Part 5

Short-Term Financial Decisions

Chapter 13
Working Capital and Current Assets Management

Chapter 14
Current Liabilities Management
Chapter 13
Working Capital and Current Assets Management

LEARNING GOALS

LG1 Understand short-term financial management, net working capital, and the related tradeoff between profitability and risk.
LG2 Describe the cash conversion cycle, its funding requirements, and the key strategies for managing it.
LG3 Discuss inventory management: differing views, common techniques, and international concerns.
LG4 Explain the credit selection process and the quantitative procedure for evaluating changes in credit standards.
LG5 Review the procedures for quantitatively considering cash discount changes, other aspects of credit terms, and credit monitoring.
LG6 Understand the management of receipts and disbursements, including float, speeding up collections, slowing down payments, cash concentration, zero-balance accounts, and investing in marketable securities.

Across the Disciplines Why This Chapter Matters to You

Accounting: You need to understand the cash conversion cycle and the management of inventory, accounts receivable, and receipts and disbursements of cash.

Information systems: You need to understand the cash conversion cycle, inventory, accounts receivable, and receipts and disbursements of cash to design financial information systems that facilitate effective short-term financial management.

Management: You need to understand the management of working capital so that you can efficiently manage current assets and decide whether to finance the firm’s funds requirements aggressively or conservatively.

Marketing: You need to understand credit selection and monitoring because sales will be affected by the availability of credit to purchasers; sales will also be affected by inventory management.

Operations: You need to understand the cash conversion cycle because you will be responsible for reducing the cycle through the efficient management of production, inventory, and costs.
An important consideration for all firms is the ability to finance the transition from cash to inventories to receivables and back to cash. Various strategies exist for managing current assets in order to reduce the amount of financing needed to support this cycle. In addition to managing cash, firms also must manage the accounts that typically represent the firm’s largest investment in current assets—inventories and accounts receivable. This chapter looks at the management of these various aspects of the firm’s current assets.

Net Working Capital Fundamentals

The firm’s balance sheet provides information about the structure of the firm’s investments on the one hand and the structure of its financing sources on the other hand. The structures chosen should consistently lead to the maximization of the value of the owners’ investment in the firm.

Important components of the firm’s financial structure include the level of investment in current assets and the extent of current liability financing. In U.S. manufacturing firms, current assets account for about 40 percent of total assets; current liabilities represent about 26 percent of total financing. Therefore, it should not be surprising to learn that short-term financial management—managing current assets and current liabilities—is one of the financial manager’s most important and time-consuming activities. A study of Fortune 1000 firms found that more than one-third of financial management time is spent managing current assets and about one-fourth of financial management time is spent managing current liabilities.

The goal of short-term financial management is to manage each of the firm’s current assets (inventory, accounts receivable, cash, and marketable securities) and current liabilities (accounts payable, accruals, and notes payable) to achieve a balance between profitability and risk that contributes positively to the firm’s value. This chapter does not discuss the optimal level of current assets and current liabilities that a firm should have. That issue is unresolved in the financial literature. Here we first use net working capital to consider the basic relationship between current assets and current liabilities and then use the cash conversion cycle to consider the key aspects of current asset management. In the following chapter, we consider current liability management.

Net Working Capital

Current assets, commonly called working capital, represent the portion of investment that circulates from one form to another in the ordinary conduct of business. This idea embraces the recurring transition from cash to inventories to receivables and back to cash. As cash substitutes, marketable securities are considered part of working capital.

Current liabilities represent the firm’s short-term financing, because they include all debts of the firm that come due (must be paid) in 1 year or less. These debts usually include amounts owed to suppliers (accounts payable), employees and governments (accruals), and banks (notes payable), among others.
As noted in Chapter 8, net working capital is commonly defined as the difference between the firm’s current assets and its current liabilities. When the current assets exceed the current liabilities, the firm has positive net working capital. When current assets are less than current liabilities, the firm has negative net working capital.

The conversion of current assets from inventory to receivables to cash provides the cash used to pay the current liabilities. The cash outlays for current liabilities are relatively predictable. When an obligation is incurred, the firm generally knows when the corresponding payment will be due. What is difficult to predict are the cash inflows—the conversion of the current assets to more liquid forms. The more predictable its cash inflows, the less net working capital a firm needs. Because most firms are unable to match cash inflows to outflows with certainty, current assets that more than cover outflows for current liabilities are usually necessary. In general, the greater the margin by which a firm’s current assets cover its current liabilities, the better able it will be to pay its bills as they come due.

The Tradeoff Between Profitability and Risk

A tradeoff exists between a firm’s profitability and its risk. Profitability, in this context, is the relationship between revenues and costs generated by using the firm’s assets—both current and fixed—in productive activities. A firm’s profits can be increased by (1) increasing revenues or (2) decreasing costs. Risk, in the context of short-term financial management, is the probability that a firm will be unable to pay its bills as they come due. A firm that cannot pay its bills as they come due is said to be technically insolvent. It is generally assumed that the greater the firm’s net working capital, the lower its risk. In other words, the more net working capital, the more liquid the firm and therefore the lower its risk of becoming technically insolvent. Using these definitions of profitability and risk, we can demonstrate the tradeoff between them by considering changes in current assets and current liabilities separately.

Changes in Current Assets

How changing the level of the firm’s current assets affects its profitability–risk tradeoff can be demonstrated using the ratio of current assets to total assets. This ratio indicates the percentage of total assets that is current. For purposes of illustration, we will assume that the level of total assets remains unchanged. The effects on both profitability and risk of an increase or decrease in this ratio are summarized in the upper portion of Table 13.1. The ratio increases—that is, when current assets increase—profitability decreases. Why? Because current assets are less profitable than fixed assets. Fixed assets are more profitable because they add more value to the product than that provided by current assets. Without fixed assets, the firm could not produce the product.

The risk effect, however, decreases as the ratio of current assets to total assets increases. The increase in current assets increases net working capital, thereby reducing the risk of technical insolvency. In addition, as you go down the asset

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1. To isolate the effect of changing asset and financing mixes on the firm’s profitability and risk, we assume the level of total assets to be constant in this and the following discussion.
side of the balance sheet, the risk associated with the assets increases: Investment in cash and marketable securities is less risky than investment in accounts receivable, inventories, and fixed assets. Accounts receivable investment is less risky than investment in inventories and fixed assets. Investment in inventories is less risky than investment in fixed assets. The nearer an asset is to cash, the less risky it is. The opposite effects on profit and risk result from a decrease in the ratio of current assets to total assets.

Changes in Current Liabilities

How changing the level of the firm’s current liabilities affects its profitability–risk tradeoff can be demonstrated by using the ratio of current liabilities to total assets. This ratio indicates the percentage of total assets that has been financed with current liabilities. Again, assuming that total assets remain unchanged, the effects on both profitability and risk of an increase or decrease in the ratio are summarized in the lower portion of Table 13.1. When the ratio increases, profitability increases. Why? Because the firm uses more of the less expensive current liabilities financing and less long-term financing. Current liabilities are less expensive because only notes payable, which represent about 20 percent of the typical manufacturer’s current liabilities, have a cost. The other current liabilities are basically debts on which the firm pays no charge or interest. However, when the ratio of current liabilities to total assets increases, the risk of technical insolvency also increases, because the increase in current liabilities in turn decreases net working capital. The opposite effects on profit and risk result from a decrease in the ratio of current liabilities to total assets.

Review Questions

13–1 Why is short-term financial management one of the most important and time-consuming activities of the financial manager? What is net working capital?

13–2 What is the relationship between the predictability of a firm’s cash inflows and its required level of net working capital? How are net working capital, liquidity, and risk of technical insolvency related?

13–3 Why does an increase in the ratio of current to total assets decrease both profits and risk as measured by net working capital? How do changes in the ratio of current liabilities to total assets affect profitability and risk?
The Cash Conversion Cycle

Central to short-term financial management is an understanding of the firm’s cash conversion cycle. This cycle frames discussion of the management of the firm’s current assets in this chapter and that of the management of current liabilities in Chapter 14. Here, we begin by demonstrating the calculation and application of the cash conversion cycle.

Calculating the Cash Conversion Cycle

A firm’s operating cycle (OC) is the time from the beginning of the production process to collection of cash from the sale of the finished product. The operating cycle encompasses two major short-term asset categories: inventory and accounts receivable. It is measured in elapsed time by summing the average age of inventory (AAI) and the average collection period (ACP).

\[ OC = AAI + ACP \] (13.1)

However, the process of producing and selling a product also includes the purchase of production inputs (raw materials) on account, which results in accounts payable. Accounts payable reduce the number of days a firm’s resources are tied up in the operating cycle. The time it takes to pay the accounts payable, measured in days, is the average payment period (APP). The operating cycle less the average payment period is referred to as the cash conversion cycle (CCC). It represents the amount of time the firm’s resources are tied up. The formula for the cash conversion cycle is

\[ CCC = OC - APP \] (13.2)

Substituting the relationship in Equation 13.1 into Equation 13.2, we can see that the cash conversion cycle has three main components, as shown in Equation 13.3: (1) average age of the inventory, (2) average collection period, and (3) average payment period.

\[ CCC = AAI + ACP - APP \] (13.3)

Clearly, if a firm changes any of these time periods, it changes the amount of resources tied up in the day-to-day operation of the firm.

MAX Company, a producer of paper dinnerware, has annual sales of $10 million, a cost of goods sold of 75% of sales, and purchases that are 65% of cost of goods sold. MAX has an average age of inventory (AAI) of 60 days, an average collection period (ACP) of 40 days, and an average payment period (APP) of 35 days. Thus the cash conversion cycle for MAX is 65 days \((60 + 40 - 35)\). Figure 13.1 presents MAX Company’s cash conversion cycle as a time line.

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The resources MAX has invested in this cash conversion cycle (assuming a 365-day year) are:

\[
\text{Inventory} = (10,000,000 \times 0.75) \times (60/365) = 1,232,877 \\
\text{Accounts receivable} = (10,000,000 \times 40/365) = 1,095,890 \\
\text{Accounts payable} = (10,000,000 \times 0.75 \times 0.65) \times (35/365) = 467,466 \\
\text{Resources invested} = 1,861,301
\]

Changes in any of the time periods will change the resources tied up in operations. For example, if MAX could reduce the average collection period on its accounts receivable by 5 days, it would shorten the cash conversion time line and thus reduce the amount of resources MAX has invested in operations. For MAX, a 5-day reduction in the average collection period would reduce the resources invested in the cash conversion cycle by $136,986 [$10,000,000 \times (5/365)].

**Funding Requirements of the Cash Conversion Cycle**

We can use the cash conversion cycle as a basis for discussing how the firm funds its required investment in operating assets. We first differentiate between permanent and seasonal funding needs and then describe aggressive and conservative seasonal funding strategies.

**Permanent Versus Seasonal Funding Needs**

If the firm’s sales are constant, then its investment in operating assets should also be constant, and the firm will have only a permanent funding requirement. If the firm’s sales are cyclic, then its investment in operating assets will vary over time.
with its sales cycles, and the firm will have seasonal funding requirements in addition to the permanent funding required for its minimum investment in operating assets.

Nicholson Company holds, on average, $50,000 in cash and marketable securities, $1,250,000 in inventory, and $750,000 in accounts receivable. Nicholson’s business is very stable over time, so its operating assets can be viewed as permanent. In addition, Nicholson’s accounts payable of $425,000 are stable over time. Thus Nicholson has a permanent investment in operating assets of $1,625,000 ($50,000 + $1,250,000 + $750,000 − $425,000). That amount would also equal its permanent funding requirement.

In contrast, Semper Pump Company, which produces bicycle pumps, has seasonal funding needs. Semper has seasonal sales, with its peak sales being driven by the summertime purchases of bicycle pumps. Semper holds, at minimum, $25,000 in cash and marketable securities, $100,000 in inventory, and $60,000 in accounts receivable. At peak times, Semper’s inventory increases to $750,000, and its accounts receivable increase to $400,000. To capture production efficiencies, Semper produces pumps at a constant rate throughout the year. Thus accounts payable remain at $50,000 throughout the year. Accordingly, Semper has a permanent funding requirement for its minimum level of operating assets of $135,000 ($25,000 + $100,000 + $60,000 − $50,000) and peak seasonal funding requirements (in excess of its permanent need) of $990,000 [($25,000 + $750,000 + $400,000 − $50,000) − $135,000]. Semper’s total funding requirements for operating assets vary from a minimum of $135,000 (permanent) to a seasonal peak of $1,125,000 ($135,000 + $990,000). Figure 13.2 depicts these needs over time.

**EXAMPLE**

Semper Pump Company’s peak funds need is $1,125,000, and its minimum need is $135,000

**FIGURE 13.2** Semper Pump Company’s Total Funding Requirements

Semper Pump Company’s peak funds need is $1,125,000, and its minimum need is $135,000
Aggressive Versus Conservative Seasonal Funding Strategies

Short-term funds are typically less expensive than long-term funds. (The yield curve is typically upward-sloping.) However, long-term funds allow the firm to lock in its cost of funds over a period of time and thus avoid the risk of increases in short-term interest rates. Also, long-term funding ensures that the required funds are available to the firm when needed. Short-term funding exposes the firm to the risk that it may not be able to obtain the funds needed to cover its seasonal peaks. Under an aggressive funding strategy, the firm funds its seasonal requirements with short-term debt and its permanent requirements with long-term debt. Under a conservative funding strategy, the firm funds both its seasonal and its permanent requirements with long-term debt.

Semper Pump Company has a permanent funding requirement of $135,000 in operating assets and seasonal funding requirements that vary between $0 and $990,000 and average $101,250 (calculated from data not shown). If Semper can borrow short-term funds at 6.25% and long-term funds at 8%, and if it can earn 5% on the investment of any surplus balances, then the annual cost of an aggressive strategy for seasonal funding will be

\[
\begin{align*}
\text{Cost of short-term financing} &= 0.0625 \times 101,250 = 6,328.13 \\
\text{Cost of long-term financing} &= 0.0800 \times 135,000 = 10,800.00 \\
\text{Earnings on surplus balances} &= 0.0500 \times 0 = 0 \\
\text{Total cost of aggressive strategy} &= 6,328.13 + 10,800.00 + 0 = 17,128.13
\end{align*}
\]

Alternatively, Semper can choose a conservative strategy, under which surplus cash balances are fully invested. (In Figure 13.2, this surplus will be the difference between the peak need of $1,125,000 and the total need, which varies between $135,000 and $1,125,000 during the year.) The cost of the conservative strategy will be

\[
\begin{align*}
\text{Cost of short-term financing} &= 0.0625 \times 0 = 0 \\
\text{Cost of long-term financing} &= 0.0800 \times 1,125,000 = 90,000.00 \\
\text{Earnings on surplus balances} &= 0.0500 \times 888,750 = 44,437.50 \\
\text{Total cost of conservative strategy} &= 0 + 90,000.00 + 44,437.50 = 45,562.50
\end{align*}
\]

It is clear from these calculations that for Semper, the aggressive strategy is far less expensive than the conservative strategy. However, it is equally clear that Semper has substantial peak-season operating-asset needs and that it must have adequate funding available to meet the peak needs and ensure ongoing operations.

Clearly, the aggressive strategy’s heavy reliance on short-term financing makes it riskier than the conservative strategy because of interest rate swings and possible difficulties in obtaining needed short-term financing quickly when seasonal peaks

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3. Because under this strategy the amount of financing exactly equals the estimated funding need, no surplus balances exist.

4. The average surplus balance would be calculated by subtracting the sum of the permanent need ($135,000) and the average seasonal need ($101,250) from the seasonal peak need ($1,125,000) to get $888,750 ($1,125,000 – $135,000 – $101,250). This represents the surplus amount of financing that on average could be invested in short-term vehicles that earn a 5% annual return.
occur. The conservative strategy avoids these risks through the locked-in interest rate and long-term financing, but it is more costly because of the negative spread between the earnings rate on surplus funds (5% in the example) and the cost of the long-term funds that create the surplus (8% in the example). Where the firm operates, between the extremes of the aggressive and conservative seasonal funding strategies, depends on management’s disposition toward risk and the strength of its banking relationships.

**Strategies for Managing the Cash Conversion Cycle**

A positive cash conversion cycle, as we saw for MAX Company in the earlier example, means the firm must use negotiated liabilities (such as bank loans) to support its operating assets. Negotiated liabilities carry an explicit cost, so the firm benefits by minimizing their use in supporting operating assets. Simply stated, the goal is to minimize the length of the cash conversion cycle, which minimizes negotiated liabilities. This goal can be realized through application of the following strategies:

1. *Turn over inventory as quickly as possible* without stockouts that result in lost sales.
2. *Collect accounts receivable as quickly as possible* without losing sales from high-pressure collection techniques.
3. *Manage mail, processing, and clearing time* to reduce them when collecting from customers and to increase them when paying suppliers.
4. *Pay accounts payable as slowly as possible* without damaging the firm’s credit rating.

Techniques for implementing these four strategies are the focus of the remainder of this chapter and the following chapter.

**Review Questions**

13–4 What is the difference between the firm’s operating cycle and its cash conversion cycle?

13–5 Why is it helpful to divide the funding needs of a seasonal business into its permanent and seasonal funding requirements when developing a funding strategy?

13–6 What are the benefits, costs, and risks of an aggressive funding strategy and of a conservative funding strategy? Under which strategy is the borrowing often in excess of the actual need?

13–7 Why is it important for a firm to minimize the length of its cash conversion cycle?

**Inventory Management**

The first component of the cash conversion cycle is the average age of inventory. The objective for managing inventory, as noted earlier, is to turn over inventory as quickly as possible without losing sales from stockouts. The financial manager
tends to act as an advisor or “watchdog” in matters concerning inventory; he or she does not have direct control over inventory but does provide input to the inventory management process.

**Differing Viewpoints About Inventory Level**

Differing viewpoints about appropriate inventory levels commonly exist among a firm’s finance, marketing, manufacturing, and purchasing managers. Each views inventory levels in light of his or her own objectives. The financial manager’s general disposition toward inventory levels is to keep them low, to ensure that the firm’s money is not being unwisely invested in excess resources. The marketing manager, on the other hand, would like to have large inventories of the firm’s finished products. This would ensure that all orders could be filled quickly, eliminating the need for backorders due to stockouts.

The manufacturing manager’s major responsibility is to implement the production plan so that it results in the desired amount of finished goods of acceptable quality at a low cost. In fulfilling this role, the manufacturing manager would keep raw materials inventories high to avoid production delays. He or she also would favor large production runs for the sake of lower unit production costs, which would result in high finished goods inventories.

The purchasing manager is concerned solely with the raw materials inventories. He or she must have on hand, in the correct quantities at the desired times and at a favorable price, whatever raw materials are required by production. Without proper control, in an effort to get quantity discounts or in anticipation of rising prices or a shortage of certain materials, the purchasing manager may purchase larger quantities of resources than are actually needed at the time.

**Common Techniques for Managing Inventory**

Numerous techniques are available for effectively managing the firm’s inventory. Here we briefly consider four commonly used techniques.

**The ABC System**

A firm using the ABC inventory system divides its inventory into three groups: A, B, and C. The A group includes those items with the largest dollar investment. Typically, this group consists of 20 percent of the firm’s inventory items but 80 percent of its investment in inventory. The B group consists of items that account for the next largest investment in inventory. The C group consists of a large number of items that require a relatively small investment.

The inventory group of each item determines the item’s level of monitoring. The A group items receive the most intense monitoring because of the high dollar investment. Typically, A group items are tracked on a perpetual inventory system that allows daily verification of each item’s inventory level. B group items are frequently controlled through periodic, perhaps weekly, checking of their levels. C group items are monitored with unsophisticated techniques, such as the two-bin method. With the two-bin method, the item is stored in two bins. As an item is needed, inventory is removed from the first bin. When that bin is empty, an order is placed to refill the first bin while inventory is drawn from the second bin. The second bin is used until empty, and so on.
The large dollar investment in A and B group items suggests the need for a better method of inventory management than the ABC system. The EOQ model, discussed next, is an appropriate model for the management of A and B group items.

The Economic Order Quantity (EOQ) Model

One of the most common techniques for determining the optimal order size for inventory items is the economic order quantity (EOQ) model. The EOQ model considers various costs of inventory and then determines what order size minimizes total inventory cost. EOQ assumes that the relevant costs of inventory can be divided into order costs and carrying costs. (The model excludes the actual cost of the inventory item.) Each of them has certain key components and characteristics.

Order costs include the fixed clerical costs of placing and receiving orders: the cost of writing a purchase order, of processing the resulting paperwork, and of receiving an order and checking it against the invoice. Order costs are stated in dollars per order.

Carrying costs are the variable costs per unit of holding an item in inventory for a specific period of time. Carrying costs include storage costs, insurance costs, the costs of deterioration and obsolescence, and the opportunity or financial cost of having funds invested in inventory. These costs are stated in dollars per unit per period.

Order costs decrease as the size of the order increases. Carrying costs, however, increase with increases in the order size. The EOQ model analyzes the tradeoff between order costs and carrying costs to determine the order quantity that minimizes the total inventory cost.

Mathematical Development of EOQ

A formula can be developed for determining the firm’s EOQ for a given inventory item, where

\[ S = \text{usage in units per period} \]
\[ O = \text{order cost per order} \]
\[ C = \text{carrying cost per unit per period} \]
\[ Q = \text{order quantity in units} \]

The first step is to derive the cost functions for order cost and carrying cost. The order cost can be expressed as the product of the cost per order and the number of orders. Because the number of orders equals the usage during the period divided by the order quantity \((S/Q)\), the order cost can be expressed as follows:

\[ \text{Order cost} = O \times \frac{S}{Q} \quad (13.4) \]

The carrying cost is defined as the cost of carrying a unit of inventory per period multiplied by the firm’s average inventory. The average inventory is the order quantity divided by 2 \((Q/2)\), because inventory is assumed to be depleted at a constant rate. Thus carrying cost can be expressed as follows:

\[ \text{Carrying cost} = C \times \frac{Q}{2} \quad (13.5) \]

The firm’s total cost of inventory is found by summing the order cost and the carrying cost. Thus the total cost function is

\[ \text{Total cost} = \left( O \times \frac{S}{Q} \right) + \left( C \times \frac{Q}{2} \right) \quad (13.6) \]
Because the EOQ is defined as the order quantity that minimizes the total cost function, we must solve the total cost function for the EOQ. The resulting equation is

\[ \text{EOQ} = \sqrt{\frac{2 \times S \times O}{C}} \] (13.7)

Although the EOQ model has weaknesses, it is certainly better than subjective decision making. Despite the fact that the use of the EOQ model is outside the control of the financial manager, the financial manager must be aware of its utility and must provide certain inputs, specifically with respect to inventory carrying costs.

**Reorder Point** Once the firm has determined its economic order quantity, it must determine when to place an order. The reorder point reflects the firm’s daily usage of the inventory item and the number of days needed to place and receive an order. Assuming that inventory is used at a constant rate, the formula for the reorder point is

\[ \text{Reorder point} = \text{Days of lead time} \times \text{Daily usage} \] (13.8)

For example, if a firm knows it takes 3 days to place and receive an order, and if it uses 15 units per day of the inventory item, then the reorder point is 45 units of inventory (3 days × 15 units/day). Thus, as soon as the item’s inventory level falls to the reorder point (45 units, in this case) an order will be placed at the item’s EOQ. If the estimates of lead time and usage are correct, then the order will arrive exactly as the inventory level reaches zero. However, lead times and usage rates are not precise, so most firms hold safety stock (extra inventory) to prevent stockouts of important items.

MAX Company has an A group inventory item that is vital to the production process. This item costs $1,500, and MAX uses 1,100 units of the item per year. MAX wants to determine its optimal order strategy for the item. To calculate the EOQ, we need the following inputs:

- Order cost per order = $150
- Carrying cost per unit per year = $200

Substituting into Equation 13.7, we get

\[ \text{EOQ} = \sqrt{\frac{2 \times 1,100 \times 150}{200}} = 41 \text{ units} \]

The reorder point for MAX depends on the number of days MAX operates per year. Assuming that MAX operates 250 days per year and uses 1,100 units of this item, its daily usage is 4.4 units (1,100 ÷ 250). If its lead time is 2 days and MAX wants to maintain a safety stock of 4 units, the reorder point for this item is 12.8 units \((2 \times 4.4) + 4\). However, orders are made only in whole units, so the order is placed when the inventory falls to 13 units.

The firm’s goal for inventory is to turn it over as quickly as possible without stockouts. Inventory turnover is best calculated by dividing cost of goods sold by average inventory. The EOQ model determines the optimal order size and,
indirectly, through the assumption of constant usage, the average inventory. Thus
the EOQ model determines the firm’s optimal inventory turnover rate, given the
firm’s specific costs of inventory.

Just-in-Time (JIT) System

The just-in-time (JIT) system is used to minimize inventory investment. The phi-
losophy is that materials should arrive at exactly the time they are needed for
production. Ideally, the firm would have only work-in-process inventory. Because
its objective is to minimize inventory investment, a JIT system uses no (or very
little) safety stock. Extensive coordination among the firm’s employees, its sup-
pliers, and shipping companies must exist to ensure that material inputs arrive on
time. Failure of materials to arrive on time results in a shutdown of the produc-
tion line until the materials arrive. Likewise, a JIT system requires high-quality
parts from suppliers. When quality problems arise, production must be stopped
until the problems are resolved.

The goal of the JIT system is manufacturing efficiency. It uses inventory as a
tool for attaining efficiency by emphasizing quality of the materials used and
their timely delivery. When JIT is working properly, it forces process inefficiencies
to surface.

Knowing the level of inventory is, of course, an important part of any inven-
tory management system. As described in the In Practice box on the facing page,
radio frequency identification technology may be the “next new thing” in improv-
ing inventory and supply chain management.

Computerized Systems for Resource Control

Today a number of systems are available for controlling inventory and other
resources. One of the most basic is the materials requirement planning (MRP)
system. It is used to determine what materials to order and when to order them.
MRP applies EOQ concepts to determine how much to order. Using a computer,
MRP simulates each product’s bill of materials, inventory status, and manufactur-
ing process. The bill of materials is simply a list of all parts and materials that
go into making the finished product. For a given production plan, the computer
simulates material requirements by comparing production needs to available
inventory balances. On the basis of the time it takes for a product that is in
process to move through the various production stages and the lead time to get
materials, the MRP system determines when orders should be placed for various
items on the bill of materials. The objective of this system is to lower the firm’s
inventory investment without impairing production. If the firm’s opportunity
cost of capital for investments of equal risk is 15 percent, every dollar of invest-
ment released from inventory will increase before-tax profits by $0.15.

A popular extension of MRP is manufacturing resource planning II (MRP II),
which integrates data from numerous areas such as finance, accounting, mar-
tering, engineering, and manufacturing using a sophisticated computer system.
This system generates production plans as well as numerous financial and man-
agement reports. In essence, it models the firm’s processes so that the effects of
changes in one area of operations on other areas can be assessed and monitored.
For example, the MRP II system would allow the firm to assess the effect of an
increase in labor costs on sales and profits.

Whereas MRP and MRP II tend to focus on internal operations, enterprise
resource planning (ERP) systems expand the focus to the external environment
by including information about suppliers and customers. ERP electronically integrates all of a firm’s departments so that, for example, production can call up sales information and immediately know how much must be produced to fill customer orders. Because all available resources—human and material—are known, the system can eliminate production delays and control costs. ERP systems automatically note changes, such as a supplier’s inability to meet a scheduled delivery date, so that necessary adjustments can be made.

International Inventory Management

International inventory management is typically much more complicated for exporters in general, and for multinational companies in particular, than for purely domestic firms. The production and manufacturing economies of scale...
that might be expected from selling products globally may prove elusive if products must be tailored for individual local markets, as very frequently happens, or if actual production takes place in factories around the world. When raw materials, intermediate goods, or finished products must be transported over long distances—particularly by ocean shipping—there will inevitably be more delays, confusion, damage, theft, and other difficulties than occur in a one-country operation. The international inventory manager therefore puts a premium on flexibility. He or she is usually less concerned about ordering the economically optimal quantity of inventory than about making sure that sufficient quantities of inventory are delivered where they are needed, when they are needed, and in a condition to be used as planned.

**Review Questions**

13–8 What are likely to be the viewpoints of each of the following managers about the levels of the various types of inventory: finance, marketing, manufacturing, and purchasing? Why is inventory an investment?

13–9 Briefly describe each of the following techniques for managing inventory: ABC system, economic order quantity (EOQ) model, just-in-time (JIT) system, and computerized systems for resource control—MRP, MRP II, and ERP.

13–10 What factors make managing inventory more difficult for exporters and multinational companies?

**Accounts Receivable Management**

The second component of the cash conversion cycle is the average collection period. This period is the average length of time from a sale on credit until the payment becomes usable funds for the firm. The average collection period has two parts. The first part is the time from the sale until the customer mails the payment. The second part is the time from when the payment is mailed until the firm has the collected funds in its bank account. The first part of the average collection period involves managing the credit available to the firm’s customers, and the second part involves collecting and processing payments. This section of the chapter discusses the firm’s accounts receivable credit management.

The objective for managing accounts receivable is to collect accounts receivable as quickly as possible without losing sales from high-pressure collection techniques. Accomplishing this goal encompasses three topics: (1) credit selection and standards, (2) credit terms, and (3) credit monitoring.

**Credit Selection and Standards**

Credit selection involves application of techniques for determining which customers should receive credit. This process involves evaluating the customer’s creditworthiness and comparing it to the firm’s **credit standards**, its minimum requirements for extending credit to a customer.
Five C’s of Credit
One popular credit selection technique is the five C’s of credit, which provides a framework for in-depth credit analysis. Because of the time and expense involved, this credit selection method is used for large-dollar credit requests. The five C’s are

1. **Character**: The applicant’s record of meeting past obligations.
2. **Capacity**: The applicant’s ability to repay the requested credit, as judged in terms of financial statement analysis focused on cash flows available to repay debt obligations.
3. **Capital**: The applicant’s debt relative to equity.
4. **Collateral**: The amount of assets the applicant has available for use in securing the credit. The larger the amount of available assets, the greater the chance that a firm will recover funds if the applicant defaults.
5. **Conditions**: Current general and industry-specific economic conditions, and any unique conditions surrounding a specific transaction.

Analysis via the five C’s of credit does not yield a specific accept/reject decision, so its use requires an analyst experienced in reviewing and granting credit requests. Application of this framework tends to ensure that the firm’s credit customers will pay, without being pressured, within the stated credit terms.

Credit Scoring
Credit scoring is a method of credit selection that is commonly used with high-volume/small-dollar credit requests. Credit scoring applies statistically derived weights to a credit applicant’s scores on key financial and credit characteristics to predict whether he or she will pay the requested credit in a timely fashion. Simply stated, the procedure results in a score that measures the applicant’s overall credit strength, and the score is used to make the accept/reject decision for granting the applicant credit. Credit scoring is most commonly used by large credit card operations, such as those of banks, oil companies, and department stores. The purpose of credit scoring is to make a relatively informed credit decision quickly and inexpensively, recognizing that the cost of a single bad scoring decision is small. However, if bad debts from scoring decisions increase, then the scoring system must be reevaluated. For a demonstration of credit scoring, including use of a spreadsheet for that purpose, see the book’s Web site at www.aw-bc.com/gitman.

Changing Credit Standards
The firm sometimes will contemplate changing its credit standards in an effort to improve its returns and create greater value for its owners. To demonstrate, consider the following changes and effects on profits expected to result from the relaxation of credit standards.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Direction of change</th>
<th>Effect on profits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sales volume</td>
<td>Increase</td>
<td>Positive</td>
</tr>
<tr>
<td>Investment in accounts receivable</td>
<td>Increase</td>
<td>Negative</td>
</tr>
<tr>
<td>Bad-debt expenses</td>
<td>Increase</td>
<td>Negative</td>
</tr>
</tbody>
</table>

If credit standards were tightened, the opposite effects would be expected.
Dodd Tool, a manufacturer of lathe tools, is currently selling a product for $10 per unit. Sales (all on credit) for last year were 60,000 units. The variable cost per unit is $6. The firm’s total fixed costs are $120,000.

The firm is currently contemplating a relaxation of credit standards that is expected to result in the following: a 5% increase in unit sales to 63,000 units; an increase in the average collection period from 30 days (the current level) to 45 days; an increase in bad-debt expenses from 1% of sales (the current level) to 2%. The firm’s required return on equal-risk investments, which is the opportunity cost of tying up funds in accounts receivable, is 15%.

To determine whether to relax its credit standards, Dodd Tool must calculate its effect on the firm’s additional profit contribution from sales, the cost of the marginal investment in accounts receivable, and the cost of marginal bad debts.

**Additional Profit Contribution from Sales**

Because fixed costs are “sunk” and therefore are unaffected by a change in the sales level, the only cost relevant to a change in sales is variable costs. Sales are expected to increase by 5%, or 3,000 units. The profit contribution per unit will equal the difference between the sale price per unit ($10) and the variable cost per unit ($6). The profit contribution per unit therefore will be $4. The total additional profit contribution from sales will be $12,000 (3,000 units × $4 per unit).

**Cost of the Marginal Investment in Accounts Receivable**

To determine the cost of the marginal investment in accounts receivable, Dodd must find the difference between the cost of carrying receivables under the two credit standards. Because its concern is only with the out-of-pocket costs, the relevant cost is the variable cost. The average investment in accounts receivable can be calculated by using the following formula:

\[
\text{Average investment in accounts receivable} = \frac{\text{Total variable cost of annual sales}}{\text{Turnover of accounts receivable}}
\]  

where

\[
\text{Turnover of accounts receivable} = \frac{365}{\text{Average collection period}}
\]

The total variable cost of annual sales under the present and proposed plans can be found as follows, using the variable cost per unit of $6.

**Total variable cost of annual sales**

- Under present plan: $(6 \times 60,000 \text{ units}) = $360,000
- Under proposed plan: $(6 \times 63,000 \text{ units}) = $378,000

The turnover of accounts receivable is the number of times each year that the firm’s accounts receivable are actually turned into cash. It is found by dividing the average collection period into 365 (the number of days assumed in a year).

**Turnover of accounts receivable**

- Under present plan: \(\frac{365}{30} = 12.2\)
- Under proposed plan: \(\frac{365}{45} = 8.1\)
By substituting the cost and turnover data just calculated into Equation 13.9 for each case, we get the following average investments in accounts receivable:

**Average investment in accounts receivable**

- Under present plan: \( \frac{\$360,000}{12.2} = \$29,508 \)
- Under proposed plan: \( \frac{\$378,000}{8.1} = \$46,667 \)

The marginal investment in accounts receivable and its cost are calculated as follows:

**Cost of marginal investment in accounts receivable**

\[
\begin{align*}
\text{Average investment under proposed plan} & = \$46,667 \\
\text{Average investment under present plan} & = 29,508 \\
\text{Marginal investment in accounts receivable} & = 17,159 \\
\times \text{Required return on investment} & = 0.15 \\
\text{Cost of marginal investment in A/R} & = 2,574
\end{align*}
\]

The resulting value of $2,574 is considered a cost because it represents the maximum amount that could have been earned on the $17,159 had it been placed in the best equal-risk investment alternative available at the firm’s required return on investment of 15%.

**Cost of Marginal Bad Debts**  The cost of marginal bad debts is found by taking the difference between the levels of bad debts before and after the proposed relaxation of credit standards.

**Cost of marginal bad debts**

\[
\begin{align*}
\text{Under proposed plan:} & \quad (0.02 \times \$10/\text{unit} \times 63,000 \text{ units}) = \$12,600 \\
\text{Under present plan:} & \quad (0.01 \times \$10/\text{unit} \times 60,000 \text{ units}) = \$6,000 \\
\text{Cost of marginal bad debts} & = \$6,600
\end{align*}
\]

Note that the bad-debt costs are calculated by using the sale price per unit ($10) to deduct not just the true loss of variable cost ($6) that results when a customer fails to pay its account, but also the profit contribution per unit (in this case $4) that is included in the “additional profit contribution from sales.” Thus the resulting cost of marginal bad debts is $6,600.

**Making the Credit Standard Decision**  To decide whether to relax its credit standards, the firm must compare the additional profit contribution from sales to the added costs of the marginal investment in accounts receivable and marginal bad debts. If the additional profit contribution is greater than marginal costs, credit standards should be relaxed.

The results and key calculations related to Dodd Tool’s decision whether to relax its credit standards are summarized in Table 13.2 (on page 528). The net addition to total profits resulting from such an action will be $2,826 per year. Therefore, the firm should relax its credit standards as proposed.
The procedure described here for evaluating a proposed change in credit standards is also commonly used to evaluate other changes in the management of accounts receivable. If Dodd Tool had been contemplating tightening its credit standards, for example, the cost would have been a reduction in the profit contribution from sales, and the return would have been from reductions in the cost of the investment in accounts receivable and in the cost of bad debts. Another application of this procedure is demonstrated later in the chapter.

**Managing International Credit**

Credit management is difficult enough for managers of purely domestic companies, and these tasks become much more complex for companies that operate internationally. This is partly because (as we have seen before) international operations typically expose a firm to exchange rate risk. It is also due to the dangers and delays involved in shipping goods long distances and in having to cross at least two international borders.

Exports of finished goods are usually priced in the currency of the importer’s local market; most commodities, on the other hand, are priced in dollars. Therefore, a U.S. company that sells a product in Japan, for example, would have to price that product in Japanese yen and extend credit to a Japanese wholesaler in the local currency (yen). If the yen depreciates against the dollar before the U.S. exporter collects on its account receivable, the U.S. company experiences an exchange rate loss; the yen collected are worth fewer dollars than expected at the time the sale was made. Of course, the dollar could just as easily depreciate against

---

**TABLE 13.2 The Effects on Dodd Tool of a Relaxation of Credit Standards**

<table>
<thead>
<tr>
<th>Description</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Additional profit contribution from sales</td>
<td>$12,000</td>
</tr>
<tr>
<td>Cost of marginal investment in A/R[^a^]</td>
<td></td>
</tr>
<tr>
<td>Average investment under proposed plan</td>
<td>$46,667</td>
</tr>
<tr>
<td>Average investment under present plan</td>
<td>29,508</td>
</tr>
<tr>
<td>Marginal investment in A/R</td>
<td>$17,159</td>
</tr>
<tr>
<td>Cost of marginal investment in A/R (0.15 × $17,159)</td>
<td>($2,574)</td>
</tr>
<tr>
<td>Cost of marginal bad debts</td>
<td></td>
</tr>
<tr>
<td>Bad debts under proposed plan (0.02 × $10 × 63,000)</td>
<td>$12,600</td>
</tr>
<tr>
<td>Bad debts under present plan (0.01 × $10 × 60,000)</td>
<td>6,000</td>
</tr>
<tr>
<td>Cost of marginal bad debts</td>
<td>($6,600)</td>
</tr>
<tr>
<td>Net profit from implementation of proposed plan</td>
<td>$2,826</td>
</tr>
</tbody>
</table>

[^a^]: The denominators 8.1 and 12.2 in the calculation of the average investment in accounts receivable under the proposed and present plans are the accounts receivable turnovers for each of these plans (365/45 = 8.1 and 365/30 = 12.2).
the yen, yielding an exchange rate gain to the U.S. exporter. Most companies fear the loss more than they welcome the gain.

For a major currency such as the Japanese yen, the exporter can hedge against this risk by using the currency futures, forward, or options markets, but it is costly to do so, particularly for relatively small amounts. If the exporter is selling to a customer in a developing country—where 40 percent of U.S. exports are now sold—there will probably be no effective instrument available for protecting against exchange rate risk at any price. This risk may be further magnified because credit standards may be much lower (and acceptable collection techniques much different) in developing countries than in the United States. Although it may seem tempting just “not to bother” with exporting, U.S. companies no longer can concede foreign markets to international rivals. These export sales, if carefully monitored and (where possible) effectively hedged against exchange rate risk, often prove to be very profitable.

Credit Terms

Credit terms are the terms of sale for customers who have been extended credit by the firm. Terms of net 30 mean the customer has 30 days from the beginning of the credit period (typically end of month or date of invoice) to pay the full invoice amount. Some firms offer cash discounts, percentage deductions from the purchase price for paying within a specified time. For example, terms of 2/10 net 30 mean the customer can take a 2 percent discount from the invoice amount if the payment is made within 10 days of the beginning of the credit period or can pay the full amount of the invoice within 30 days.

A firm’s regular credit terms are strongly influenced by the firm’s business. For example, a firm selling perishable items will have very short credit terms, because its items have little long-term collateral value; a firm in a seasonal business may tailor its terms to fit the industry cycles. A firm wants its regular credit terms to conform to its industry’s standards. If its terms are more restrictive than its competitors’, it will lose business; if its terms are less restrictive than its competitors’, it will attract poor-quality customers that probably could not pay under the standard industry terms. The bottom line is that a firm should compete on the basis of quality and price of its product and service offerings, not its credit terms. Accordingly, the firm’s regular credit terms should match the industry standards, but individual customer terms should reflect the riskiness of the customer.

Cash Discount

Including a cash discount in the credit terms is a popular way to achieve the goal of speeding up collections without putting pressure on customers. The cash discount provides an incentive for customers to pay sooner. By speeding collections, the discount decreases the firm’s investment in accounts receivable (which is the objective), but it also decreases the per-unit profit. Additionally, initiating a cash discount should reduce bad debts because customers will pay sooner, and it should increase sales volume because customers who take the discount pay a lower price for the product. Accordingly, firms that consider offering a cash discount must perform a benefit–cost analysis to determine whether extending a cash discount is profitable.
MAX Company has an average collection period of 40 days \( \text{turnover} = \frac{365}{40} = 9.1 \). In accordance with the firm’s credit terms of net 30, this period is divided into 32 days until the customers place their payments in the mail (not everyone pays within 30 days) and 8 days to receive, process, and collect payments once they are mailed. MAX is considering initiating a cash discount by changing its credit terms from net 30 to 2/10 net 30. The firm expects this change to reduce the amount of time until the payments are placed in the mail, resulting in an average collection period of 25 days \( \text{turnover} = \frac{365}{25} = 14.6 \).

As noted earlier in the EOQ example (on page 521), MAX has a raw material with current annual usage of 1,100 units. Each finished product produced requires 1 unit of this raw material at a variable cost of $1,500 per unit, incurs another $800 of variable cost in the production process, and sells for $3,000 on terms of net 30. Variable costs therefore total $2,300 \( (1,500 + 800) \). MAX estimates that 80% of its customers will take the 2% discount and that offering the discount will increase sales of the finished product by 50 units (from 1,100 to 1,150 units) per year but will not alter its bad-debt percentage. MAX’s opportunity cost of funds invested in accounts receivable is 14%. Should MAX offer the proposed cash discount? An analysis similar to that demonstrated earlier for the credit standard decision, presented in Table 13.3, shows a net loss from the cash discount of $6,640. Thus MAX should not initiate the proposed cash discount. However, other discounts may be advantageous.

### Cash Discount Period

The cash discount period, the number of days after the beginning of the credit period during which the cash discount is available, can be changed by the finan-

<table>
<thead>
<tr>
<th>TABLE 13.3 Analysis of Initiating a Cash Discount for MAX Company</th>
</tr>
</thead>
<tbody>
<tr>
<td>Additional profit contribution from sales</td>
</tr>
<tr>
<td>50 units ( \times ($3,000 - $2,300) )</td>
</tr>
<tr>
<td>Cost of marginal investment in A/R(^a)</td>
</tr>
<tr>
<td>Average investment presently (without discount):</td>
</tr>
<tr>
<td>( \frac{$2,300 \times 1,100 \text{ units}}{9.1} ) = $2,530,000</td>
</tr>
<tr>
<td>Average investment with proposed cash discount:(^b)</td>
</tr>
<tr>
<td>( \frac{$2,300 \times 1,150 \text{ units}}{14.6} ) = $2,645,000</td>
</tr>
<tr>
<td>Reduction in accounts receivable investment</td>
</tr>
<tr>
<td>Cost savings from reduced investments in accounts receivable (0.14 ( \times $96,858 ))(^c)</td>
</tr>
<tr>
<td>Cost of cash discount (0.02 ( \times 0.80 \times 1,150 \times $3,000 ))</td>
</tr>
<tr>
<td>Net profit from initiation of proposed cash discount</td>
</tr>
</tbody>
</table>

\(^a\)In analyzing the investment in accounts receivable, we use the variable cost of the product sold \( ($1,500 \text{ raw materials cost} + $800 \text{ production cost} = $2,300 \text{ per unit variable cost}) \) instead of the sale price, because the variable cost is a better indicator of the firm’s investment.

\(^b\)The average investment in accounts receivable with the proposed cash discount is estimated to be tied up for an average of 25 days instead of the 40 days under the original terms.

\(^c\)MAX’s opportunity cost of funds is 14%.
cial manager. The net effect of changes in this period is difficult to analyze because of the nature of the forces involved. For example, if a firm were to increase its cash discount period by 10 days (for example, changing its credit terms from 2/10 net 30 to 2/20 net 30), the following changes would be expected to occur: (1) Sales would increase, positively affecting profit. (2) Bad-debt expenses would decrease, positively affecting profit. (3) The profit per unit would decrease as a result of more people taking the discount, negatively affecting profit. The difficulty for the financial manager lies in assessing what impact an increase in the cash discount period would have on the firm’s investment in accounts receivable. This investment will decrease because of non–discount takers now paying earlier. However, the investment in accounts receivable will increase for two reasons: (1) Discount takers will still get the discount but will pay later, and (2) new customers attracted by the new policy will result in new accounts receivable. If the firm were to decrease the cash discount period, the effects would be the opposite of those just described.

Credit Period

Changes in the credit period, the number of days after the beginning of the credit period until full payment of the account is due, also affect a firm’s profitability. For example, increasing a firm’s credit period from net 30 days to net 45 days should increase sales, positively affecting profit. But both the investment in accounts receivable and bad-debt expenses would also increase, negatively affecting profit. The increased investment in accounts receivable would result from both more sales and generally slower pay, on average, as a result of the longer credit period. The increase in bad-debt expenses results from the fact that the longer the credit period, the more time available for a firm to fail, making it unable to pay its accounts payable. A decrease in the length of the credit period is likely to have the opposite effects. Note that the variables affected by an increase in the credit period behave in the same way they would have if the credit standards had been relaxed, as demonstrated earlier in Table 13.2.

Credit Monitoring

The final issue a firm should consider in its accounts receivable management is credit monitoring. Credit monitoring is an ongoing review of the firm’s accounts receivable to determine whether customers are paying according to the stated credit terms. If they are not paying in a timely manner, credit monitoring will alert the firm to the problem. Slow payments are costly to a firm because they lengthen the average collection period and thus increase the firm’s investment in accounts receivable. Two frequently used techniques for credit monitoring are average collection period and aging of accounts receivable. In addition, a number of popular collection techniques are used by firms.

Average Collection Period

The average collection period is the second component of the cash conversion cycle. As noted in Chapter 2, it is the average number of days that credit sales are outstanding. The average collection period has two components: (1) the time from sale until the customer places the payment in the mail and (2) the time to
receive, process, and collect the payment once it has been mailed by the customer. The formula for finding the average collection period is

\[
\text{Average collection period} = \frac{\text{Accounts receivable}}{\text{Average sales per day}} \quad (13.10)
\]

Assuming receipt, processing, and collection time is constant, the average collection period tells the firm, on average, when its customers pay their accounts.

Knowing its average collection period enables the firm to determine whether there is a general problem with accounts receivable. For example, a firm that has credit terms of net 30 would expect its average collection period (minus receipt, processing, and collection time) to equal about 30 days. If the actual collection period is significantly greater than 30 days, the firm has reason to review its credit operations. If the firm’s average collection period is increasing over time, it has cause for concern about its accounts receivable management. A first step in analyzing an accounts receivable problem is to “age” the accounts receivable. By this process the firm can determine whether the problem exists in its accounts receivable in general or is attributable to a few specific accounts.

### Aging of Accounts Receivable

An aging schedule breaks down accounts receivable into groups on the basis of their time of origin; it shows the percentages of the total accounts receivable balance that have been outstanding for specified periods of time. The form and evaluation of an aging schedule can be illustrated with a simple example.

The accounts receivable balance on the books of Dodd Tool on December 31, 2006, was $200,000. The firm extends net 30-day credit terms to its customers. To gain insight into the firm’s relatively lengthy—51.3-day—average collection period, Dodd prepared the following aging schedule.

<table>
<thead>
<tr>
<th>Age of account</th>
<th>Balance outstanding</th>
<th>Percentage of total balance outstanding</th>
</tr>
</thead>
<tbody>
<tr>
<td>0–30 days</td>
<td>$80,000</td>
<td>40%</td>
</tr>
<tr>
<td>31–60 days</td>
<td>$36,000</td>
<td>18</td>
</tr>
<tr>
<td>61–90 days</td>
<td>$52,000</td>
<td>26</td>
</tr>
<tr>
<td>91–120 days</td>
<td>$26,000</td>
<td>13</td>
</tr>
<tr>
<td>Over 120 days</td>
<td>$6,000</td>
<td>3%</td>
</tr>
<tr>
<td>Totals at 12/31/06</td>
<td>$200,000</td>
<td>100%</td>
</tr>
</tbody>
</table>

Because Dodd extends 30-day credit terms to its customers, its customers have 30 days after the end of the month of sale to remit payment. Therefore the 40% of the balance outstanding with an age of 0–30 days is current. The balances outstanding for 31–60 days, 61–90 days, 91–120 days, and over 120 days are overdue.

Reviewing the aging schedule we see that 40% of the accounts are current (age < 30 days) and the remaining 60% are overdue (age > 30 days). Eighteen
percent of the balance outstanding is 1–30 days overdue, 26% is 31–60 days overdue, 13% is 61–90 days overdue, and 3% is more than 90 days overdue. Although the collections seem generally slow, a noticeable irregularity in these data is the high percentage of the balance outstanding that is 31–60 days overdue (ages of 61–90 days). Clearly, a problem must have occurred 61–90 days ago. Investigation may find that the problem can be attributed to the hiring of a new credit manager, the acceptance of a new account that made a large credit purchase but has not yet paid for it, or ineffective collection policy. When these types of discrepancies are found in the aging schedule, the analyst should determine, evaluate, and remedy its cause.

### Popular Collection Techniques

A number of collection techniques, ranging from letters to legal action, are employed. As an account becomes more and more overdue, the collection effort becomes more personal and more intense. In Table 13.4 the popular collection techniques are listed, and briefly described, in the order typically followed in the collection process.

### Review Questions

13–11 What is the role of the five C’s of credit in the credit selection activity?
13–12 Explain why credit scoring is typically applied to consumer credit decisions rather than to mercantile credit decisions.
What are the basic tradeoffs in a tightening of credit standards?

Why are the risks involved in international credit management more complex than those associated with purely domestic credit sales?

Why do a firm’s regular credit terms typically conform to those of its industry?

Why should a firm actively monitor the accounts receivable of its credit customers? How are the average collection period and an aging schedule used for credit monitoring?

Management of Receipts and Disbursements

As discussed in the previous section, the average collection period (the second component of the cash conversion cycle) has two parts: (1) the time from sale until the customer mails the payment and (2) the receipt, processing, and collection time. The third component of the cash conversion cycle, the average payment period, also has two parts: (1) the time from purchase of goods on account until the firm mails its payment and (2) the receipt, processing, and collection time required by the firm’s suppliers. The receipt, processing, and collection time for the firm, both from its customers and to its suppliers, is the focus of receipts and disbursements management.

Float

Float refers to funds that have been sent by the payer but are not yet usable funds to the payee. Float is important in the cash conversion cycle because its presence lengthens both the firm’s average collection period and its average payment period. However, the goal of the firm should be to shorten its average collection period and lengthen its average payment period. Both can be accomplished by managing float.

Float has three component parts:

1. Mail float is the time delay between when payment is placed in the mail and when it is received.
2. Processing float is the time between receipt of the payment and its deposit into the firm’s account.
3. Clearing float is the time between deposit of a payment and when spendable funds become available to the firm.

Some popular techniques for managing the component parts of float to speed up collections and slow down payments are described here.

Speeding Up Collections

Speeding up collections reduces customer collection float time and thus reduces the firm’s average collection period, which reduces the investment the firm must make in its cash conversion cycle. In our earlier examples, MAX Company had...
annual sales of $10 million and 8 days of total collection float (receipt, processing, and collection time). If MAX can reduce its float time by 3 days, it will reduce its investment in the cash conversion cycle by $82,192 \left[ \frac{10,000,000}{365} \times \frac{3}{365} \right].

A popular technique for speeding up collections is a lockbox system. A lockbox system works as follows: Instead of mailing payments to the company, customers mail payments to a post office box. The firm’s bank empties the post office box regularly, processes each payment, and deposits the payments in the firm’s account. Deposit slips, along with payment enclosures, are sent (or transmitted electronically) to the firm by the bank so that the firm can properly credit customers’ accounts. Lockboxes are geographically dispersed to match the locations of the firm’s customers. A lockbox system affects all three components of float. Lockboxes reduce mail time and often clearing time by being near the firm’s customers. Lockboxes reduce processing time to nearly zero because the bank deposits payments before the firm processes them. Obviously a lockbox system reduces collection float time, but not without a cost; therefore, a firm must perform an economic analysis to determine whether to implement a lockbox system.

Lockbox systems are commonly used by large firms whose customers are geographically dispersed. However, a firm does not have to be large to benefit from a lockbox. Smaller firms can also benefit from a lockbox system. The benefit to small firms often comes primarily from transferring the processing of payments to the bank.

**Slowing Down Payments**

Float is also a component of the firm’s average payment period. In this case, the float is in the favor of the firm. The firm may benefit by increasing all three of the components of its payment float. One popular technique for increasing payment float is controlled disbursing, which involves the strategic use of mailing points and bank accounts to lengthen mail float and clearing float, respectively. This approach should be used carefully, though, because longer payment periods may strain supplier relations.

In summary, a reasonable overall policy for float management is (1) to collect payments as quickly as possible, because once the payment is in the mail, the funds belong to the firm, and (2) to delay making payment to suppliers, because once the payment is mailed, the funds belong to the supplier.

**Cash Concentration**

Cash concentration is the process used by the firm to bring lockbox and other deposits together into one bank, often called the concentration bank. Cash concentration has three main advantages. First, it creates a large pool of funds for use in making short-term cash investments. Because there is a fixed-cost component in the transaction cost associated with such investments, investing a single pool of funds reduces the firm’s transaction costs. The larger investment pool also allows the firm to choose from a greater variety of short-term investment options.
vehicles. Second, concentrating the firm’s cash in one account improves the tracking and internal control of the firm’s cash. Third, having one concentration bank enables the firm to implement payment strategies that reduce idle cash balances.

There are a variety of mechanisms for transferring cash from the lockbox bank and other collecting banks to the concentration bank. One mechanism is a **depository transfer check (DTC)**, which is an unsigned check drawn on one of the firm’s bank accounts and deposited in another. For cash concentration, a DTC is drawn on each lockbox or other collecting bank account and deposited in the concentration bank account. Once the DTC has cleared the bank on which it is drawn (which may take several days), the transfer of funds is completed. Most firms currently provide deposit information by telephone to the concentration bank, which then prepares and deposits into its account the DTC drawn on the lockbox or other collecting bank account.

A second mechanism is an **ACH (automated clearinghouse) transfer**, which is a preauthorized electronic withdrawal from the payer’s account. A computerized clearing facility (called the automated clearinghouse, or ACH) makes a paperless transfer of funds between the payer and payee banks. An ACH settles accounts among participating banks. Individual accounts are settled by respective bank balance adjustments. ACH transfers clear in one day. For cash concentration, an ACH transfer is made from each lockbox bank or other collecting bank to the concentration bank. An ACH transfer can be thought of as an electronic DTC, but because the ACH transfer clears in one day, it provides benefits over a DTC; however, both banks in the ACH transfer must be members of the clearinghouse.

A third cash concentration mechanism is a **wire transfer**. A wire transfer is an electronic communication that, via bookkeeping entries, removes funds from the payer’s bank and deposits them in the payee’s bank. Wire transfers can eliminate mail and clearing float and may reduce processing float as well. For cash concentration, the firm moves funds using a wire transfer from each lockbox or other collecting account to its concentration account. Wire transfers are a substitute for DTC and ACH transfers, but they are more expensive.

It is clear that the firm must balance the costs and benefits of concentrating cash to determine the type and timing of transfers from its lockbox and other collecting accounts to its concentration account. The transfer mechanism selected should be the one that is most profitable. (The profit per period of any transfer mechanism equals earnings on the increased availability of funds minus the cost of the transfer system.)

### Zero-Balance Accounts

**Zero-balance account (ZBA)**

A disbursement account that always has an end-of-day balance of zero because the firm deposits money to cover checks drawn on the account only as they are presented for payment each day.

**Zero-balance accounts** (ZBAs) are disbursement accounts that always have an end-of-day balance of zero. The purpose is to eliminate nonearning cash balances in corporate checking accounts. A ZBA works as well as a disbursement account under a cash concentration system.

ZBAs work as follows: Once all of a given day’s checks are presented for payment from the firm’s ZBA, the bank notifies the firm of the total amount of checks, and the firm transfers funds into the account to cover the amount of that

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**depository transfer check (DTC)**

An unsigned check drawn on one of a firm’s bank accounts and deposited in another.

**ACH (automated clearinghouse) transfer**

Preauthorized electronic withdrawal from the payer’s account and deposit into the payee’s account via a settlement among banks by the automated clearinghouse, or ACH.

**wire transfer**

An electronic communication that, via bookkeeping entries, removes funds from the payer’s bank and deposits them in the payee’s bank.
day’s checks. This leaves an end-of-day balance of $0 (zero dollars). The ZBA enables the firm to keep all of its operating cash in an interest-earning account, thereby eliminating idle cash balances. Thus a firm that used a ZBA in conjunction with a cash concentration system would need two accounts. The firm would concentrate its cash from the lockboxes and other collecting banks into an interest-earning account and would write checks against its ZBA. The firm would cover the exact dollar amount of checks presented against the ZBA with transfers from the interest-earning account, leaving the end-of-day balance in the ZBA at $0.

A ZBA is a disbursement management tool. As we discussed earlier, the firm would prefer to maximize its payment float. However, some cash managers feel that actively attempting to increase float time on payments is unethical. A ZBA enables the firm to maximize the use of float on each check without altering the float time of payments to its suppliers. Keeping all the firm’s cash in an interest-earning account enables the firm to maximize earnings on its cash balances by capturing the full float time on each check it writes.

Investing in Marketable Securities

Marketable securities are short-term, interest-earning, money market instruments that can easily be converted into cash. Marketable securities are classified as part of the firm’s liquid assets. The firm uses them to earn a return on temporarily idle funds. To be truly marketable, a security must have (1) a ready market so as to minimize the amount of time required to convert it into cash, and (2) safety of principal, which means that it experiences little or no loss in value over time.

The securities that are most commonly held as part of the firm’s marketable-securities portfolio are divided into two groups: (1) government issues, which have relatively low yields as a consequence of their low risk, and (2) nongovernment issues, which have slightly higher yields than government issues with similar maturities because of the slightly higher risk associated with them. Table 13.5 (on page 538) summarizes the key features and recent (November 17, 2004) yields for popular marketable securities.

Review Questions

13–17  What is float and what are its three components?
13–18  What are the firm’s objectives with regard to collection float and to payment float?
13–19  What are the three main advantages of cash concentration?
13–20  What are three mechanisms of cash concentration? What is the objective of using a zero-balance account (ZBA) in a cash concentration system?
13–21  What two characteristics make a security marketable? Why are the yields on nongovernment marketable securities generally higher than the yields on government issues with similar maturities?

5. As explained in Chapter 1, the money market results from a financial relationship between the suppliers and demanders of short-term funds, that is, marketable securities.
### TABLE 13.5
Features and Recent Yields on Popular Marketable Securities

<table>
<thead>
<tr>
<th>Security</th>
<th>Issuer</th>
<th>Description</th>
<th>Initial maturity</th>
<th>Risk and return</th>
<th>Yield on Nov. 17, 2004</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Government Issues</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Treasury bills</td>
<td>U.S. Treasury</td>
<td>Issued weekly at auction; sold at a discount; strong secondary market</td>
<td>91 and 182 days</td>
<td>Lowest, virtually risk-free</td>
<td>2.08%</td>
</tr>
<tr>
<td>Treasury notes</td>
<td>U.S. Treasury</td>
<td>Stated interest rate; interest paid semiannually; strong secondary market</td>
<td>1 to 10 years</td>
<td>Low, but slightly higher than U.S. Treasury bills</td>
<td>2.14%</td>
</tr>
<tr>
<td>Federal agency issues</td>
<td>Agencies of federal government</td>
<td>Not an obligation of U.S. Treasury; strong secondary market</td>
<td>9 months to 30 years</td>
<td>Slightly higher than U.S. Treasury issues</td>
<td>2.11%</td>
</tr>
<tr>
<td><strong>Nongovernment Issues</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Negotiable certificates of deposit (CDs)</td>
<td>Commercial banks</td>
<td>Represent specific cash deposits in commercial banks; amounts and maturities tailored to investor needs; large denominations; good secondary market</td>
<td>1 month to 3 years</td>
<td>Higher than U.S. Treasury issues and comparable to commercial paper</td>
<td>2.28%</td>
</tr>
<tr>
<td>Commercial paper</td>
<td>Corporation with a high credit standing</td>
<td>Unsecured note of issuer; large denominations</td>
<td>3 to 270 days</td>
<td>Higher than U.S. Treasury issues and comparable to negotiable CDs</td>
<td>2.25%</td>
</tr>
<tr>
<td>Banker’s acceptances</td>
<td>Banks</td>
<td>Results from a bank guarantee of a business transaction; sold at discount from maturity value</td>
<td>30 to 180 days</td>
<td>About the same as negotiable CDs and commercial paper but higher than U.S. Treasury issues</td>
<td>2.26%</td>
</tr>
<tr>
<td>Eurodollar deposits</td>
<td>Foreign banks</td>
<td>Deposits of currency not native to the country in which the bank is located; large denominations; active secondary market</td>
<td>1 day to 3 years</td>
<td>High, due to less regulation of depository banks and some foreign exchange risk</td>
<td>2.27%</td>
</tr>
<tr>
<td>Money market mutual funds</td>
<td>Professional portfolio management companies</td>
<td>Professionally managed portfolios of marketable securities; provide instant liquidity</td>
<td>None—depends on wishes of investor</td>
<td>Vary, but generally higher than U.S. Treasury issues and comparable to negotiable CDs and commercial paper</td>
<td>1.14%&lt;sup&gt;d&lt;/sup&gt;</td>
</tr>
<tr>
<td>Repurchase agreements</td>
<td>Bank or security dealer</td>
<td>Bank or security dealer sells specific securities to firm and agrees to repurchase them at a specific price and time</td>
<td>Customized to purchaser’s needs</td>
<td>Generally slightly below that associated with the outright purchase of the security</td>
<td>—</td>
</tr>
</tbody>
</table>

<sup>a</sup>The prime rate of interest at this time was 5.00%.
<sup>b</sup>Yields obtained for 3-month maturities of each security.
<sup>c</sup>Federal National Mortgage Association (Fannie Mae) issue with 3 months to maturity is used here.
<sup>d</sup>The Dryfus Money Market Fund with an average maturity of 42 days is used here in the absence of any average-yield data. Comparatively low money market mutual fund yields occur when interest rates are relatively low, as was the case in late 2004.

SUMMARY

FOCUS ON VALUE

It is important for a firm to maintain a reasonable level of net working capital. To do so, it must balance the high profit and high risk associated with low levels of current assets and high levels of current liabilities against the low profit and low risk that result from high levels of current assets and low levels of current liabilities. A strategy that achieves a reasonable balance between profits and liquidity should positively contribute to the firm’s value.

Similarly, the firm should manage its cash conversion cycle by turning inventory quickly; collecting accounts receivable quickly; managing mail, processing, and clearing time; and paying accounts payable slowly. These strategies should enable the firm to manage its current accounts efficiently and to minimize the amount of resources invested in operating assets.

The financial manager can manage inventory, accounts receivable, and cash receipts to minimize the firm’s operating cycle investment, thereby reducing the amount of resources needed to support its business. Employing these strategies, and managing accounts payable and cash disbursements so as to shorten the cash conversion cycle, should minimize the negotiated liabilities needed to support the firm’s resource requirements. Active management of the firm’s working capital and current assets should positively contribute to the firm’s goal of maximizing its stock price.

REVIEW OF LEARNING GOALS

LG1 Understand short-term financial management, net working capital, and the related tradeoff between profitability and risk. Short-term financial management focuses on managing each of the firm’s current assets (inventory, accounts receivable, cash, and marketable securities) and current liabilities (accounts payable, accruals, and notes payable) in a manner that positively contributes to the firm’s value. Net working capital is the difference between current assets and current liabilities. Risk, in the context of short-term financial decisions, is the probability that a firm will be unable to pay its bills as they come due. Assuming a constant level of total assets, the higher a firm’s ratio of current assets to total assets, the less profitable the firm, and the less risky it is. The converse is also true. With constant total assets, the higher a firm’s ratio of current liabilities to total assets, the more profitable and the more risky the firm is. The converse of this statement is also true.

LG2 Describe the cash conversion cycle, its funding requirements, and the key strategies for managing it. The cash conversion cycle has three components: (1) average age of inventory, (2) average collection period, and (3) average payment period. The length of the cash conversion cycle determines the amount of time resources are tied up in the firm’s day-to-day operations. The firm’s investment in short-term assets often consists of both permanent and seasonal funding requirements. The seasonal requirements can be financed using either an aggressive (low-cost, high-risk) financing strategy or a conservative (high-cost, low-risk) financing strategy. The firm’s funding decision for its cash conversion cycle ultimately depends on management’s disposition toward risk and the strength of the firm’s banking relationships. To minimize its reliance on negotiated liabilities, the financial manager seeks to (1) turn over inventory as quickly as possible, (2) collect accounts receivable as quickly as possible, (3) manage mail, processing,
Discuss inventory management: differing views, common techniques, and international concerns. The viewpoints of marketing, manufacturing, and purchasing managers about the appropriate levels of inventory tend to cause higher inventories than those deemed appropriate by the financial manager. Four commonly used techniques for effectively managing inventory to keep its level low are (1) the ABC system, (2) the economic order quantity (EOQ) model, (3) the just-in-time (JIT) system, and (4) computerized systems for resource control—MRP, MRP II, and ERP. International inventory managers place greater emphasis on making sure that sufficient quantities of inventory are delivered where and when needed, and in the right condition, than on ordering the economically optimal quantities.

Explain the credit selection process and the quantitative procedure for evaluating changes in credit standards. Credit selection techniques determine which customers’ creditworthiness is consistent with the firm’s credit standards. Two popular credit selection techniques are the five C’s of credit and credit scoring. Changes in credit standards can be evaluated mathematically by assessing the effects of a proposed change on profits from sales, the cost of accounts receivable investment, and bad-debt costs.

Review the procedures for quantitatively considering cash discount changes, other aspects of credit terms, and credit monitoring.

Changes in credit terms—the cash discount, the cash discount period, and the credit period—can be quantified similarly to changes in credit standards. Credit monitoring, the ongoing review of accounts receivable, frequently involves use of the average collection period and an aging schedule. A number of popular collection techniques are used by firms.

Understand the management of receipts and disbursements, including float, speeding up collections, slowing down payments, cash concentration, zero-balance accounts, and investing in marketable securities. Float refers to funds that have been sent by the payer but are not yet usable funds to the payee. The components of float are mail time, processing time, and clearing time. Float occurs in both the average collection period and the average payment period. One technique for speeding up collections to reduce collection float is a lockbox system. A popular technique for slowing payments to increase payment float is controlled disbursing.

The goal for managing operating cash is to balance the opportunity cost of nonearning balances against the transaction cost of temporary investments. Firms commonly use depositary transfer checks (DTCs), ACH transfers, and wire transfers to transfer lockbox receipts to their concentration banks quickly. Zero-balance accounts (ZBAs) can be used to eliminate nonearning cash balances in corporate checking accounts. Marketable securities are short-term, interest-earning, money market instruments used by the firm to earn a return on temporarily idle funds. They may be government or nongovernment issues.

SELF-TEST PROBLEMS (SOLUTIONS IN APPENDIX B)

ST13–1 Cash conversion cycle  Hurkin Manufacturing Company pays accounts payable on the tenth day after purchase. The average collection period is 30 days, and the average age of inventory is 40 days. The firm currently has annual sales of about $18 million. The firm is considering a plan that would stretch its accounts payable by 20 days. If the firm pays 12% per year for its resource investment, what annual savings can it realize by this plan? Assume no difference in the investment per dollar of sales in inventory, receivables, and payables; no discount for early payment of accounts payable; and a 365-day year.
ST13–2 EOQ analysis  Thompson Paint Company uses 60,000 gallons of pigment per year. The cost of ordering pigment is $200 per order, and the cost of carrying the pigment in inventory is $1 per gallon per year. The firm uses pigment at a constant rate every day throughout the year.

a. Calculate the EOQ.

b. Assuming that it takes 20 days to receive an order once it has been placed, determine the reorder point in terms of gallons of pigment. (Note: Use a 365-day year.)

ST13–3 Relaxing credit standards  Regency Rug Repair Company is trying to decide whether it should relax its credit standards. The firm repairs 72,000 rugs per year at an average price of $32 each. Bad-debt expenses are 1% of sales, the average collection period is 40 days, and the variable cost per unit is $28. Regency expects that if it does relax its credit standards, the average collection period will increase to 48 days and that bad debts will increase to 1 1/2% of sales. Sales will increase by 4,000 repairs per year. If the firm has a required rate of return on equal-risk investments of 14%, what recommendation would you give the firm? Use your analysis to justify your answer. (Note: Use a 365-day year.)

WARM-UP EXERCISES

E13–1 Sharam Industries has a 120-day operating cycle. If its average age of inventory is 50 days, how long is its average collection period? If its average payment period is 30 days, what is its cash conversion cycle? Place all of this information on a time line similar to Figure 13.1 on page 515.

E13–2 Icy Treats, Inc., is a seasonal business that sells frozen desserts. At the peak of its summer selling season the firm has $35,000 in cash, $125,000 in inventory, $70,000 in accounts receivable, and $65,000 in accounts payable. During the slow winter period the firm holds $10,000 in cash, $55,000 in inventory, $40,000 in accounts receivable, and $35,000 in accounts payable. Calculate Icy Treats’ minimum and peak funding requirements.

E13–3 Mama Leone’s Frozen Pizzas uses 50,000 units of cheese per year. Each unit costs $2.50. The ordering cost for the cheese is $250 per order, and its carrying cost is $0.50 per unit per year. Calculate the firm’s economic order quantity (EOQ) for the cheese. Mama Leone’s operates 250 days per year and maintains a minimum inventory level of 2 days’ worth of cheese. If the lead time to receive orders of cheese is 3 days, calculate the reorder point.

E13–4 Forrester Fashions has annual credit sales of 250,000 units with an average collection period of 70 days. The company has a per-unit variable cost of $20 and a per-unit sale price of $30. Bad debts currently are 5% of sales. The firm estimates that a proposed relaxation of credit standards would not affect its 70-day average collection period, but would increase bad debts to 7.5% of sales, which would increase to 300,000 units per year. Forrester requires a 12% return on investments. Show all necessary calculations required to evaluate Forrester’s proposed relaxation of credit standards.
E13–5 Klein’s Tools is considering offering a cash discount to speed up the collection of accounts receivable. Currently the firm has an average collection period of 65 days, annual sales are 35,000 units, the per-unit sale price is $40, and the per-unit variable cost is $29. A 2% cash discount is being considered. Klein’s Tools estimates that 80% of its customers will take the 2% discount. If sales are expected to rise to 37,000 units per year and the firm has a 15% required rate of return, what minimum average collection period is required to approve the cash discount plan?

PROBLEMS

P13–1 Cash conversion cycle American Products is concerned about managing cash efficiently. On the average, inventories have an age of 90 days, and accounts receivable are collected in 60 days. Accounts payable are paid approximately 30 days after they arise. The firm has annual sales of about $30 million. Assume there is no difference in the investment per dollar of sales in inventory, receivables, and payables; and a 365-day year.

a. Calculate the firm’s operating cycle.
b. Calculate the firm’s cash conversion cycle.
c. Calculate the amount of resources needed to support the firm’s cash conversion cycle.
d. Discuss how management might be able to reduce the cash conversion cycle.

P13–2 Changing cash conversion cycle Camp Manufacturing turns over its inventory 8 times each year, has an average payment period of 35 days, and has an average collection period of 60 days. The firm’s annual sales are $3.5 million. Assume there is no difference in the investment per dollar of sales in inventory, receivables, and payables; and a 365-day year.

a. Calculate the firm’s operating cycle and cash conversion cycle.
b. Calculate the firm’s daily cash operating expenditure. How much in resources must be invested to support its cash conversion cycle?
c. If the firm pays 14% for these resources, by how much would it increase its annual profits by favorably changing its current cash conversion cycle by 20 days?

P13–3 Multiple changes in cash conversion cycle Garrett Industries turns over its inventory 6 times each year; it has an average collection period of 45 days and an average payment period of 30 days. The firm’s annual sales are $3 million. Assume there is no difference in the investment per dollar of sales in inventory, receivables, and payables; and a 365-day year.

a. Calculate the firm’s cash conversion cycle, its daily cash operating expenditure, and the amount of resources needed to support its cash conversion cycle.
b. Find the firm’s cash conversion cycle and resource investment requirement if it makes the following changes simultaneously.
   (1) Shortens the average age of inventory by 5 days.
   (2) Speeds the collection of accounts receivable by an average of 10 days.
   (3) Extends the average payment period by 10 days.
c. If the firm pays 13% for its resource investment, by how much, if anything, could it increase its annual profit as a result of the changes in part b?

d. If the annual cost of achieving the profit in part c is $35,000, what action would you recommend to the firm? Why?

P13–4 Aggressive versus conservative seasonal funding strategy

Dynabase Tool has forecast its total funds requirements for the coming year as shown in the following table.

<table>
<thead>
<tr>
<th>Month</th>
<th>Amount</th>
<th>Month</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>January</td>
<td>$2,000,000</td>
<td>July</td>
<td>$12,000,000</td>
</tr>
<tr>
<td>February</td>
<td>2,000,000</td>
<td>August</td>
<td>14,000,000</td>
</tr>
<tr>
<td>March</td>
<td>2,000,000</td>
<td>September</td>
<td>9,000,000</td>
</tr>
<tr>
<td>April</td>
<td>4,000,000</td>
<td>October</td>
<td>5,000,000</td>
</tr>
<tr>
<td>May</td>
<td>6,000,000</td>
<td>November</td>
<td>4,000,000</td>
</tr>
<tr>
<td>June</td>
<td>9,000,000</td>
<td>December</td>
<td>3,000,000</td>
</tr>
</tbody>
</table>

a. Divide the firm’s monthly funds requirement into (1) a permanent component and (2) a seasonal component, and find the monthly average for each of these components.

b. Describe the amount of long-term and short-term financing used to meet the total funds requirement under (1) an aggressive funding strategy and (2) a conservative funding strategy. Assume that under the aggressive strategy, long-term funds finance permanent needs and short-term funds are used to finance seasonal needs.

c. Assuming that short-term funds cost 12% annually and that the cost of long-term funds is 17% annually, use the averages found in part a to calculate the total cost of each of the strategies described in part b.

d. Discuss the profitability–risk tradeoffs associated with the aggressive strategy and those associated with the conservative strategy.

P13–5 EOQ analysis

Tiger Corporation purchases 1,200,000 units per year of one component. The fixed cost per order is $25. The annual carrying cost of the item is 27% of its $2 cost.

a. Determine the EOQ under the following conditions: (1) no changes, (2) order cost of zero, and (3) carrying cost of zero.

b. What do your answers illustrate about the EOQ model? Explain.

P13–6 EOQ, reorder point, and safety stock

Alexis Company uses 800 units of a product per year on a continuous basis. The product has a fixed cost of $50 per order, and its carrying cost is $2 per unit per year. It takes 5 days to receive a shipment after an order is placed, and the firm wishes to hold 10 days’ usage in inventory as a safety stock.

a. Calculate the EOQ.

b. Determine the average level of inventory. (Note: Use a 365-day year to calculate daily usage.)

c. Determine the reorder point.
d. Indicate which of the following variables change if the firm does not hold the safety stock: (1) order cost, (2) carrying cost, (3) total inventory cost, (4) reorder point, (5) economic order quantity. Explain.

P13–7 Accounts receivable changes without bad debts  Tara’s Textiles currently has credit sales of $360 million per year and an average collection period of 60 days. Assume that the price of Tara’s products is $60 per unit and that the variable costs are $55 per unit. The firm is considering an accounts receivable change that will result in a 20% increase in sales and a 20% increase in the average collection period. No change in bad debts is expected. The firm’s equal-risk opportunity cost on its investment in accounts receivable is 14%.  (Note: Use a 365-day year.)

a. Calculate the additional profit contribution from new sales that the firm will realize if it makes the proposed change.

b. What marginal investment in accounts receivable will result?

c. Calculate the cost of the marginal investment in accounts receivable.

d. Should the firm implement the proposed change? What other information would be helpful in your analysis?

P13–8 Accounts receivable changes with bad debts  A firm is evaluating an accounts receivable change that would increase bad debts from 2% to 4% of sales. Sales are currently 50,000 units, the selling price is $20 per unit, and the variable cost per unit is $15. As a result of the proposed change, sales are forecast to increase to 60,000 units.

a. What are bad debts in dollars currently and under the proposed change?

b. Calculate the cost of the marginal bad debts to the firm.

c. Ignoring the additional profit contribution from increased sales, if the proposed change saves $3,500 and causes no change in the average investment in accounts receivable, would you recommend it? Explain.

d. Considering all changes in costs and benefits, would you recommend the proposed change? Explain.

e. Compare and discuss your answers in parts c and d.

P13–9 Relaxation of credit standards  Lewis Enterprises is considering relaxing its credit standards to increase its currently sagging sales. As a result of the proposed relaxation, sales are expected to increase by 10% from 10,000 to 11,000 units during the coming year; the average collection period is expected to increase from 45 to 60 days; and bad debts are expected to increase from 1% to 3% of sales. The sale price per unit is $40, and the variable cost per unit is $31. The firm’s required return on equal-risk investments is 25%. Evaluate the proposed relaxation, and make a recommendation to the firm.  (Note: Assume a 365-day year.)

P13–10 Initiating a cash discount  Gardner Company currently makes all sales on credit and offers no cash discount. The firm is considering offering a 2% cash discount for payment within 15 days. The firm’s current average collection period is 60 days, sales are 40,000 units, selling price is $45 per unit, and variable cost per unit is $36. The firm expects that the change in credit terms will result in an increase in sales to 42,000 units, that 70% of the sales will take the discount, and that the average collection period will fall to 30 days. If the firm’s required rate of return on equal-risk investments is 25%, should the proposed discount be offered?  (Note: Assume a 365-day year.)
P13–11 **Shortening the credit period**  A firm is contemplating shortening its credit period from 40 to 30 days and believes that as a result of this change, its average collection period will decline from 45 to 36 days. Bad-debt expenses are expected to decrease from 1.5% to 1% of sales. The firm is currently selling 12,000 units but believes that as a result of the proposed change, sales will decline to 10,000 units. The sale price per unit is $56, and the variable cost per unit is $45. The firm has a required return on equal-risk investments of 25%. Evaluate this decision, and make a recommendation to the firm. *(Note: Assume a 365-day year.)*

P13–12 **Lengthening the credit period**  Parker Tool is considering lengthening its credit period from 30 to 60 days. All customers will continue to pay on the net date. The firm currently bills $450,000 for sales and has $345,000 in variable costs. The change in credit terms is expected to increase sales to $510,000. Bad-debt expenses will increase from 1% to 1.5% of sales. The firm has a required rate of return on equal-risk investments of 20%. *(Note: Assume a 365-day year.)*

a. What additional profit contribution from sales will be realized from the proposed change?

b. What is the cost of the marginal investment in accounts receivable?

c. What is the cost of the marginal bad debts?

d. Do you recommend this change in credit terms? Why or why not?

P13–13 **Float**  Simon Corporation has daily cash receipts of $65,000. A recent analysis of its collections indicated that customers’ payments were in the mail an average of 2.5 days. Once received, the payments are processed in 1.5 days. After payments are deposited, it takes an average of 3 days for these receipts to clear the banking system.

a. How much collection float (in days) does the firm currently have?

b. If the firm’s opportunity cost is 11%, would it be economically advisable for the firm to pay an annual fee of $16,500 to reduce collection float by 3 days? Explain why or why not.

P13–14 **Lockbox system**  Eagle Industries feels that a lockbox system can shorten its accounts receivable collection period by 3 days. Credit sales are $3,240,000 per year, billed on a continuous basis. The firm has other equally risky investments with a return of 15%. The cost of the lockbox system is $9,000 per year. *(Note: Assume a 365-day year.)*

a. What amount of cash will be made available for other uses under the lockbox system?

b. What net benefit (cost) will the firm realize if it adopts the lockbox system? Should it adopt the proposed lockbox system?

P13–15 **Zero-balance account**  Union Company is considering establishment of a zero-balance account. The firm currently maintains an average balance of $420,000 in its disbursement account. As compensation to the bank for maintaining the zero-balance account, the firm will have to pay a monthly fee of $1,000 and maintain a $300,000 non–interest-earning deposit in the bank. The firm currently has no other deposits in the bank. Evaluate the proposed zero-balance account, and make a recommendation to the firm, assuming that it has a 12% opportunity cost.
P13–16 ETHICS PROBLEM  Controlled disbursing is defined as an information product—that is, the bank on which the company’s checks are drawn provides an early-morning notification of the total dollar amount of checks that will clear the account that day. Based on that notification, the company may then fund the account for that amount by the close of business that afternoon. How might controlled disbursing still be viewed as a form of “remote disbursing,” and therefore be considered unethical?

CHAPTER 13 CASE  Assessing Roche Publishing Company’s Cash Management Efficiency

Lisa Pinto, vice president of finance at Roche Publishing Company, a rapidly growing publisher of college texts, is concerned about the firm’s high level of short-term resource investment. She believes that the firm can improve the management of its cash and, as a result, reduce this investment. In this regard, she charged Arlene Bessenoff, the treasurer, with assessing the firm’s cash management efficiency. Arlene decided to begin her investigation by studying the firm’s operating and cash conversion cycles.

Arlene found that Roche’s average payment period was 25 days. She consulted industry data, which showed that the average payment period for the industry was 40 days. Investigation of three similar publishing companies revealed that their average payment period was also 40 days. She estimated the annual cost of achieving a 40-day payment period to be $53,000.

Next, Arlene studied the production cycle and inventory policies. The average age of inventory was 120 days. She determined that the industry standard as reported in a survey done by Publishing World, the trade association journal, was 85 days. She estimated the annual cost of achieving an 85-day average age of inventory to be $150,000.

Further analysis showed Arlene that the firm’s average collection period was 60 days. The industry average, derived from the trade association data and information on three similar publishing companies, was found to be 42 days—30% lower than Roche’s. Arlene estimated that if Roche initiated a 2% cash discount for payment within 10 days of the beginning of the credit period, the firm’s average collection period would drop from 60 days to the 42-day industry average. She also expected the following to occur as a result of the discount: Annual sales would increase from $13,750,000 to $15,000,000; bad debts would remain unchanged; and the 2% cash discount would be applied to 75% of the firm’s sales. The firm’s variable costs equal 80% of sales.

Roche Publishing Company is currently spending $12,000,000 per year on its operating-cycle investment, but it expects that initiating a cash discount will increase its operating-cycle investment to $13,100,000 per year. (Note: The operating-cycle investment per dollar of inventory, receivables, and payables is assumed to be the same.) Arlene’s concern was whether the firm’s cash management was as efficient as it could be. Arlene knew that the company paid 12% annual interest for its resource investment and therefore viewed this value as the firm’s required return. For this reason, she was concerned about the resource investment cost resulting from any inefficiencies in the management of Roche’s cash conversion cycle. (Note: Assume a 365-day year.)
TO DO

a. Assuming a constant rate for purchases, production, and sales throughout the year, what are Roche’s existing operating cycle (OC), cash conversion cycle (CCC), and resource investment need?

b. If Roche can optimize operations according to industry standards, what would its operating cycle (OC), cash conversion cycle (CCC), and resource investment need be under these more efficient conditions?

c. In terms of resource investment requirements, what is the annual cost of Roche’s operational inefficiency?

d. Evaluate whether Roche’s strategy for speeding its collection of accounts receivable would be acceptable. What annual net profit or loss would result from implementation of the cash discount?

e. Use your finding in part d, along with the payables and inventory costs given, to determine the total annual cost the firm would incur to achieve the industry level of operational efficiency.

f. Judging on the basis of your findings in parts c and e, should the firm incur the annual cost to achieve the industry level of operational efficiency? Explain why or why not.

SPREADSHEET EXERCISE

The current balance in accounts receivable for Eboy Corporation is $443,000. This level was achieved with annual (365 days) credit sales of $3,544,000. The firm offers its customers credit terms of net 30. However, in an effort to help its cash flow position and to follow the actions of its rivals, the firm is considering changing its credit terms from net 30 to 2/10 net 30. The objective is to speed up the receivable collections and thereby improve the firm’s cash flows. Eboy would like to increase its accounts receivable turnover to 12.0.

The firm works with a raw material whose current annual usage is 1,450 units. Each finished product requires 1 unit of this raw material at a variable cost of $2,600 per unit and sells for $4,200 on terms of net 30. It is estimated that 70% of the firm’s customers will take the 2% cash discount and that with the discount, sales of the finished product will increase by 50 units per year. The firm’s opportunity cost of funds invested in accounts receivable is 12.5%

In analyzing the investment in accounts receivable, use the variable cost of the product sold instead of the sale price, because the variable cost is a better indicator of the firm’s investment.

TO DO

Create a spreadsheet similar to Table 13.3 (or to one that can be viewed at www.aw-bc.com/gitman) to analyze whether the firm should initiate the proposed cash discount. What is your advice? Make sure you calculate the following:

a. Additional profit contribution from sales.

b. Average investment in accounts receivable at present (without cash discount).

c. Average investment in accounts receivable with the proposed cash discount.
d. Reduction in investment in accounts receivable.

e. Cost savings from reduced investment in accounts receivable.

f. Cost of the cash discount.

g. Net profit (loss) from initiation of the proposed cash discount.

Web Exercise

As this chapter points out, cash management is not only important, but it is also challenging. Many small businesses simply do not have the managerial expertise needed to properly manage working capital and current assets. As a result of this knowledge vacuum, many banks have stepped in to offer small business services.

To Do

Point your browser to www.bankofamerica.com/, the home page for the Bank of America (BoA). Click on the small business tab and investigate the types of services BoA offers. Report on those services offered by BoA and how they relate to the topics covered in this chapter.