle (CCC)} & & \text{outstanding (DSO)} & & \text{inventory (DSI)} & & \text{outstanding (DPO)} \end{array}$$

We calculate days of sales outstanding as follows:

$$\begin{array}{ccc} \text{Days of} & & \\ \text{sales} & = & \frac{\text{accounts receivable}}{\text{sales}/365} \\ \text{outstanding (DSO)} & & \end{array} \quad (15-2)$$

Recall from Chapter 4 that DSO can also be thought of as the average age of the firm's accounts receivable or the average collection period.

Days of sales in inventory is defined as follows:

$$\begin{array}{ccc} \text{Days of} & & \\ \text{sales} & = & \frac{\text{inventories}}{\text{cost of goods sold}/365} \\ \text{in inventory (DSI)} & & \end{array} \quad (15-3)$$

Note that DSI can also be thought of as the average age of the firm's inventory, that is, the average number of days that a dollar of inventory is held by the firm.

Days of payables outstanding is defined as follows:

$$\begin{array}{ccc} \text{Days of} & & \\ \text{payables} & = & \frac{\text{accounts payable}}{\text{cost of goods sold}/365} \\ \text{outstanding (DPO)} & & \end{array} \quad (15-4)$$

This ratio indicates the average age, in days, of the firm's accounts payable.

To illustrate the use of the CCC metric, consider Dell Computer Corporation. In 1989 Dell was a fledgling start-up whose CCC was 121.88 days. By 1998, Dell had reduced this number to -5.6 days. (See Table 15-2.) How, you might ask, does a firm reduce its CCC below zero? The answer is through very aggressive management of its working capital. As Table 15-2 indicates, Dell achieved this phenomenal reduction in CCC primarily through very effective management of inventories (days of sales in inventories dropped from 37.36

CAN YOU DO IT?

COMPUTING THE CASH CONVERSION CYCLE

Harrison Electronics is evaluating its cash conversion cycle and has estimated each of its components as follows:

Days of sales outstanding (DSO) = 38 days

Days of sales in inventory (DSI) = 41 days

Days of payables outstanding (DPO) = 30 days

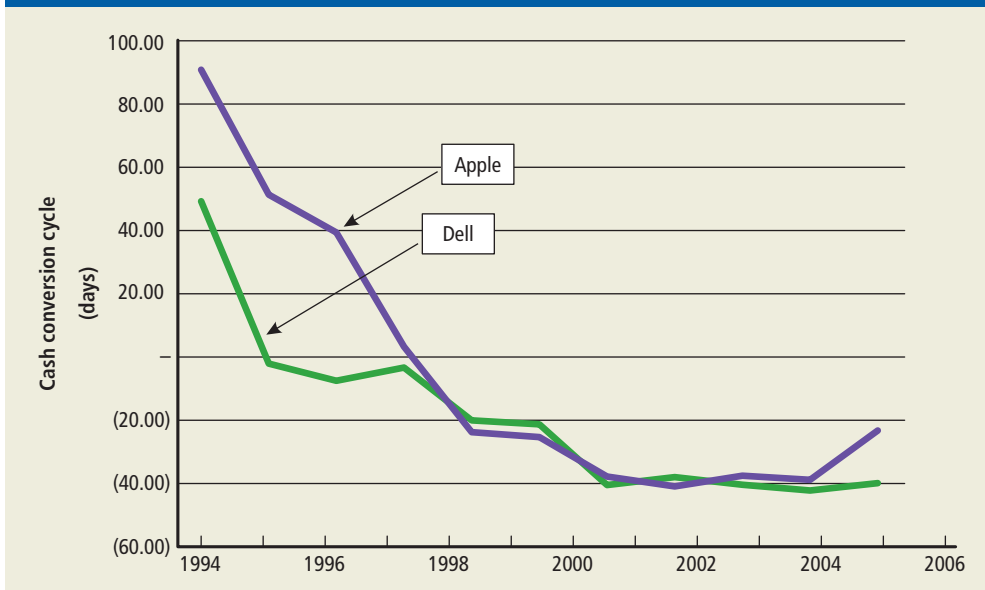
What is the firm's cash conversion cycle?

(The solution can be found on page 463.)

TABLE 15-2 The Determinants of Dell Computer Corporation's Cash Conversion Cycle for 1995–2005

Cash conversion cycle (CCC) = days of sales outstanding (DSO) + days of sales in inventory (DSI) – days of payables outstanding (DPO)											
	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
Days of sales outstanding (DSO)	50.04	42.48	44.00	49.64	38.69	33.14	26.57	26.66	32.01	32.74	35.59
Days of sales in inventory (DSI)	37.36	15.15	8.92	7.10	7.17	5.79	3.99	9.22	7.75	4.20	4.65
Days of payables outstanding (DPO)	40.58	62.79	62.87	62.34	64.92	62.07	72.87	75.79	79.41	81.46	79.41
Cash conversion cycle (CCC)	46.81	(5.15)	(9.96)	(5.60)	(19.06)	(23.14)	(42.30)	(39.90)	(39.64)	(44.51)	(39.17)

in 1995 to 4.65 in 2005) and more favorable trade credit payment practices (days of payables outstanding increased from 40.58 in 1995 to 81.46 in 2004). Specifically, Dell, a direct marketer of personal computers, does not build a computer until an order is received. It purchases its supplies using trade credit. This business model results in minimal investment in inventories. Dell has obviously improved its working-capital management practices, as evidenced in Figure 15-2, where we compare Dell with Apple. Obviously, both firms follow

FIGURE 15-2 Cash Conversion Cycles for Apple and Dell: 1995–2005

DID YOU GET IT?

COMPUTING THE CASH CONVERSION CYCLE

The cash conversion cycle (CCC) is calculated as follows:

$$\text{Cash conversion cycle (CCC)} = \left(\begin{array}{c} \text{days of} \\ \text{sales outstanding} \\ \text{(DSO)} \end{array} \right) + \left(\begin{array}{c} \text{days of} \\ \text{sales in inventory} \\ \text{(DSI)} \end{array} \right) - \left(\begin{array}{c} \text{days of payables} \\ \text{outstanding} \\ \text{(DPO)} \end{array} \right)$$

Substituting the following:

Days sales outstanding (DSO) = 38 days

Days sales in inventory (DSI) = 41 days

Days of payables outstanding (DPO) = 30 days

What is the firm's cash conversion cycle?

$$\text{Cash conversion cycle (CCC)} = 38 \text{ days} + 41 \text{ days} - 30 \text{ days} = 49 \text{ days}$$

We calculate the CCC to be 49 days. Harrison can reduce its cash conversion cycle by reducing DSO (for example, offering a cash discount for early payment or simply reducing the firm's credit terms) and DSI (for example, reducing the amount of inventory the firm carries), or by seeking better credit terms that increase its DPO.

FINANCIAL DECISION TOOLS

Name of Tool	Formula	What It Tells You
Cash conversion cycle (CCC)	$\frac{\text{days of sales outstanding (DSO)}}{1} + \frac{\text{days of sales in inventory (DSI)}}{1} + \frac{\text{days of payables outstanding (DPO)}}{1}$	- The number of days that it takes for cash to cycle through the firm - The shorter the cycle, the less money the firm has tied up in working capital
Days of sales outstanding (DSO)	$\frac{\text{accounts receivable}}{\text{sales}/365 \text{ days}}$	- The average number of days until credit sales are collected - The lower the number is, the less money the firm has tied up in accounts receivable at any time
Days of sales in inventory (DSI)	$\frac{\text{inventories}}{\text{cost of goods sold}/365 \text{ days}}$	- The number of days that an item sits in inventory before being sold - The lower the number, the smaller is the firm's investment in inventories
Days of payables outstanding (DPO)	$\frac{\text{accounts payable}}{\text{cost of goods sold}/365 \text{ days}}$	- The number of days that the firm takes to pay its trade credit - The higher the number, the lower is the firm's need for cash to support its investment in current assets

similar strategies and have been very successful in managing their cash conversion cycle in recent years.

Concept Check

1. What three actions can a firm take to minimize its net working capital?
2. Define *days of sales outstanding*, *days of sales in inventory*, and *days of payables outstanding*.

4 Estimate the cost of short-term credit.

Estimating the Cost of Short-Term Credit Using the Approximate Cost-of-Credit Formula

In Chapter 5 when we introduced the time value of money, we first introduced the principles that underlie the computation of the cost of credit. However, we repeat much of that discussion in this chapter because it is critical to gaining an understanding of how to estimate the cost of short-term credit.

The procedure for estimating the cost of short-term credit is a very simple one and relies on the basic interest equation:

$$\text{Interest} = \text{principal} \times \text{rate} \times \text{time} \quad (15-5)$$

where *interest* is the dollar amount paid by a borrower to a lender in return for the use of the *principal* amount of a loan for a fraction of a year (represented by *time*). For example, a 6-month loan for \$1,000 at 8 percent interest would require an interest payment of \$40.

$$\text{Interest} = \$1,000 \times 0.08 \times \frac{1}{2} = \$40$$

We use this basic relationship to solve for the cost of a source of short-term financing or the annual percentage rate (*APR*) when the interest amount, the principal sum, and the time period for financing are known. Thus, solving the basic interest equation for *APR* produces³

$$APR = \frac{\text{interest}}{\text{principal} \times \text{time}} \quad (15-6)$$

³For ease of computation, we assume a 30-day month and 360-day year in this chapter.

or

$$APR = \frac{\text{interest}}{\text{principal}} \times \frac{1}{\text{time}} \quad (15-7)$$

This equation, called the *APR* calculation, is clarified by the following example.

EXAMPLE 15.1 Estimating the cost of short-term credit

The SKC Corporation plans to borrow \$1,000 for a 90-day period. At maturity the firm will repay the \$1,000 principal amount plus \$30 interest. The effective annual rate of interest for the loan can be estimated using the *APR* equation, as follows:

STEP 1: FORMULATE A SOLUTION STRATEGY

The cost of short-term credit is estimated using the annual percentage rate (*APR*) formula, which represents the ratio of interest to principal multiplied by the annualized time period fraction of the debt, that is,

$$APR = \frac{\text{interest}}{\text{principal}} \times \frac{1}{\text{time}}$$

Note that interest, in the *APR* equation above, is the product of the principal, interest rate, and time. In this example, the interest payment is adjusted to match the time period of less than 1 year. With the following equation, an annualized interest rate is adjusted so that payments match the time period of the debt,

$$\text{Interest} = \text{principal} \times \text{rate} \times \text{time}$$

STEP 2: CRUNCH THE NUMBERS

Substituting the characteristics of SKC Corporation's short-term credit, we get the following:

$$\begin{aligned} APR &= \frac{\$30}{\$1,000} \times \frac{1}{90/360} \\ &= 0.03 \times \frac{360}{90} = 0.12 = 12\% \end{aligned}$$

STEP 3: ANALYZE YOUR RESULTS

Because SKC Corporation's bondholders require a \$30 payment of interest over the 90-day time period for the principal amount of \$1,000, the effective cost of borrowing short-term credit is equated by annualizing the bondholders' required rate of return of 3 percent (\$30/\$1,000) over the four quarters in the year. The effective annual cost of funds provided by the loan is, therefore, 12 percent.

The simple *APR* calculation does not consider compound interest. To account for the influence of compounding, we can use the following equation:

$$APY = \left(1 + \frac{i}{m}\right)^m - 1 \quad (15-8)$$

where *APY* is the annual percentage yield, *i* is the nominal rate of interest per year (12 percent in the previous example), and *m* is the number of compounding periods within a year [*m* = 1/time = 1/(90/360) = 4 in the preceding example]. Thus, the *APY* on the loan in the example problem, considering compounding, is

$$APY = \left(1 + \frac{0.12}{4}\right)^4 - 1 = 0.126 = 12.6\%$$

Compounding effectively raises the cost of short-term credit. Because the differences between *APR* and *APY* are usually small, we use the simple interest values of *APR* to compute the cost of short-term credit.

CAN YOU DO IT?

THE APPROXIMATE COST OF SHORT-TERM CREDIT

Hempstead Electric buys its wiring materials in bulk directly from Hamilton Wire and Cable Company. Hamilton offers credit terms that involve a cash discount of 3 percent if payment is received in 30 days. Otherwise, the full amount is due in 90 days. What is the approximate cost of credit to Hempstead if it exceeds 30 days and passes up the cash discount? (The solution can be found below.)

FINANCIAL DECISION TOOLS

Name of Tool	Formula	What It Tells You
Annual percentage rate (APR)	$\frac{\text{interest}}{\text{principal} \times \text{time}}$ Interest = dollar interest expense Principal = face amount of credit extended Time = the fraction of time for which credit is extended (e.g., 0.5 for a six-month loan)	• An estimate of the approximate annual cost of short-term credit that does not consider the effects of compounding
Annual percentage yield (APY)	$\left(1 + \frac{\text{nominal rate of interest } (i)}{\text{number of compounding periods per year } (m)}\right)^m - 1$	• The compounded annual rate of interest • The cost of short-term (less than one year) credit

Concept Check

1.

What is the fundamental interest equation that underlies the calculation of the approximate cost-of-credit formula?
2.

What is the annual percentage yield (APY) and how does it differ from the annual percentage rate (APR)?

b5

Identify the primary sources of short-term credit.

unsecured loans all sources of credit that have as their security only the lender’s faith in the borrower’s ability to repay the funds when due.

secured loans sources of credit that require security in the form of pledged assets. In the event the borrower defaults in payment of principal or interest, the lender can seize the pledged assets and sell them to settle the debt.

Sources of Short-Term Credit

Short-term credit sources can be classified into two basic groups: unsecured and secured. **Unsecured loans** include all those *sources that have as their security only the lender’s faith in the ability of the borrower to repay the funds when due*. The major sources of unsecured short-term credit include accrued wages and taxes, trade credit, unsecured bank loans, and commercial paper. A **secured loan** involves the *pledge of specific assets as collateral in the event the borrower defaults in payment of principal or interest*. Commercial banks, finance companies, and factors are the primary suppliers of secured credit. The principal sources of collateral include accounts receivable and inventories.

DID YOU GET IT?

THE APPROXIMATE COST OF SHORT-TERM CREDIT

If Hempstead chooses to pass up the cash discount, then the cost of credit will reflect the loss of the 3 percent discount so that the firm can use the principal amount of the purchases (that is, 97 percent of each dollar of wire purchased) for a period of 60 days (the difference in the discount period of 30 days and the

end of the credit period of 90 days). The APR is calculated as follows using equation (15-6):

$$APR = \frac{\text{interest}}{\text{principal} \times \text{time}} = \frac{0.03}{0.97 \times \frac{60}{360}} = 0.1856, \text{ or } 18.56\%$$

FINANCE AT WORK

MANAGING WORKING CAPITAL BY TRIMMING RECEIVABLES

LaFarge Corporation is located in Reston, Virginia, and operates in the building materials industry. Last year LaFarge was able to dramatically improve its management of accounts receivable. This improvement is reflected in a decrease in the days of sales outstanding ratio (*DSO*); that is,

$$DSO = \frac{\text{accounts receivable}}{\text{sales}/365}$$

After reviewing this formula, you may recall that we referred to *DSO* in Chapter 4 as the average collection period. The company's success is due in large part to the fact that it ties incentive pay to the return on net assets (*RONA*) as defined here:

$$RONA = \frac{\text{earnings before interest and taxes}}{\text{net assets}}$$

Note that improvements in accounts-receivable management that result in a decrease in *DSO* also lead to a reduction in the firm's net assets and a corresponding increase in *RONA*. Of course, this presumes that the reduction in *DSO* does not have an adverse impact on the firm's revenues and, consequently, earnings.

How Did They Do It?

Pete Sacripanti, vice president and controller of LaFarge's Calgary-based construction materials business, credits the firm's improved collections to 12 fundamental steps:^a

1. **Focusing on customers and collections**, which involves all layers of management and is not just a finance responsibility.
2. **Building a base of preferred customers** that confers a competitive advantage.
3. **Delineating clear ownership of customer accounts** among the sales staff, which prevents passing the buck on delinquent accounts.
4. **Fixing clear guidelines** that govern LaFarge's commitments and responsibilities to customers.
5. **Articulating standard sales terms and conditions**, stipulating terms that are negotiable and those that are never negotiable.
6. **Establishing monthly collection targets by salesperson and division**, with collection targets based on the prior month's sales plus past-due accounts.

7. **Training salespeople on customer profitability**, with particular attention to (1) the link between past-due accounts and increased risk of bad debt write-offs, (2) the volume of business required to recover the cost of bad debts, and (3) higher borrowing costs for the company.
8. **Engaging in regular (weekly) credit and collection meetings** with the sales team, the credit manager, and the general manager.
9. **Encouraging constant "in-your-face" executive management**, featuring weekly status updates of collections by salespeople, including key account information.
10. **Facilitating collections through advance phone calls** to establish expected payment amount and availability and to provide a courier to pick up the payments.
11. **Developing collection skills**, including partial holdback releases; offsetting balances owed for services or equipment; use of construction liens, guarantees, letters of credit, and payment bonds; negotiation techniques for securing extras in lieu of write-offs; and better knowledge of the company's products, its industry, and its customers.
12. **Developing unique value** by building stronger relationships with customers, such as air-miles loyalty programs, engineered solutions, quality assurance, and new-product development.

The key thing to note in this list is that each item represents a managerial action aimed at improving the firm's success in collecting its receivables. The *DSO* metric captures the success of these actions, but it is these 12 steps that actually brought about the improvements.

Measuring Success

LaFarge engaged in a 3-year program aimed at reducing its investment in working capital. The success of the program is most clearly evident in the company's western Canadian construction-materials operation based in Calgary. This unit slashed its working capital by 38 percent to around \$36 million while increasing sales by 10 percent to \$425 million. The effect on *RONA* was dramatic because the firm simultaneously increased earnings (the numerator of the ratio) and decreased net assets (the denominator).

^aBased on "Dollars in the Details: The 1999 Working Capital Survey" by S. L. Mintz, CFO.com, July 1, 1999.

Unsecured Sources: Accrued Wages and Taxes

Because most businesses pay their employees only periodically (weekly, biweekly, or monthly), firms accrue a wages-payable account that is, in essence, a loan from their employees. For example, if the wage expense for the Appleton Manufacturing Company is \$450,000 per week and it pays its employees monthly, then by the end of a 4-week month the firm will owe its employees \$1.8 million in wages for services they have already performed during the month. Consequently, the employees finance their own efforts by waiting a full month for payment.

Similarly, firms generally make quarterly income tax payments for their estimated quarterly tax liability. This means that the firm has the use of the tax money it owes based on its

CAN YOU DO IT?
THE COST OF SHORT-TERM CREDIT (CONSIDERING COMPOUNDING EFFECTS)

Re-evaluate the cost of short-term credit for Hempstead using the annual percentage yield (APY), which incorporates compound interest.
(The solution can be found on page 469.)

quarterly profits through the end of the quarter. In addition, the firm pays sales taxes and withholding (income) taxes for its employees on a deferred basis. The longer the period that the firm holds the tax payments, the greater the amount of financing they provide for the firm.

Note that these sources of financing *rise and fall spontaneously* with the level of the firm’s sales. That is, as the firm’s sales increase, so do its labor expenses, sales taxes collected, and income tax. Consequently, these accrued expense items provide the firm with automatic, or spontaneous, sources of financing.

Unsecured Sources: Trade Credit

Trade credit provides one of the most flexible sources of short-term financing available to the firm. We previously noted that trade credit is a primary source of spontaneous, or on-demand, financing. That is, trade credit arises spontaneously with the firm’s purchases. To arrange for credit, the firm need only place an order with one of its suppliers. The supplier checks the firm’s credit and, if it is good, sends the merchandise. The purchasing firm then pays for the goods in accordance with the supplier’s credit terms.

Credit Terms and Cash Discounts Very often the credit terms offered with trade credit involve a cash discount for early payment. For example, a supplier might offer terms of 2/10, net 30, which means that a 2 percent discount is offered if payment is made within 10 days or the full amount is due in 30 days. Thus, a 2 percent penalty is involved for not paying within 10 days, or for delaying payment from the tenth to the thirtieth day (that is, for 20 days). The effective annual cost of not taking the cash discount can be quite severe. Using a \$1 invoice amount, the effective cost of passing up the discount period using the preceding credit terms and our *APR* equation can be estimated.

$$APR = \frac{\$0.02}{\$0.98} \times \frac{1}{20/360} = 0.3673 = 36.73\%$$

Note that the 2 percent cash discount is the *interest* cost of extending the payment period an *additional* 20 days. Note also that the principal amount of the credit is \$0.98. This amount constitutes the full principal amount as of the tenth day of the credit period, after which time the cash discount is lost. The effective cost of passing up the 2 percent discount for 20 days is quite expensive: 36.73 percent. Furthermore, once the discount period has passed, there is no reason to pay before the final due date (the thirtieth day). Table 15-3 lists the effective annual cost of a number of alternative credit terms. Note that the cost of trade credit varies directly with the size of the cash discount and inversely with the length of time between the end of the discount period and the final due date.

TABLE 15-3 The Rates of Interest on Selected Trade Credit Terms	
Credit Terms	Effective Rates
2/10, net 60	14.69%
2/10, net 90	9.18
3/20, net 60	27.84
6/10, net 90	28.72

DID YOU GET IT?

THE COST OF SHORT-TERM CREDIT (CONSIDERING COMPOUNDING EFFECTS)

Using equation (15-8) we can estimate the cost of short-term credit to Hempstead as follows:

$$APY = \left(1 + \frac{i}{m}\right)^m - 1 = \left(1 + \frac{0.18}{6}\right)^6 - 1 = 0.1941, \text{ or } 19.41\%$$

where i is the nominal annual rate of interest. That is, the cash discount is 3 percent and this gets Hempstead an added 60 days or 1/6th of a year. Therefore, the nominal rate of interest for a year is 6×0.03 , or 18 percent. Considering the effects of compound interest, the cost of short-term credit from deferring payment to Hamilton for wiring until the end of the 90-day credit period is 19.41 percent.

The Stretching of Trade Credit Some firms that use trade credit engage in a practice called *stretching of trade accounts*. This practice involves delaying payments beyond the prescribed credit period. For example, a firm might purchase materials under credit terms of 3/10, net 60; however, when faced with a shortage of cash, the firm might delay payment until the eightieth day. Continued violation of trade terms can eventually lead to a loss of credit. However, for short periods, and at infrequent intervals, stretching offers the firm an emergency source of short-term credit.

The Advantages of Trade Credit As a source of short-term financing, trade credit has a number of advantages. First, trade credit is conveniently obtained as a normal part of the firm's operations. Second, no formal agreements are generally involved in extending credit. Furthermore, the amount of credit extended expands and contracts with the needs of the firm; this is why it is classified as a spontaneous, or on-demand, source of financing.

Unsecured Sources: Bank Credit

Commercial banks provide unsecured short-term credit in two basic forms: lines of credit and transaction loans (notes payable). Maturities of both types of loans are usually 1 year or less, with rates of interest depending on the creditworthiness of the borrower and the level of interest rates in the economy as a whole.

Line of Credit A **line of credit** is generally an informal agreement or understanding between the borrower and the bank about the maximum amount of credit that the bank will provide the borrower at any one time. Under this type of agreement there is no legal commitment on the part of the bank to provide the credit. In a **revolving credit agreement**, which is a variant of this form of financing, a legal obligation is involved. The line of credit agreement generally covers a period of 1 year corresponding to the borrower's fiscal year. Thus, if the borrower is on a July 31 fiscal year, its lines of credit are based on the same annual period.

Lines of credit generally do not involve fixed rates of interest; instead they state that credit will be extended at $\frac{1}{2}$ percent over prime or some other spread over the bank's prime rate.⁴ Furthermore, the agreement usually does not spell out the specific use that will be made of the funds beyond a general statement, such as *for working-capital purposes*.

Lines of credit usually require that the borrower maintain a *minimum balance in the bank throughout the loan period*, called a **compensating balance**. This required balance (which can be stated as a percentage of the line of credit or the loan amount) increases the effective cost of the loan to the borrower unless a deposit balance equal to or greater than this balance requirement is maintained in the bank.

The effective cost of short-term bank credit can be estimated using the *APR* equation. Consider the following example.

line of credit generally an informal agreement or understanding between a borrower and a bank as to the maximum amount of credit the bank will provide the borrower at any one time. Under this type of agreement there is no "legal" commitment on the part of the bank to provide the stated credit.

revolving credit agreement an understanding between the borrower and the bank as to the amount of credit the bank will be legally obligated to provide the borrower.

compensating balance a balance of a given amount that the firm maintains in its demand deposit account. It may be required by either a formal or an informal agreement with the firm's commercial bank. Such balances are usually required by the bank (1) on the unused portion of a loan commitment, (2) on the unpaid portion of an outstanding loan, or (3) in exchange for certain services provided by the bank, such as check-clearing or credit information. These balances raise the effective rate of interest paid on borrowed funds.

⁴The *prime rate of interest* is the rate that a bank charges its most creditworthy borrowers.

EXAMPLE 15.2**Calculating the effective annual cost of short-term bank credit**

M&M Beverage Company has a \$300,000 line of credit that requires a compensating balance equal to 20 percent of the loan amount. The rate paid on the loan is 10 percent per annum; \$200,000 is borrowed for a 6-month period deposit with the lending bank. The dollar cost of the loan includes the interest expense and the opportunity cost of maintaining an idle cash balance equal to the 20 percent compensating balance. To accommodate the cost of the compensating-balance requirement, assume that the added funds will have to be borrowed and simply left idle in the firm's checking accounts.

STEP 1: FORMULATE A SOLUTION STRATEGY

The amount actually borrowed (B) will be larger than the \$200,000 needed. In fact, the needed \$200,000 will constitute 80 percent of the total borrowed funds because of the 20 percent compensating-balance requirement; hence,

$$0.80B = \$200,000, \text{ such that } B = \$250,000$$

Thus, interest is paid on a \$250,000 loan, of which only \$200,000 is available for use by the firm.⁵

$$\begin{aligned} \text{Interest} &= \text{principal} \times \text{rate} \times \text{time} \\ &= \$250,000 \times 0.10 \times (180/360) = \$12,500 \end{aligned}$$

Note that we use the \$250,000 as the principal when calculating the interest payment. The reason is that the firm must borrow the 20 percent compensating balance of \$50,000 that is left idle in the firm's checking account.

The effective annual cost of credit, therefore, is calculated using the APR formula:

$$APR = \frac{\text{interest}}{\text{principal}} \times \frac{1}{\text{time}}$$

STEP 2: CRUNCH THE NUMBERS

Substituting the characteristics of M&M Beverage Company's bank loan into the APR equation above, we get the following:

$$APR = \frac{\$12,500}{\$200,000} \times \frac{1}{180/360} = 0.125 = 12.5\%$$

Note that we use \$200,000 as the principal when calculating the annual percentage rate. This amount represents the available portion of the loan, or the effective portion; therefore, we use it to calculate effective annual cost.

STEP 3: ANALYZE YOUR RESULTS

In the M&M Beverage Company example, the loan required the payment of principal (\$250,000), which includes the 20 percent compensatory balance, plus interest (\$12,500), a 10 percent rate, at the end of the 6-month loan period. The effective annual cost of credit was calculated using the ratio of interest (\$12,500) to effective principal amount (\$200,000). When annualized, this ratio produced an effective annual cost of bank credit of 12.5 percent.

Frequently, bank loans will be made on a discount basis. That is, the loan interest will be deducted from the loan amount before the funds are transferred to the borrower. Extending the M&M Beverage Company example to consider discounted interest involves reducing the effective loan proceeds (\$200,000) in the previous example by the amount of interest for the full 6 months (\$12,500). The effective rate of interest on the loan is now:

⁵The same answer would have been obtained by assuming a total loan of \$200,000, of which only 80 percent, or \$160,000, was available for use by the firm; that is,

$$APR = \frac{\$10,000}{\$160,000} \times \frac{1}{180/360} = 12.5\%$$

Interest is now calculated on the \$200,000 loan amount $\left(\$10,000 = \$200,000 \times 0.10 \times \frac{1}{2} \right)$

$$APR = \frac{\$12,500}{\$200,000 - \$12,500} \times \frac{1}{(180/360)} = 0.1333 = 13.33\%$$

The effect of discounting interest was to raise the cost of the loan from 12.5 percent to 13.33 percent. This results from the fact that the firm pays interest on the same amount of funds as before (\$250,000); however, this time it gets the use of \$12,500 less, or $\$200,000 - \$12,500 = \$187,500$.⁶

Transaction Loans Still another form of unsecured short-term bank credit can be obtained in the form of a **transaction loan**. Here the loan is *made for a specific purpose*. This is the type of loan that most individuals associate with bank credit and is obtained by signing a promissory note.

An unsecured transaction loan is very similar to a line of credit with regard to its cost, term to maturity, and compensating-balance requirements. In both instances commercial banks often require that the borrower *clean up* its short-term loans for a 30- to 45-day period during the year. This means, very simply, that the borrower must be free of any bank debt for the stated period. The purpose of such a requirement is to ensure that the borrower is not using short-term bank credit to finance a part of its permanent needs for funds.

transaction loan a loan where the proceeds are designated for a specific purpose—for example, a bank loan used to finance the acquisition of a piece of equipment.

Unsecured Sources: Commercial Paper

Only the largest and most creditworthy companies are able to use **commercial paper**, which is simply a *short-term promise to pay that is sold in the market for short-term debt securities*.

The maturity of the credit source is generally 6 months or less, although some issues carry 270-day maturities. The interest rate on commercial paper is generally slightly lower ($\frac{1}{2}$ to 1 percent) than the prime rate on commercial bank loans. Also, the interest is usually discounted, although sometimes interest-bearing commercial paper is available.

New issues of commercial paper are either directly placed (sold by the issuing firm directly to the investing public) or dealer placed. A dealer placement involves the use of a commercial paper dealer, who sells the issue for the issuing firm. Many major finance companies, such as General Motors Acceptance Corporation, place their commercial paper directly. The volume of direct versus dealer placements is roughly 4 to 1 in favor of direct placements. Dealers are used primarily by industrial firms that either make only infrequent use of the commercial paper market or, owing to their small size, would have difficulty placing the issue without the help of a dealer.

commercial paper short-term unsecured promissory notes sold by large businesses in order to raise cash. Unlike most other money-market instruments, commercial paper has no developed secondary market.

Commercial Paper as a Source of Short-Term Credit Several advantages accrue to the user of commercial paper.

- 1. Interest rate.** Commercial paper rates are generally lower than rates on bank loans and comparable sources of short-term financing.
- 2. Compensating-balance requirement.** No minimum balance requirements are associated with commercial paper. However, issuing firms usually find it desirable to maintain line-of-credit agreements sufficient to back up their short-term financing

⁶If M&M needs the use of a full \$200,000, then it will have to borrow more than \$250,000 to cover both the compensating-balance requirement *and* the discounted interest. In fact, the firm will have to borrow some amount B such that

$$\begin{aligned} B - 0.2B - \left(0.10 \times \frac{1}{2}\right)B &= \$200,000 \\ 0.75B &= \$200,000 \\ B &= \frac{\$200,000}{0.75} = \$266,667 \end{aligned}$$

The cost of credit remains the same at 13.33 percent, as we see here:

$$\begin{aligned} APR &= \frac{\$13,333}{\$266,667 - \$53,333 - \$13,333} \times \frac{1}{180/360} \\ &= 0.1333 = 13.33\% \end{aligned}$$

needs in the event that a new issue of commercial paper cannot be sold or an outstanding issue cannot be repaid when due.

3. **Amount of credit.** Commercial paper offers the firm with very large credit needs a single source for all its short-term financing. Because of loan amount restrictions placed on the banks by the regulatory authorities, obtaining the necessary funds from a commercial bank might require borrowing from a number of institutions.⁷
4. **Prestige.** Because it is widely recognized that only the most creditworthy borrowers have access to the commercial paper market, its use signifies a firm's credit status.

Using commercial paper for short-term financing, however, involves a very important risk. The commercial paper market is highly impersonal and denies even the most creditworthy borrower any flexibility in terms of repayment. When bank credit is used, the borrower has someone with whom he or she can work out any temporary difficulties that might be encountered in meeting a loan deadline. This flexibility simply does not exist for the user of commercial paper.

Estimating the Cost of Using Commercial Paper The cost of commercial paper can be estimated using the simple, effective cost-of-credit equation (*APR*). The key points to remember are that commercial paper interest is usually discounted and that if a dealer is used to place the issue, a fee is charged. Even if a dealer is not used, the issuing firm will incur costs associated with preparing and placing the issue, and these costs must be included in estimating the cost of this credit.

EXAMPLE 15.3

Calculating the effective cost of credit

The EPG Manufacturing Company uses commercial paper regularly to support its needs for short-term financing. The firm plans to sell \$100 million in 270-day-maturity paper, on which it expects to pay discounted interest at a rate of 12 percent per annum (\$9 million). In addition, EPG expects to incur a cost of approximately \$100,000 in dealer placement fees and other expenses of issuing the paper. What is the effective cost of credit to EPG?

STEP 1: FORMULATE A SOLUTION STRATEGY

EPG's effective cost of credit can be determined using the annual percentage rate formula. By identifying each of the variables and plugging them into the *APR* equation, the following calculation is generated:

$$APR = \frac{\text{interest}}{\text{principal}} \times \frac{1}{\text{time}} \quad (15-7)$$

where interest is calculated using the formula

$$\text{interest} = (\text{principal} \times \text{rate} \times \text{time}) + \text{financing fees}$$

In this example, interest will represent the interest itself plus any other financing fees. The principal is the total cash received from financing, less any interest costs. Finally, the time period is over 270 days.

STEP 2: CRUNCH THE NUMBERS

Substituting the characteristics of EPG's commercial paper financing strategy into equation (15-7) we get the following:

$$\begin{aligned} APR &= \frac{\$9,000,000 + \$100,000}{\$100,000,000 - \$100,000 - \$9,000,000} \times \frac{1}{270/360} \\ &= 0.1335 = 13.35\% \end{aligned}$$

⁷Member banks of the Federal Reserve System are limited to 10 percent of their total capital, surplus, and undivided profits when making loans to a single borrower. Thus, when a corporate borrower's needs for financing are very large, it may have to deal with a group of participating banks to raise the needed funds.

where the interest cost is calculated as $\$100,000,000 \times 0.12 \times (270/360) = \$9,000,000$ plus the \$100,000 dealer placement fee. Thus, the effective cost of credit to EPG is 13.35 percent.

STEP 3: ANALYZE YOUR RESULTS

It appears that at the 12 percent discount rate, the commercial paper sale will only return \$89,900,000 in cash financing, after the \$100,000 of dealer placement fees are included. This means that \$9.1 million is the interest cost of financing \$89.9 million. In this case, the interest represents 13.35 percent of the total cash received, which therefore represents the effective cost of credit.

Secured Sources: Accounts-Receivable Loans

Secured sources of short-term credit have certain assets of the firm pledged as collateral to secure the loan. Upon default of the loan agreement, the lender has first claim to the pledged assets in addition to its claim as a general creditor of the firm. Hence, the secured credit agreement offers an added margin of safety to the lender.

Generally, a firm's receivables are among its most liquid assets. For this reason they are considered by many lenders to be prime collateral for a secured loan. Two basic procedures can be used in arranging for financing based on receivables: pledging and factoring.

Pledging Accounts Receivable Under the **pledging accounts receivable** arrangement, the borrower simply pledges accounts receivable as collateral for a loan obtained from either a commercial bank or a finance company. The amount of the loan is stated as a percentage of the face value of the receivables pledged. If the firm provides the lender with a *general line* on its receivables, then all of the borrower's accounts are pledged as security for the loan. This method of pledging is simple and inexpensive. However, because the lender has no control over the quality of the receivables being pledged, it will set the maximum loan at a relatively low percentage of the total face value of the accounts, generally ranging downward from a maximum of around 75 percent.

pledging accounts receivable a loan the firm obtains from a commercial bank or a finance company using its accounts receivable as collateral.

Still another approach to pledging involves the borrower presenting specific invoices to the lender as collateral for a loan. This method is somewhat more expensive because the lender must assess the creditworthiness of each individual account pledged; however, given this added knowledge, the lender should be willing to increase the loan as a percentage of the face value of the invoices. In this case the loan might reach as high as 85 or 90 percent of the face value of the pledged receivables.

Credit Terms Accounts-receivable loans generally carry an interest rate that is 2 to 5 percent higher than the bank's prime lending rate. Finance companies charge an even higher rate. In addition, the lender usually charges a handling fee stated as a percentage of the face value of the receivables processed, which may be as much as 1 to 2 percent of the face value.

EXAMPLE 15.4

Calculating the annual percentage rate of short-term lender credit

The A. B. Good Company sells electrical supplies to building contractors on terms of net 60. The firm's average monthly sales are \$100,000; thus, given the firm's 2-month credit terms, its average receivables balance is \$200,000. The firm pledges all of its receivables to a local bank, which in turn advances up to 70 percent of the face value of the receivables at 3 percent over prime and charges a 1 percent processing fee on all receivables pledged. A. B. Good follows a practice of borrowing the maximum amount possible, and the current prime rate is 10 percent. What is the *APR* of using this source of financing for a full year?

STEP 1: FORMULATE A SOLUTION STRATEGY

In this example, the same annual percentage rate formula is used. However, the key is identifying the correct characteristics to use as variables in the equation:

$$\text{Annual percentage rate} = \frac{\text{interest}}{\text{principal}} \times \frac{1}{\text{time}} \quad (15-7)$$

Note that we can calculate interest by adding the interest expense plus the annual processing fee. The principal will be represented by the actual amount of credit extended. Finally, our time period should be over the full year:

$$APR = \frac{\text{interest expense} + \text{processing fee}}{\text{credit extended}} \times \frac{1}{\text{time}}$$

STEP 2: CRUNCH THE NUMBERS

Once we substitute the correct variables from above into the equation, we get the following result:

$$APR = \frac{\$18,200 + \$12,000}{\$140,000} \times \frac{1}{360/360} = 0.2157 = 21.57\%$$

where the total dollar cost of the loan consists of both the annual interest expense ($0.13 \times 0.70 \times \$200,000 = \$18,200$) and the annual processing fee ($0.01 \times \$100,000 \times 12 \text{ months} = \$12,000$). The amount of credit extended is $0.70 \times \$200,000 = \$140,000$. Note that the processing charge applies to all receivables pledged. Thus, the A. B. Good Company pledges \$100,000 each month, or \$1,200,000 during the year, on which a 1 percent fee must be paid, for a total annual charge of \$12,000.

STEP 3: ANALYZE YOUR RESULTS

It appears that A. B. Good Company's lender charges a rate of about 14 percent (13 percent interest and 1 percent annual processing fee) for the 70 percent of receivables for which they give a receivables advance. In this example the effective *APR* is actually more than this charge of 14 percent, because of the discounted amount of the receivables advance. Since only 70 percent of the receivables are actually credited, the effective *APR* is increased to account for the 30 percent of receivables for which no advance is given.

One more point: The lender, in addition to making advances or loans, may be providing certain credit services to the borrower. For example, the lender may provide billing and collection services. The value of these services should be considered in computing the cost of credit. In the preceding example, A. B. Good Company may save \$10,000 per year in credit department expenses by pledging all of its accounts and letting the lender provide those services. In this case, the cost of short-term credit is only:

$$APR = \frac{\$18,200 + \$12,000 - \$10,000}{\$140,000} \times \frac{1}{360/360} = 0.1443 = 14.43\%$$

The Advantages and Disadvantages of Pledging The primary advantage of pledging as a source of short-term credit is the flexibility it provides the borrower. Financing is available on a continuous basis. The new accounts created through credit sales provide the collateral for the financing of new production. Furthermore, the lender may provide credit services that eliminate or at least reduce the need for similar services within the firm. The primary disadvantage associated with this method of financing is its cost, which can be relatively high compared with other sources of short-term credit, owing to the level of the interest rate charged on loans and the processing fee on pledged accounts.

Factoring Accounts Receivable Factoring accounts receivable involves the *outright sale of a firm's accounts to a financial institution called a factor*. A **factor** is a firm that acquires the receivables of other firms. The factoring institution might be a commercial finance company that engages solely in the factoring of receivables (known as an *old-line factor*) or it might be a commercial bank. The factor, in turn, bears the risk of collection and, for a fee, services the accounts. The fee is stated as a percentage of the face value of all receivables factored (usually 1 to 3 percent).

The factor firm typically does *not* make payment for factored accounts until the accounts have been collected or the credit terms have been met. Should the firm wish to receive immediate payment for its factored accounts, it can borrow from the factor, using the factored accounts as collateral. The maximum loan the firm can obtain is equal to the face value of its factored accounts less the factor's fee (1 to 3 percent) less a reserve (6 to 10 percent) less the interest on the loan. For example, if \$100,000 in receivables is factored, carrying 60-day credit terms, a 2 percent factor's fee, a 6 percent reserve, and interest at 1 percent per month on advances, then the maximum loan or advance the firm can receive is computed as follows:

Face amount of receivables factored	\$100,000
Less: Fee ($0.02 \times \$100,000$)	(2,000)
Reserve ($0.06 \times \$100,000$)	(6,000)
Interest ($0.01 \times \$92,000 \times 2 \text{ months}$)	(1,840)
Maximum advance	\$ 90,160

Note that interest is discounted and calculated based on a maximum amount of funds available for advance ($\$92,000 = \$100,000 - \$2,000 - \$6,000$). Thus, the effective cost of credit can be calculated as follows:

$$\begin{aligned} APR &= \frac{\$1,840 + \$2,000}{\$90,160} \times \frac{1}{60/360} \\ &= 0.2555 = 25.55\% \end{aligned}$$

Secured Sources: Inventory Loans

Inventory loans, or *loans secured by inventories*, provide a second source of security for short-term credit. The amount of the loan that can be obtained depends on both the marketability and perishability of the inventory. Some items, such as raw materials (grains, oil, lumber, and chemicals), are excellent sources of collateral, because they can easily be liquidated. Other items, such as work-in-process inventories, provide very poor collateral because of their lack of marketability.

There are several methods by which inventory can be used to secure short-term financing. These include a floating, or blanket, lien, a chattel mortgage, a field-warehouse receipt, and a terminal-warehouse receipt.

Under a **floating lien agreement**, *the borrower gives the lender a lien against all of its inventories*. This provides the simplest but least secure form of inventory collateral. The borrowing firm maintains full control of the inventories and continues to sell and replace them as it sees fit. Obviously, this lack of control over the collateral greatly dilutes the value of this type of security to the lender.

Under a **chattel mortgage agreement**, *the inventory is identified (by serial number or otherwise) in the security agreement, and the borrower retains title to the inventory but cannot sell the items without the lender's consent*.

Under a **field-warehouse agreement**, *inventories used as collateral are physically separated from the firm's other inventories and are placed under the control of a third-party field-warehousing firm*.

factoring accounts receivable the outright sale of a firm's accounts receivable to another party (the factor) without recourse. The factor, in turn, bears the risk of collection.

factor a firm that, in acquiring the receivables of other firms, bears the risk of collection and, for a fee, services the accounts.

inventory loans loans secured by inventories. Examples include floating or blanket lien agreements, chattel mortgage agreements, field-warehouse receipt loans, and terminal-warehouse receipt loans.

floating lien agreement an agreement, generally associated with a loan, whereby the borrower gives the lender a lien against all its inventory.

chattel mortgage agreement a loan agreement in which the lender can increase his or her security interest by having specific items of inventory identified in the loan agreement. The borrower retains title to the inventory but cannot sell the items without the lender's consent.

field-warehouse agreement a security agreement in which inventories pledged as collateral are physically separated from the firm's other inventories and placed under the control of a third-party field-warehousing firm.

terminal-warehouse agreement a security agreement in which the inventories pledged as collateral are transported to a public warehouse that is physically removed from the borrower's premises. This is the safest (though costly) form of financing secured by inventory.

A **terminal-warehouse agreement** differs from a field-warehouse agreement in only one respect. Here *the inventories pledged as collateral are transported to a public warehouse that is physically removed from the borrower's premises*. The lender has an added degree of safety or security because the inventory is totally removed from the borrower's control. Once again the cost of this type of arrangement is increased because the warehouse firm must be paid by the borrower; in addition, the inventory must be transported to and, eventually, from the public warehouse.

Concept Check

1. What are some examples of unsecured and secured sources of short-term credit?
2. What is the difference between a line of credit and a revolving credit agreement?
3. What are the types of credit agreements a firm can get that are secured by its accounts receivable as collateral?
4. What are some examples of loans secured by a firm's inventories?

Chapter Summaries



Describe the risk-return trade-off involved in managing working capital. (pgs. 457–458)

SUMMARY: Working-capital management involves managing the firm's liquidity, which in turn involves managing (1) the firm's investment in current assets and (2) its use of current liabilities. Each of these problems involves risk–return trade-offs. Investing in current assets reduces the firm's risk of illiquidity at the expense of lowering its overall rate of return on its investment in assets. By contrast, the use of long-term sources of financing enhances the firm's liquidity while reducing its rate of return on assets.

KEY TERMS

Working capital, page 457 A concept traditionally defined as a firm's investment in current assets.

Net working capital, page 457 The difference between the firm's current assets and its current liabilities.

KEY EQUATION

Net working capital = current assets – current liabilities



Describe the determinants of net working capital. (pgs. 459–462)

SUMMARY: A firm's net working capital is determined by its need for current assets and the sources of financing it uses to acquire them. In deciding on the sources of financing, it is important to note that the firm gets some financing automatically from the firm's suppliers in the form of accounts payable. However, the firm typically needs more financing, which can come in the form of short- (less than 1 year) or long-term financing. Using short-term sources is often cheaper than long-term sources but adds risk as the firm is faced with a near-term maturity that must be repaid. The hedging principle, or principle of self-liquidating debt, offers the financial manager one tool for resolving this financing problem. Basically, this methodology requires that the firm match up the maturities of its liabilities with the maturity of its asset needs. For example, if the firm has a seasonal and temporary need to raise its inventories and accounts receivable (for example, a retailer at Christmas) then short-term financing is

appropriate. However, if the firm has a more permanent need to increase its current assets, then long-term financing should be used.

KEY TERMS

Hedging principle (principle of self-liquidating debt), page 459 A working-capital management policy which states that the cash-flow-generating characteristics of a firm's investments should be matched with the cash-flow requirements of the firm's sources of financing. Very simply, short-lived assets should be financed with short-term sources of financing while long-lived assets should be financed with long-term sources of financing.

Permanent investment, page 459 Investments that the firm expects to hold

longer than 1 year. The firm makes permanent investments in fixed and current assets.

Temporary investments, page 459 A firm's investments in current assets that will be liquidated and not replaced within a period of 1 year or less. Examples include seasonal expansions in inventories and accounts receivable.

Trade credit, page 460 Credit made available by a firm's suppliers in conjunction with the acquisition of materials. Trade credit appears on the balance sheet as accounts payable.

Compute the firm's cash conversion cycle. (pgs. 462–464)



SUMMARY: The cash conversion cycle is a key measure of how efficiently the firm is in managing its net working capital. Specifically, the cash conversion cycle equals the number of days it takes to collect on credit sales, plus the number of days items are in inventory, less the number of days that payables are outstanding. The importance of the length of the conversion cycle is that this is the number of days that the firm has money tied up in inventories and accounts receivable. The longer is this period, other things being the same, the more money the firm must invest in current assets.

KEY EQUATIONS

$$\text{Cash conversion cycle (CCC)} = \frac{\text{days of sales outstanding (DSO)}}{\text{sales}} + \frac{\text{days of sales in inventory (DSI)}}{\text{sales}} - \frac{\text{days of payables outstanding (DPO)}}{\text{sales}}$$

$$\frac{\text{Days of sales outstanding (DSO)}}{\text{sales}} = \frac{\text{accounts receivable}}{\text{sales}/365}$$

$$\frac{\text{Days of sales in inventory (DSI)}}{\text{sales}} = \frac{\text{inventories}}{\text{cost of goods sold}/365}$$

$$\frac{\text{Days of payables outstanding (DPO)}}{\text{sales}} = \frac{\text{accounts payable}}{\text{cost of goods sold}/365}$$

Estimate the cost of short-term credit. (pgs. 464–466)



SUMMARY: The key consideration in selecting a source of short-term financing is the effective cost of credit. Since short-term credit is, by definition, extended for a period less than 1 year, the analyst must adjust the interest paid for the term of the financing (less than 1 year) in order to compute an annual rate of interest. The adjustment can assume simple interest (that is, not compounded) to compute the annual percentage rate (*APR*) or the adjustment can account for compound interest, in which case we compute the annual percentage yield (*APY*).

KEY EQUATIONS

$$\text{Interest} = \text{principal} \times \text{rate} \times \text{time}$$

$$\frac{\text{Annual percentage rate (APR)}}{\text{rate (APR)}} = \frac{\text{interest}}{\text{principal} \times \text{time}}$$

$$\frac{\text{Annual percentage rate (APR)}}{\text{rate (APR)}} = \frac{\text{interest}}{\text{principal}} \times \frac{1}{\text{time}}$$

$$\frac{\text{Annual percentage yield (APY)}}{\text{yield (APY)}} = \left(1 + \frac{i}{m}\right)^m - 1$$

**Identify the primary sources of short-term credit.** (pgs. 466–476)

SUMMARY: The various sources of short-term credit can be categorized into two groups: unsecured and secured. Unsecured credit offers no specific assets as security for the loan agreement. The primary sources include trade credit, lines of credit, unsecured transaction loans from commercial banks, and commercial paper. Secured credit is generally provided to business firms by commercial banks, finance companies, and factors. The most popular sources of security involve the use of accounts receivable and inventories. Loans secured by accounts receivable include pledging agreements, in which a firm pledges its receivables as security for a loan, and factoring agreements, in which the firm sells the receivables to a factor. In a pledging arrangement, the lender retains the right of recourse in the event of default, whereas in factoring, a lender is generally without recourse. Loans secured by inventories can be made using one of several types of security arrangements. Among the most widely used are the floating lien, chattel mortgage, field-warehouse agreement, and terminal-warehouse agreement. The form of agreement used depends on the type of inventories pledged as collateral and the degree of control the lender wishes to exercise over the collateral.

KEY TERMS

Unsecured loans, page 466 All sources of credit that have as their security only the lender's faith in the borrower's ability to repay the funds when due.

Secured loans, page 466 Sources of credit that require security in the form of pledged assets. In the event the borrower defaults in payment of principal or interest, the lender can seize the pledged assets and sell them to settle the debt.

Line of credit, page 469 Generally an informal agreement or understanding between a borrower and a bank as to the maximum amount of credit the bank will provide the borrower at any one time. Under this type of agreement there is no "legal" commitment on the part of the bank to provide the stated credit.

Revolving credit agreement, page 469 An understanding between the borrower and the bank as to the amount of credit the bank will be legally obligated to provide the borrower.

Compensating balance, page 469 A balance of a given amount that the firm maintains in its demand deposit account. It may be required by either a formal or an informal agreement with the firm's commercial bank. Such balances are usually required by the bank (1) on the unused portion of a loan commitment, (2) on the unpaid portion of an outstanding loan, or (3) in

exchange for certain services provided by the bank, such as check-clearing or credit information. These balances raise the effective rate of interest paid on borrowed funds.

Transaction loan, page 471 A loan where the proceeds are designated for a specific purpose—for example, a bank loan used to finance the acquisition of a piece of equipment.

Commercial paper, page 471 Short-term unsecured promissory notes sold by large businesses in order to raise cash. Unlike most other money-market instruments, commercial paper has no developed secondary market.

Pledging accounts receivable, page 473 A loan the firm obtains from a commercial bank or a finance company using its accounts receivable as collateral.

Factoring accounts receivable, page 475 The outright sale of a firm's accounts receivable to another party (the factor) without recourse. The factor, in turn, bears the risk of collection.

Factor, page 475 A firm that, in acquiring the receivables of other firms, bears the risk of collection and, for a fee, services the accounts.

Inventory loans, page 475 Loans secured by inventories. Examples include floating or

blanket lien agreements, chattel mortgage agreements, field-warehouse receipt loans, and terminal-warehouse receipt loans.

Floating lien agreement, page 475 An agreement, generally associated with a loan, whereby the borrower gives the lender a lien against all its inventory.

Chattel mortgage agreement, page 475 A loan agreement in which the lender can increase his or her security interest by having specific items of inventory identified in the loan agreement. The borrower retains title to the inventory but cannot sell the items without the lender's consent.

Field-warehouse agreement, page 475

A security agreement in which inventories pledged as collateral are physically separated from the firm's other inventories and placed under the control of a third-party field-warehousing firm.

Terminal-warehouse agreement, page 476

A security agreement in which the inventories pledged as collateral are transported to a public warehouse that is physically removed from the borrower's premises. This is the safest (though costly) form of financing secured by inventory.

Review Questions

All Review Questions are available in MyFinanceLab.

15-1. Dell Computer Corporation (DELL) has long been recognized for its innovative approach to managing its working capital. Describe how Dell pioneered the management of net working capital to free up resources in the firm.

15-2. Define and contrast the terms *working capital* and *net working capital*.

15-3. Discuss the risk–return relationship involved in the firm's asset-investment decisions as that relationship pertains to its working-capital management.

15-4. What advantages and disadvantages are generally associated with the use of short-term debt? Discuss.

15-5. Explain what is meant by the statement “The use of current liabilities as opposed to long-term debt subjects the firm to a greater risk of illiquidity.”

15-6. Define the hedging principle. How can this principle be used in the management of working capital?

15-7. Define the following terms:

- a. Permanent asset investments
- b. Temporary asset investments
- c. Permanent sources of financing
- d. Temporary sources of financing
- e. Spontaneous sources of financing

15-8. How can the formula “interest = principle $\times$ rate $\times$ time” be used to estimate the cost of short-term credit?

15-9. How can we accommodate the effects of compounding in our calculation of the effective cost of short-term credit?

15-10. There are three major sources of unsecured short-term credit other than accrued wages and taxes. List and discuss the distinguishing characteristics of each.

15-11. What is meant by the following trade credit terms: 2/10, net 30? 4/20, net 60? 3/15, net 45?

15-12. Define the following:

- a. Line of credit
- b. Commercial paper
- c. Compensating balance
- d. Prime rate

Study Problems

All Study Problems are available in MyFinanceLab.

15-1. (Risk–return trade-off) The Carton Packing Company (CPC) is located in rapidly growing Austin, Texas. To meet its need for funds to finance its growing assets the firm has



reinvested earnings and borrowed using short-term bank notes. Balance sheets for the last 5 years are found below:

Carton Packing Company Balance Sheets

	2010	2011	2012	2013	2014
Current assets	\$100	\$130	\$160	\$190	\$220
Fixed assets	250	270	290	310	330
Total	<u>\$350</u>	<u>\$400</u>	<u>\$450</u>	<u>\$500</u>	<u>\$550</u>
Current liabilities	\$ 50	\$ 90	\$130	\$170	\$210
Long-term liabilities	100	100	100	100	100
Owners' equity	200	210	220	230	240
Total	<u>\$350</u>	<u>\$400</u>	<u>\$450</u>	<u>\$500</u>	<u>\$550</u>

- Compute CPC's current ratio (current assets divided by current liabilities) and the firm's debt ratio (current plus long-term liabilities divided by total assets) for the 5-year period found above. Describe the firm's risk using both the current ratio and debt ratio.
- Alter the financial statements above such that current liabilities remain constant at \$50 and long-term liabilities increase in the amount needed to meet the firm's financing requirements. Compute CPC's current ratio (current assets divided by current liabilities) and the firm's debt ratio (current plus long-term liabilities divided by total assets) using the revised financial statements you have prepared for the 5-year period 2010–2014. Describe the firm's risk using both the current ratio and debt ratio.
- Which of the financing plans is more risky? Why?



15-2. (Hedging principle) A popular theory for managing risk to the firm that arises out of its management of working capital (that is, current assets and current liabilities) involves following something called the principle of self-liquidating debt. How would this principle be applied in each of the following situations? Explain your responses to each alternative.

- Longleaf Homes owns a chain of senior housing complexes in the Seattle, Washington, area. The firm is presently debating whether it should borrow short or long term to raise \$10 million in needed funds. The funds are to be used to expand the firm's care facilities, which are expected to last 20 years.
- Arrow Chemicals needs \$5 million to purchase inventory to support its growing sales volume. Arrow does not expect the need for additional inventory to diminish in the future.
- Blocker Building Materials, Inc. is reviewing its plans for the coming year and expects that during the months of November through January it will need an additional \$5 million to finance the seasonal expansion in inventories and receivables.



15-3. (Cash conversion cycle) Sims Electric Corp. has been striving for the last 5 years to improve its management of working capital. Historical data for the firm's sales, accounts receivable, inventories, and accounts payable follow:

Sims Electric Corp. Financial Data

	JAN-10	JAN-11	JAN-12	JAN-13	JAN-14
Sales—Net	2,873	3,475	5,296	7,759	12,327
Receivables	411	538	726	903	1,486
Accounts payable	283	447	466	1,040	1,643
Inventories	220	293	429	251	233

- Calculate Sims' days of sales outstanding and days of sales in inventory for each of the 5 years. What has Sims accomplished in its attempts to better manage its investments in accounts receivable and inventory?
- Calculate Sims' cash conversion cycle for each of the 5 years. Evaluate Sims' overall management of its working capital.

15-4. (*Estimating the cost of bank credit*) Paymaster Enterprises has arranged to finance its seasonal working-capital needs with a short-term bank loan. The loan will carry a rate of 12 percent per annum with interest paid in advance (discounted). In addition, Paymaster must maintain a minimum demand deposit with the bank of 10 percent of the loan balance throughout the term of the loan. If Paymaster plans to borrow \$100,000 for a period of 3 months, what is the cost of the bank loan?



15-5. (*Cost of short-term financing*) The R. Morin Construction Company needs to borrow \$100,000 to help finance the cost of a new \$150,000 hydraulic crane used in the firm's commercial construction business. The crane will pay for itself in 1 year, and the firm is considering the following alternatives for financing its purchase:

Alternative A—The firm's bank has agreed to lend the \$100,000 at a rate of 14 percent. Interest would be discounted and a 15 percent compensating balance would be required. However, the compensating-balance requirement would not be binding on R. Morin because the firm normally maintains a minimum demand deposit (checking account) balance of \$25,000 in the bank.

Alternative B—The equipment dealer has agreed to finance the equipment with a 1-year loan. The \$100,000 loan would require payment of principal and interest totaling \$116,300.

- Which alternative should R. Morin select?
- If the bank's compensating-balance requirement were to necessitate idle demand deposits equal to 15 percent of the loan, what effect would this have on the cost of the bank loan alternative?

15-6. (*Cost of secured short-term credit*) The Sean-Janeow Import Co. needs \$500,000 for the 3-month period ending September 30, 2013. The firm has explored two possible sources of credit.

- S-J has arranged with its bank for a \$500,000 loan secured by its accounts receivable. The bank has agreed to advance S-J 80 percent of the value of its pledged receivables at a rate of 11 percent plus a 1 percent fee based on all receivables pledged. S-J's receivables average a total of \$1 million year-round.
- An insurance company has agreed to lend the \$500,000 at a rate of 9 percent per annum, using a loan secured by S-J's inventory of salad oil. A field-warehouse agreement would be used, which would cost S-J \$2,000 a month. Which source of credit should S-J select? Explain.

15-7. (*Cost of short-term financing*) You plan to borrow \$20,000 from the bank to pay for inventories for a gift shop you have just opened. The bank offers to lend you the money at 10 percent annual interest for the 6 months the funds will be needed.

- Calculate the effective rate of interest on the loan.
- In addition, the bank requires you to maintain a 15 percent compensating balance in the bank. Because you are just opening your business, you do not have a demand deposit account at the bank that can be used to meet the compensating-balance requirement. This means that you will have to put up 15 percent of the loan amount from your own personal money (which you had planned to use to help finance the business) in a checking account. What is the cost of the loan now?
- In addition to the compensating-balance requirement in part (b), you are told that interest will be discounted. What is the effective rate of interest on the loan now?

15-8. (*Estimating the cost of commercial paper*) On February 3, 2012, the Burlington Western Company plans a commercial paper issue of \$20 million. The firm has never used commercial paper before but has been assured by the firm placing the issue that it will have no difficulty raising the funds. The commercial paper will carry a 270-day maturity and require interest based on a rate of 11 percent per annum. In addition, the firm will have to pay fees totaling \$200,000 to bring the issue to market and place it. What is the effective cost of the commercial paper to Burlington Western?

15-9. (*Cost of trade credit*) Calculate the effective cost of the following trade credit terms when payment is made on the net due date:

- 2/10, net 30
- 3/15, net 30
- 3/15, net 45
- 2/15, net 60

15-10. (*Annual percentage yield*) Compute the cost of the trade credit terms in problem 15-3 using the compounding formula, or effective annual rate.

15-11. (*Cost of short-term bank loan*) On July 1, 2013, the Southwest Forging Corporation arranged for a line of credit with the First National Bank of Dallas. The terms of the agreement call for a \$100,000 maximum loan with interest set at 1 percent over prime. In addition, the firm has to maintain a 20 percent compensating balance in its demand deposit account throughout the year. The prime rate is currently 12 percent.

- If Southwest normally maintains a \$20,000 to \$30,000 balance in its checking account with FNB of Dallas, what is the effective cost of credit under the line-of-credit agreement when the maximum loan amount is used for a full year?
- Recompute the effective cost of credit if the firm borrows the compensating balance and the maximum possible amount under the loan agreement. Again, assume the full amount of the loan is outstanding for a whole year.

15-12. (*Cost of commercial paper*) Tri-State Enterprises plans to issue commercial paper for the first time in the firm's 35-year history. The firm plans to issue \$500,000 in 180-day maturity notes. The paper will carry a 10 1/2 percent rate with discounted interest and will cost Tri-State \$12,000 (paid in advance) to issue.

- What is the effective cost of credit to Tri-State?
- What other factors should the company consider in analyzing whether to issue the commercial paper?

15-13. (*Cost of accounts receivable*) Johnson Enterprises Inc. is involved in the manufacture and sale of electronic components used in small AM/FM radios. The firm needs \$300,000 to finance an anticipated expansion in receivables due to increased sales. Johnson's credit terms are net 60, and its average monthly credit sales are \$200,000. In general, the firm's customers pay within the credit period; thus, the firm's average accounts-receivable balance is \$400,000. Chuck Idol, Johnson's comptroller, approached the firm's bank with a request for a loan for the \$300,000 using the firm's accounts receivable as collateral. The bank offered to make a loan at a rate of 2 percent over prime plus a 1 percent processing charge on all receivables pledged (\$200,000 per month). Furthermore, the bank agreed to lend up to 75 percent of the face value of the receivables pledged.

- Estimate the cost of the receivables loan to Johnson when the firm borrows the \$300,000. The prime rate is currently 11 percent.
- Idol also requested a line of credit for \$300,000 from the bank. The bank agreed to grant the necessary line of credit at a rate of 3 percent over prime and required a 15 percent compensating balance. Johnson currently maintains an average demand deposit of \$80,000. Estimate the cost of the line of credit to Johnson.
- Which source of credit should Johnson select? Why?

15-14. (*Cost of factoring*) MDM Inc. is considering factoring its receivables. The firm has credit sales of \$400,000 per month and has an average receivables balance of \$800,000 with 60-day credit terms.

The factor has offered to extend credit equal to 90 percent of the receivables factored less interest on the loan at the rate of 1.5 percent per month. The 10 percent difference in the advance and the face value of all receivables factored consists of a 1 percent factoring fee plus a 9 percent reserve, which the factor maintains. In addition, if MDM Inc. decides to factor its receivables, it will sell them all so that it can reduce its credit department costs by \$1,500 a month.

- What is the cost of borrowing the maximum amount of credit available to MDM Inc. through the factoring agreement?
- What considerations other than cost should be accounted for by MDM Inc. in determining whether to enter the factoring agreement?

15-15. (*Cost of factoring*) A factor has agreed to lend the JVC Corporation working capital on the following terms: JVC's receivables average \$100,000 per month and have a 90-day average collection period. (Note that JVC's credit terms call for payment in 90 days, and accounts receivable average \$300,000 because of the 90-day average collection period.) The factor will charge 12 percent interest on any advance (1 percent per month paid in advance) and a 2 percent processing fee on all receivables factored and will maintain a 20 percent reserve. If JVC undertakes the loan, it will reduce its own credit department expenses by \$2,000 per month. What is the annual effective rate of interest to JVC on the factoring arrangement? Assume that the maximum advance is taken.

15-16. (*Cost of a short-term bank loan*) Jimmy Hale is the owner and operator of the grain elevator in Brownfield, Texas, where he has lived for most of his 62 years. The rains during the spring have been the best in a decade, and Mr. Hale is expecting a bumper wheat crop. This prompted him to rethink his current financing sources. He now believes he will need an additional \$240,000 for

the 3-month period ending with the close of the harvest season. After meeting with his banker, Mr. Hale is puzzling over what the additional financing will actually cost. The banker quoted him a rate of 1 percent over prime (which is currently 7 percent) and also requested that the firm increase its current bank balance of \$4,000 up to 20 percent of the loan.

- a. If interest and principal are all repaid at the end of the 3-month loan term, what is the annual percentage rate on the loan offer made by Mr. Hale's bank?
- b. If the bank were to lower the rate to prime if interest is discounted, should Mr. Hale accept this alternative?

15-17. (*Terminology*) Identify each of the following sources of short-term credit in terms of whether they are secured (include some type of collateral) or are unsecured:



- ◆ Line of credit
- ◆ Pledging of accounts receivable
- ◆ Trade credit
- ◆ Factoring of accounts receivable
- ◆ Inventory loans
- ◆ Commercial paper