PART 5

Operations

The Management of Working Capital

CHAPTER 16

CHAPTER OUTLINE

Working capital consists of certain balance sheet accounts that arise from routine activities common to most companies. Working capital *management* refers to controlling the balances in the accounts, but more importantly to the way the underlying functions are run. In what follows we'll gain an understanding of the decisions involved in working capital management and the relationships it creates between finance and other departments.

WORKING CAPITAL BASICS

The term "working capital" refers to the assets and liabilities required to operate a business on a day-to-day basis. The assets include cash, receivables, and inventories, while the liabilities are generally payables and accruals.

It's important to distinguish these accounts from long-term items such as buildings and equipment on the asset side of the balance sheet and long-term debt and equity on the liabilities side. Long-term assets are held for extended periods (at least a year) and tend to be financed or *supported* with liabilities that don't have to be paid off for similarly long periods of time.

Working capital items, on the other hand, are short term. Most *turn over* continually, meaning that items are held for only a little while. Inventory is a good example. Although firms always have inventory on hand, individual pieces are purchased and sold relatively quickly. The important point is that normal operating activities create and liquidate the elements of working capital on a regular basis.

Working capital accounts arise from **day-to-day operations** and include **cash**, **receivables**, **inventory**, **payables**, and **accruals**.

The assets and liabilities in working capital accounts **turn over** regularly.

WORKING CAPITAL, FUNDING REQUIREMENTS, AND THE CURRENT ACCOUNTS

The assets associated with short-term operating activities in most companies are cash, accounts receivable, and inventory. Together, they're called *gross working capital*. The word "capital" refers to the idea that funds have to be committed to support these short-term assets, while the word "working" emphasizes the fact that they're associated with the day-to-day operation of the business.

It's important to realize that working capital is an absolute necessity to the operation of virtually all companies. Firms can no more do business without working capital than they can without buildings or equipment.

Working Capital Requires Funds

Providing working capital takes a more or less permanent investment of funds. For example, suppose a company operates with a $10 million inventory. Even though individual inventory items are constantly being bought and sold, approximately $10

INSIGHTS

PRACTICAL **FINANCE**

Going Broke Profitably

Can a company that's making a profit and has great prospects for the future fail? That sounds like a trick question, but it isn't. Profitable businesses, especially small ones, fail all the time. All that's necessary is a few mistakes with working capital.

Here's an example. Suppose an entrepreneur has a great idea for a product she wants to sell to a large company nearby. A unit sells for $1,000, costs $500 to make, and requires overhead of about $200. That means in the long run every unit makes $300, and the business looks like it will be solidly profitable.

Flushed with excitement, our entrepreneur leases space, hires workers, and buys a year's inventory. Then she operates for three months, shipping product to a delighted customer who promises to pay in 30 days.

But at the end of that time the receivable isn't paid and the business is out of cash. Calling the customer, the entrepreneur gets a long story about minor technical problems with the product, a confusing tale about invoices not matching purchase orders, and an assurance of payment after these problems are worked out.

However, after checking around, she finds that the customer is well known for paying bills slowly and using excuses to delay. It also turns out that the customer is in financial difficulty and has been especially bad about paying bills lately.

Notice that at this point the entrepreneur's income statement says she's doing great having made $300 on every unit shipped. But the balance sheet tells a different story. She's got a pile of inventory, a big receivable, and no cash. That means she can't pay the rent or her workers in the fourth month of operation. The new business will fail immediately unless a bank bails it out with a loan until it collects some money.

This entrepreneur's failure comes from two mistakes in working capital management. She bought too much inventory and didn't do a credit check on the customer. Those seemingly small oversights cost her everything. We'll learn how to avoid this kind of disaster in this chapter.

Maintaining a working capital balance requires a **permanent** commitment of **funds**.

million is always required to support the total. In effect, the firm buys an inventory *level* just as it buys a building or a machine.

The same is true of receivables, although it's a little more difficult to visualize. When product is sold on credit, a receivable is created that won't be realized in cash until the customer pays the bill. In the meantime the receivable represents money the company has recognized from the sale but doesn't have.

Keeping cash in the bank also takes funding. Even though money is constantly flowing in and out of a company's bank account, an average balance has to be maintained to pay bills and conduct business. That money has to come from somewhere and represents a funding requirement just like inventory or receivables. In effect, the company buys a cash balance in its bank account.

The Short-Term Liabilities—Spontaneous Financing

Operating activities also create payable and accrual liabilities. When inventory is purchased on credit, the payable represents material that can be used (temporarily) without payment. Similarly, labor that's been received but not yet paid is reflected in an accrual. (Review the definition of accruals in Chapter 2, page 36, if necessary.)

These liabilities provide an offset to the funding requirements discussed in the last section. It's important to notice that they come *automatically* with the associated assets and operating activities. In other words, the acts of buying inventory and building product lead directly to the related payables and accruals.

The **liabilities** created by operations **spontaneously** offset the funding required to support the assets.

Because of the automatic nature of the liabilities arising from operating activities, they're referred to as *spontaneous financing*. They spontaneously reduce the need for funds to support gross working capital.

Working Capital and the Current Accounts

The term "net working capital" refers to the difference between gross working capital and spontaneous financing. *A firm's net working capital reflects the net amount of funds required to support routine operations.*

In Chapter 2 (pages 36 and 37) we defined current assets and current liabilities, respectively, as items that are expected to generate or require cash within a year. The elements of working capital make up the bulk of the current accounts in most companies. For that reason, it's customary to define working capital as follows.

In practice, **working** capital is the net of **current assets less current liabilities**.

$$\textbf{gross working capital} = \textbf{current assets}$$

$$\textbf{net working capital} = \textbf{current assets} - \textbf{current liabilities}^{1}$$

Usage

Common usage isn't particularly consistent in this area. People often use the term "working capital" for "net working capital." In practice it pays to be sure anyone you're talking with is using the same definition you are.

1. There's a minor problem in this definition. Certain items are regularly classified as current that are not related to routine operating activities. For example, when the repayment date for a long-term loan is less than a year away, the loan is normally classified as a current liability. Similarly, a receivable due from the sale of something other than product (like real estate) will be a current asset, but has nothing to do with daily operations. Hence, current assets and liabilities don't quite match the working capital concept. Nevertheless, it's common practice to define working capital in terms of the current accounts, ignoring any imprecision implied.

THE OBJECTIVE OF WORKING CAPITAL MANAGEMENT

Good working capital management means running the company effectively with as little money tied up in the current accounts as possible. That involves an important series of cost/benefit trade-offs. The trade-offs arise because it's easier to run a business with more working capital than with less, but it's also more expensive. Let's briefly consider each working capital element to see why.

Inventory: Large inventories keep customers happy because firms always have what they want right away. Also, production delays due to running out of materials are minimized by carrying big stocks of parts. However, larger inventories cost more to finance; incur bigger losses from obsolescence, breakage, and theft; and take more storage space than smaller inventories.

Receivables: A large receivables balance means the firm grants credit to customers easily and is willing to wait a long time to be paid. That makes customers happy and tends to increase sales. However, it also means relatively large bad debt losses and big interest charges to finance the receivables balance.

Cash: More rather than less cash in the bank makes it easier to conduct business and minimizes the chance of running short, but it also increases financing costs.

Payables and Accruals: On the liabilities side, more net working capital means smaller payables and accruals balances. That comes from paying vendors and employees quickly, which keeps them happy. However, it also reduces spontaneous financing and thus increases the need for costly external funding.

Working capital management involves **trade-offs** between **easier operation** and the **cost of carrying** short-term assets.

In general, using more working capital increases sales and improves relations with customers and vendors, but costs extra money. There's no magic prescription for setting the right working capital level. The choice is a matter of policy, and involves trade-offs that are often hard to quantify. Therefore, working capital management requires judgment, experience, and an ability to work with others in the organization.

We'll look into the management of each working capital component in detail later in the chapter.

OPERATIONS—THE CASH CONVERSION CYCLE

Current assets can be thought of as going through a series of transformations as a business operates. Cash "becomes" inventory and labor, which combine to become product. When product is sold, a receivable is created, which in turn becomes cash when collected.

The transformation process is conceptually important. In essence, the firm begins with cash, which it turns into things that eventually turn back into cash. This enables it to buy more inventory, which starts the cycle all over again. We referred to the process in our discussion of cash flows in Chapter 3, calling it the cash conversion cycle or the race track diagram (Figure 3.3). We'll repeat part of the diagram here for convenience as Figure 16.1.

The Cash Conversion Time Line

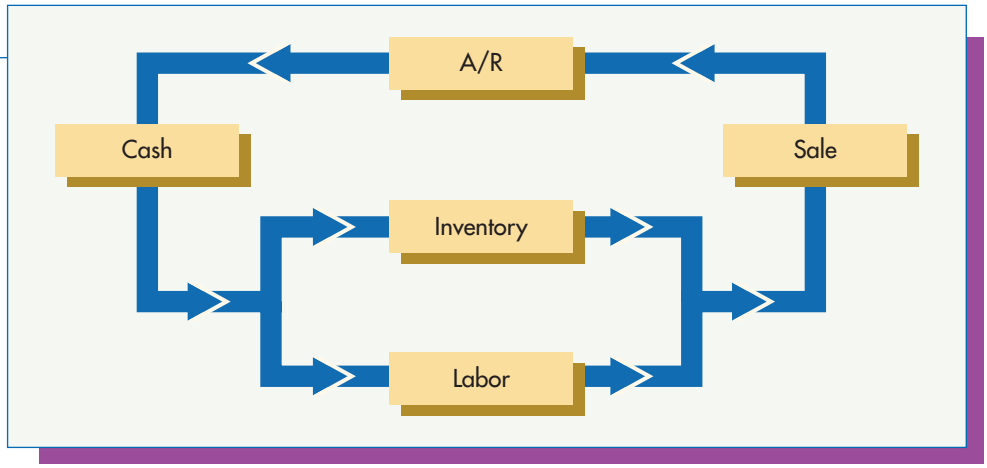
The **operating cycle** is the time from the **acquisition of inventory** until **cash is collected** from product sales.

Another way to look at the cash conversion cycle is by laying out its elements on a time line as illustrated in Figure 16.2. In this representation, events occur along the line and processes occupy intervals between the events.

It's important to notice how the two cycles are defined at the bottom of the diagram. A business's *operating cycle* is the period from the acquisition of inventory to the realization of cash from the sale of product. However, the cash conversion cycle is shorter by the period during which the firm holds a payable for the inventory. Cash

Figure 16.1

The Cash Conversion Cycle

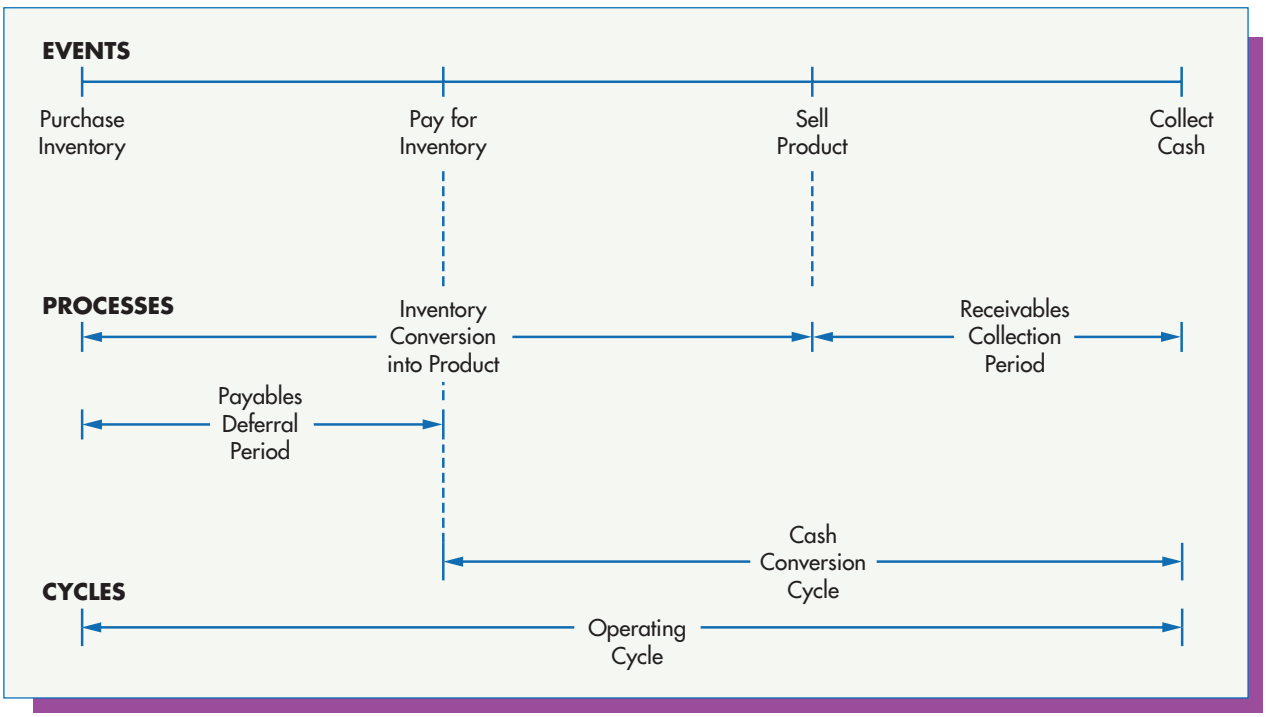


conversion is the time from the disbursement of cash to pay for materials to the receipt of cash for product sold.

Notice that Figure 16.2 doesn't show labor. Generally, production labor is continuously added to inventory during the conversion to product process, and is paid relatively quickly. Administrative labor is being performed and paid all the time.

The cash conversion concept is important because it contributes to our understanding of just how an ongoing business works. It's particularly enlightening in terms of the relationship between physical things and money.

Figure 16.2 Time Line Representation of the Cash Conversion Cycle



PERMANENT AND TEMPORARY WORKING CAPITAL

A firm's need for working capital varies directly with its sales level. The more it produces and sells, the larger its inventories have to be and generally the more receivables and cash it has to carry.

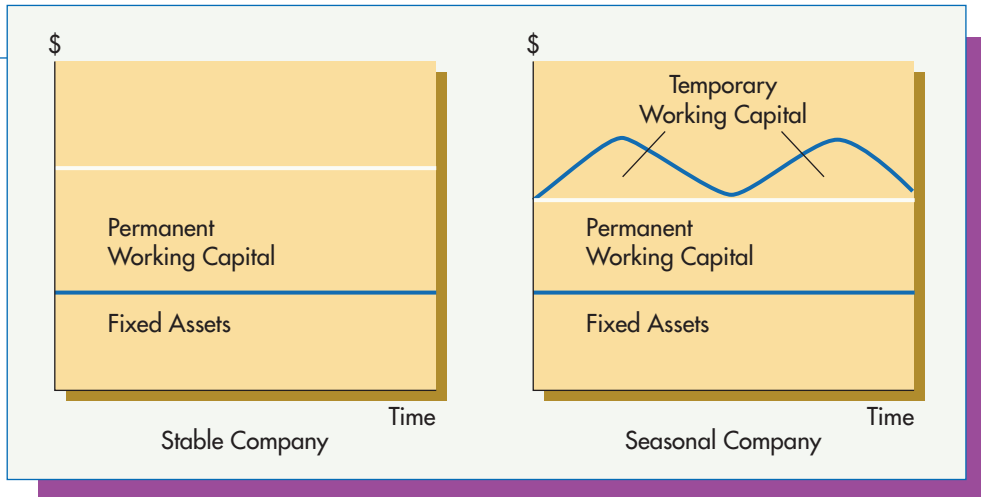
Temporary working capital supports **seasonal peaks** in business.

Some businesses operate at relatively even sales levels year round, and therefore have more or less constant needs for working capital. In *seasonal* businesses, however, sales vary throughout the year, as do working capital needs.

Seasonally variable business gives rise to the ideas of permanent and temporary working capital. Working capital is permanent to the extent that it supports a constant or minimum level of sales. On the other hand, working capital that supports operations above the minimum level doesn't need to be maintained year round and can be viewed as temporary. Temporary working capital can be thought of as supporting peak sales levels. These ideas are portrayed graphically in Figure 16.3.

Figure 16.3

Working Capital Needs of Different Firms



FINANCING NET WORKING CAPITAL

The fact that working capital differs from other assets because of its short-term nature leads to the idea that it may be appropriate to support it separately with short-term financing rather than using the firm's general pool of debt and equity capital. The idea arises almost naturally. Let's consider an illustration.

Working capital tends to be **financed separately** with **short-term** debt.

Suppose a merchant who has a store but no money for inventory approaches a bank for a loan to buy merchandise that he'll sell through his store. He promises to repay the loan with the money from the sale as soon as the goods are sold. Banks are generally reluctant to lend to very small businesses because they're extremely risky. However, this proposal has some attractive features for the bank.

First, the loan is short term because it will be paid off as soon as the merchandise sells. Banks consider short-term loans safer than those made for longer periods because they don't allow much time for business conditions to deteriorate before repayment is made.

Self-liquidating debt must be paid off when the **item financed becomes cash** in the borrower's hands.

Second, the bank can see exactly where the money to pay off the loan will come from—the proceeds of the sale of the inventory purchased with the borrowed money. This is an important point. The loan is *self-liquidating*. The merchant is not at liberty to do anything else with the sale proceeds. Such an arrangement is more secure than depending on the business's general profitability for repayment.

Third, the bank can demand that the merchant pledge the inventory itself as security for the loan. Then if payment isn't made, it can repossess and sell the inventory, which should be easily marketable. A similar case can be made for a loan based on receivables.

These features enable banks to make working capital loans to businesses that wouldn't qualify for general unsecured loans. The point is that working capital lends itself to short-term financing by offering lenders elements of security that aren't available with loans for other purposes.

The Options Available to Most Companies

Although everyone's situation isn't exactly like the merchant's in our example, most companies have the option of financing at least some of their working capital needs on a short-term basis. In practice, the loans aren't always tied to specific assets, but they're always short term.

On the other hand, firms can just about always use some of their long-term debt/equity capital to finance working capital. Therefore, management has a choice between using long-term and short-term funds.

We'll get into the advantages and disadvantages of each option after we review an important financial principle.

The Maturity Matching Principle

The **maturity matching** principle advises that the **term of financing** match the **duration** of the **item supported**.

The *maturity matching* concept says that the maturity date of financing should be roughly matched to the duration of the asset or project being financed. In other words, a loan taken out to finance a project should be repayable at roughly the time of the project's completion. This makes the loan/project combination a *self-liquidating* proposition.

For example, suppose a project requires a $1 million investment today and is expected to pay off $1.2 million in six months. Maturity matching implies that a firm should borrow the $1 million for about six months and use the project's proceeds to pay off the loan. Borrowing for a longer period will leave unused funds drawing interest after the project's end. Borrowing for a shorter period can result in a default.

To illustrate the danger of borrowing short, imagine that a firm borrows $1 million for just three months with the intention of refinancing for the second three months. But suppose conditions change and the lender refuses to refinance after the first three-month period. The firm won't be able to pay off the loan at that time because the project will not yet have generated the expected cash. That can lead to default and potential bankruptcy.

Hence, in principle, it's a good idea to match the duration of short- and intermediate-term projects with the maturity of the financing supporting them. Very long-term projects should be financed with equity, which has an indefinite duration, or with long-term debt lasting 20 to 40 years.

It's also not a good idea to *overfinance* a project. For example, imagine that a new venture requires $6 million to get started, but the owner manages to raise $10 million. Investors will expect a high return on the entire $10 million, but will probably be disappointed because earning opportunities are available for only $6 million.

These guidelines shouldn't be interpreted too literally. Modest overfunding in both time and amount provides conservatism. In our first example, if the $1.2 million is late coming in, borrowing a little long avoids missing the six-month loan repayment date. In the second example, if the start-up is more expensive than anticipated, a slightly larger initial loan might save the trouble and embarrassment of going back to investors a second time.

Short- and Long-Term Working Capital Financing

Permanent working capital can be financed **long or short** term, but **temporary** needs should be supported with **short-term** funds.

Now let's return to the choice between financing working capital with short- or long-term money. It's easy to see that maturity matching doesn't give us a clear prescription in the case of permanent working capital. Although the inventories and receivables financed are clearly short term, they're continuously replaced so the *level* of the working capital assets remains constant. In the context of maturity matching, the situation can be interpreted as appropriate for either short- or long-term financing. Temporary working capital, on the other hand, is more clearly of limited duration and therefore calls for short-term financing.

Firms clearly have a range of reasonable options for financing working capital. They can support it very largely with long-term sources using little or no short-term borrowing, or they can use short-term money extensively. Let's look at why a firm might prefer one or the other.

Financing with long-term funds is safe but expensive.[2] It's safe because enough money is raised at the outset to cover anticipated working capital needs for a long time, and the firm is unlikely ever to run short. It's expensive because long-term rates of return are generally higher than short-term rates, and raising long-term money usually involves paying flotation costs.

Long-term financing is **safe but expensive**, while **short-term** money is **cheap but risky**.

On the other hand, financing with short-term funds is cheap but risky. It's cheap because short rates are generally lower than long rates, and the transaction costs of raising the money are relatively small. But borrowing short term is risky because every time a new loan is required, the firm has to face a new set of market conditions. For example, if interest rates rise over time, a company borrowing short term will have to pay increasing market rates. These may turn out to be higher than the long-term rate that was available initially.

There's also a possibility that money can become so tight[3] that financing isn't available at any rate. If that happens, the firm may not be able to finance working capital at all, which can seriously affect its survival.

Alternative Policies

The result of all this is that the degree to which a firm uses short-term financing to support working capital is an issue of policy. Two possible options are illustrated graphically in Figure 16.4 for a firm that has both permanent and temporary working capital.

The **mix** of short- or long-term working capital financing is a matter of **policy**. Use of **longer-term** funds reflects **conservatism**.

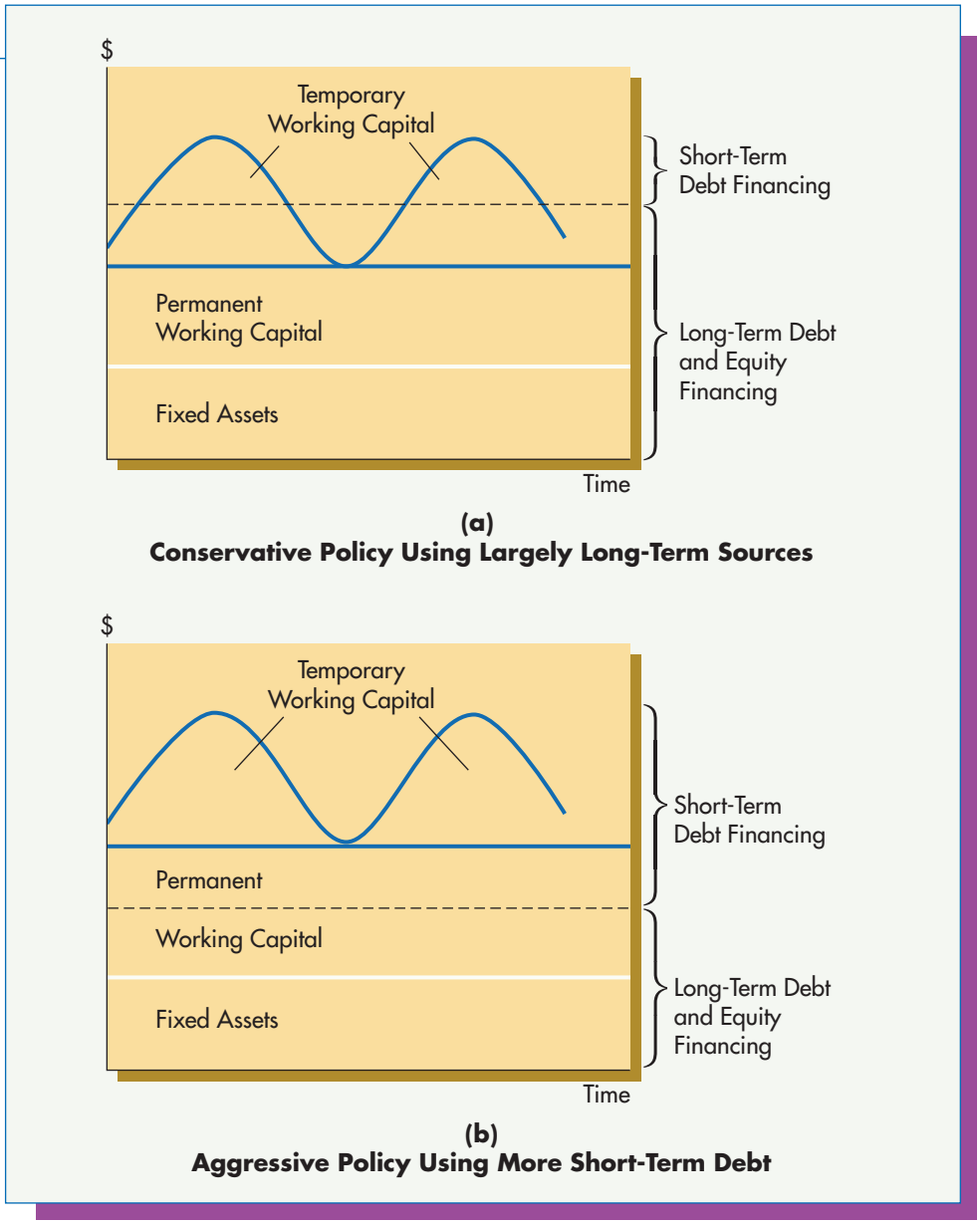
We say a working capital financing policy is conservative if long-term funding is used predominantly as illustrated in Figure 16.4(a). Notice that short-term funding supports only the peaks of temporary working capital. When temporary working capital is low and the total funding requirement is below the long-term level, the excess funds are invested in short-term marketable securities. This policy is conservative in that there's very little risk of being unable to fund ups and downs in working capital. However, its cost tends to be fairly high.

We say a working capital financing policy is aggressive if relatively more short-term funding is used as illustrated in Figure 16.4(b). Here short-term funds support all of temporary and a good part of permanent working capital. The policy is aggressive in the sense that some risk is being taken to reduce cost. The illustration makes it easy to see that a sudden rise in short-term rates will substantially increase the firm's interest costs. Further, a drying up of the availability of short-term funds could make normal business operations very difficult.

2. Long-term funds are capital and may include equity, long-term debt, or preferred stock.
3. "Tight money" means there's little available to borrow, so lenders demand very high rates and may refuse credit to all but the highest-quality borrowers.

Figure 16.4

Working Capital Financing Policies



WORKING CAPITAL POLICY

Working capital policy refers to the firm's policies on four subissues.

1. How much working capital is used
2. The extent to which working capital is supported by short- versus long-term financing
3. The nature/source of any short-term financing used
4. How each component of working capital is managed

We've already discussed the first and second of these subissues; we'll consider the third and fourth next.

SOURCES OF SHORT-TERM FINANCING

Working capital is the major reason most firms seek short-term loans. It's worth noting explicitly that short-term financing is always debt of one form or another.

We'll divide the sources of short-term financing into the following four categories and review each in some detail.

1. Spontaneous financing consisting of accounts payable and accruals
2. Unsecured bank loans
3. Commercial paper
4. Secured loans, which may be from banks or other sources

SPONTANEOUS FINANCING

Spontaneous financing consists of accounts payable and accruals. We'll consider accruals first.

Accruals

Accruals arise because firms receive services continually, but make payments at fixed intervals. (Review Chapter 2, pages 36–37.) A payroll accrual is relatively easy to understand. Suppose employees working a normal week are paid on Friday afternoon. At any time after the start of work on Monday until paychecks are handed out on Friday, the firm owes its employees for services performed so far that week. The obligation is represented by a balance sheet accrual if the books are closed any time other than Friday.

Accruals are made for any number of other services and obligations such as property taxes, insurance, and rents. Effectively, they're interest-free loans from whoever provides the service.

Payables and accruals arise in the normal course of business and represent **spontaneous financing**.

Accruals, especially for labor, tend to be very short term. In most companies they're liquidated every week or two on payday. They're also not very controllable. Labor market practices and tax laws dictate when payments have to be made with little or no flexibility. In other words, accruals provide a modest financing advantage, but they're not a policy issue.

Accounts Payable—Trade Credit

Most sales between companies are made on credit. The buying firm receives the goods and is expected to pay for them at a specified later date. Effectively, the selling company *lends* the buyer the purchase price, without interest, from the time the goods are shipped until payment is made. The practice is called extending *trade credit* to the customer.

There's typically no security and very little contractual support for trade credit. The contract between the parties is limited to the terms written on the buyer's purchase order and the seller's invoice.

Trade credit is an attractive source of financing because it's free. However, it typically isn't extended for very long periods of time.

Credit Terms

A vendor's terms of sale specify the number of days after delivery that payment is expected. In most cases, a discount is offered for earlier payment. Typical terms are specified as

2/10, net 30

This expression means that the net amount of the invoice is due within 30 days, but a 2% prompt payment discount may be taken if payment is made in 10 days or less. Any combination of discount period, net period, and discount is possible.

You can also interpret terms like these as meaning the true price of the goods is 98% of the invoiced amount, and 2% is a penalty for not paying quickly.

The Prompt Payment Discount

Passing prompt payment discounts is generally a very **expensive** source of financing.

The early payment discount is typically a very generous offer on the part of the vendor. We'll illustrate with the 2/10, net 30 case.

Because payment is due in 30 days and the discount can be taken within 10, foregoing the discount buys the customer an additional 20 days of trade credit. We can think of this as paying 2% interest for 20 days' use of money. That rate can be converted to an annual figure by multiplying by the number of 20-day periods in a year as follows.[4]

$$\frac{365}{20} \times 2\% = 36.5\%$$

The implication is that by not taking the prompt payment discount, the firm is effectively borrowing at 36.5%, clearly a very high rate. It's apparent that when such a discount is offered, early payment should be made and the discount taken.

Most prompt payment discounts, like the illustration, are quite attractive. Therefore, many companies have simply ordered their payables departments to take all discounts offered. This has prompted some vendors to offer discounts that aren't such a good deal. As an exercise, calculate the approximate interest cost of $\frac{1}{4}$/15, net 30. Is it clearly a good idea to take the discount?

Abuses of Trade Credit Terms

Stretching payables is a common **abuse** of trade credit.

On its face, trade credit is purely an accommodation to customers. In fact, however, the practice has become so ingrained in industry that it's come to be expected. In other words, vendors offer credit because they have to rather than because they want to.

In that context, the trade credit relationship can become somewhat adversarial, with customers abusing credit privileges when they can. Paying late, beyond the net date specified in a vendor's invoice, isn't uncommon at all. The practice is called **stretching payables** or **leaning on the trade**. It's probably safe to say that most firms do at least a little stretching if they can. Another common practice involves taking the prompt payment discount after the specified period has elapsed.

from the **CFO**

Vendors will tolerate a limited amount of abuse because they want to keep the customer's business. But if the practice becomes excessive the customer is labeled a slow payer and can find itself with problems. Slow-paying customers can be cut off from further shipments until debts are caught up or can be refused product unless payment is made in advance.

4. The calculation shown is a simplification in two respects. First, the money made available by not taking the discount isn't the invoiced amount, but 98% of that amount. The extra 2% is interest. That means the cost of the 20 days' use of the funds isn't 2% but (2%/.98 =) 2.04%.

Second, we should really compound the 20-day rate into a year rather than multiplying it. Because there are (365/20 =) 18.25 20-day periods in a year, the effective interest rate implied by not taking the discount is

$$[(1.0204)^{18.25} - 1] = 446 = 44.6\%.$$

Although this is the more technically correct calculation, most people think in terms of the simpler approach.

Slow-paying companies receive poor **credit ratings** in **credit reports** issued by **credit agencies**.

In addition, vendors usually report slow payers to a **credit agency** (also known as a **credit bureau**). Credit agencies prepare *credit reports* on virtually all companies doing business in the country. When new customers approach vendors asking for trade credit, it's customary to consult an agency about the applicant's record. A bad *credit rating* from a credit agency generally prevents a firm from getting trade credit.

UNSECURED BANK LOANS

Bank loans are the primary source of short-term financing for most companies, and are the primary business of commercial banks.[5] They come in a variety of forms and may be secured or unsecured.[6]

http://

The Federal Deposit Insurance Corporation provides access to consumer information, press releases, and banking statistics at **http://www.fdic.gov**

Promissory Note

A *promissory note* is the traditional bank lending arrangement. A note is signed promising to repay the amount borrowed at a definite future date along with a specified amount of interest. Sometimes a schedule of several repayments is stipulated. The note also stipulates the nature of supporting collateral if there is any, and any other terms and conditions that may have been agreed upon.

When the agreement is signed, the bank generally credits the amount borrowed directly into the borrowing firm's checking account.

Line of Credit

A **line of credit** is an informal, **revocable borrowing limit** offered by banks.

A **line of credit** is a relatively informal, nonbinding agreement between the bank and the borrowing firm that specifies the maximum amount that can be borrowed during a particular period, usually a year.

For example, a firm with a $100,000 line of credit could have up to five $20,000 promissory notes outstanding at any time during a year. However, because the agreement is nonbinding, the bank could reduce the line at any time. For example, it could decide that the firm's condition had deteriorated somewhat after $80,000 had been advanced, and refuse to make the last loan. It could not, however, shorten the term of any note that had already been signed. An amount borrowed under a line of credit is said to *take down* the line by that amount.

Under a line of credit agreement, the borrower pays interest only on the amounts actually borrowed.

Credit lines are generally *unsecured*, meaning the loans are not backed by specific assets and the bank relies only on the general creditworthiness of the borrower for repayment.

REVOLVING CREDIT AGREEMENT

A **revolving credit agreement** is an **irrevocable** borrowing limit requiring a **commitment fee** on the unused amount.

A **revolving credit agreement** is similar to a line of credit except that the bank guarantees the availability of funds up to a maximum amount during the specified period. In other words, a *revolver* is essentially a *binding* line of credit. It is also generally unsecured.

The bank's commitment to advance funds up to a maximum in a revolver isn't free. The borrower is required to pay a **commitment fee** on the unborrowed balance of the agreement whether it's used or not. Commitment fees are in the neighborhood of one quarter of 1% per year.

5. A *commercial* bank specializes in serving businesses rather than individuals. Although commercial banks do make longer-term loans, about two-thirds of their lending activity entails maturities of less than a year.

6. A secured loan is backed by a specific asset. If the borrower defaults, the bank gets the asset, which it can sell to repay the debt.

The interest rates on revolving credit agreements are generally variable. They're usually specified relative to the bank's **prime rate**, which is the rate it charges its largest and most creditworthy corporate customers. Most banks follow the lead of the major New York banks in setting their prime rates. The interest rate on a smaller firm's revolving debt is likely to be stated as prime plus 2 or 3%.

Example 16.1

The Arcturus Company has a $10-million revolving credit agreement with its bank at prime plus 2.5% based on a calendar year. Prior to the month of June, it had taken down $4 million that was outstanding for the entire month. On June 15, it took down another $2 million (assume the funds were available on June 16). Prime is 9.5% and the bank's commitment fee is .25% annually. What bank charges will Arcturus incur for the month of June?

SOLUTION: Arcturus's payment will consist of the interest on money actually borrowed and the commitment fee for the unused balance of its revolving credit agreement. Its monthly interest rate is

$$(\text{prime} + 2.5\%)/12 = (9.5\% + 2.5\%)/12 = 1\%$$

and the monthly commitment fee is

$$.25\%/12 = .0208\%$$

In June a loan of $4 million was outstanding for the entire month and an additional $2 million was outstanding for 15 days. Hence, the interest charge is

$$(\$4{,}000{,}000 \times .01) + \left(\$2{,}000{,}000 \times .01 \times \frac{15}{30}\right) = \$50{,}000$$

The unused balance of the revolver was $6 million for 15 days and $4 million for 15 days for an average of $5 million. The commitment fee is then

$$\$5{,}000{,}000 \times .000208 = \$1{,}040$$

Thus, the total interest payment is $51,040.

Compensating Balances

http://

Information about banking services from the American Savings Education Council can be found at **http://www.choosetosave.org/asec**

Short-term bank loans often come with a feature that seems outrageously unfair to the borrower, but is actually just a roundabout way of compensating the bank for its services. A **compensating balance** is a minimum percentage of the loan amount that has to be left in the borrower's account and is therefore unavailable for use.

For example, if a firm borrows $100,000 subject to a 20% compensating balance, the bank will deposit $100,000 in the company's account, but only $80,000 can be drawn out and used.

Compensating balances increase the effective interest rate on the loan. Suppose the rate in our example was 12%. That would mean the borrower would pay 12% of $100,000 in interest, but would have actually borrowed only $80,000. In a year, that means the interest would be

$$\frac{\$12{,}000}{\$80{,}000} = 15\%$$

A **compensating balance** requires leaving a **portion of the loan on deposit** raising the effective interest rate.

There are two kinds of compensating balance. One is the *minimum balance requirement* we've just described. The other is an *average balance requirement*, which may not have as severe an effect. In this arrangement the average daily balance over a month cannot fall below a specified level. That means the entire loan can be used, but not all the time.

Firms typically maintain positive cash balances in their checking accounts most of the time anyway, so an average balance requirement may not present much of a problem. If that's the case, the effective interest rate on the loan isn't necessarily raised by very much.

Compensating balances are typically between 10% and 20% of amounts loaned.

Example 16.2 What is the effective interest rate on a $50,000 loan at 9% for 90 days if a 15% minimum compensating balance requirement is imposed? What is the effective rate if a 15% average compensating balance is required?

SOLUTION: First note that we don't need the loan amount or the term to solve the problem. We can adjust the nominal interest rate directly by dividing by 1 minus the minimum compensating balance requirement stated in decimal form. In this case, the calculation is

$$\text{effective rate} = \frac{9\%}{(1 - .15)} = \frac{9\%}{.85} = 10.6\%$$

There isn't an answer to the second question because we can't say by how much the average balance requirement will reduce the borrower's use of the money without knowing what the firm's average balances would have been anyway.

Clean-Up Requirements

Most banks require that borrowers **clean up** short-term loans once a year.

Theoretically, a firm can maintain a balance of short-term debt all the time by borrowing on a new note to pay off each old one as it comes due. Doing that makes it possible to fund long-term projects with short-term money, refinancing the debt again and again throughout the life of the project.

This procedure is rather risky for two reasons. If short-term rates rise, interest expense can increase quickly, putting a strain on the firm's profitability. Worse, if refinancing funds become unavailable, a default on the short-term notes is likely as they come due.

This kind of risk for a borrowing company is also risk for the bank, because a defaulted customer is likely to mean a lending loss. Therefore, banks try to keep customers from falling into the trap of using short-term funds to support long-term projects.

The banks' approach is the clean-up requirement. They simply require that borrowers pay off all unsecured short-term debt periodically and remain out of debt for a specified period. Most clean-up requirements stipulate that borrowers be out of short-term debt for 30 to 45 days once a year.

Commercial paper is **short-term borrowing** done by the largest corporations.

COMMERCIAL PAPER

Commercial paper refers to notes issued by large, strong companies to borrow money from investors for relatively short periods. The paper itself is simply a promise to repay the money borrowed at a given date. Conceptually, commercial paper is

simply a very short-term corporate bond, but there are a number of administrative differences.

Buyers and Sellers

Commercial paper is *unsecured* debt issued by a limited number of the nation's largest and strongest companies. It tends to be purchased by other large organizations that have excess funds to invest for short periods. Typically buyers are insurance companies, money market mutual funds, banks, and pension funds. The notes are generally placed with buyers by dealers for a fee.

Maturity and Terms

Commercial paper is actually a debt security of the issuing corporation. However, it can be sold without SEC registration as long as its maturity is under 270 days and the buyers are "sophisticated" investors. Maturities generally range from one to nine months, averaging five or six.

Commercial paper is considered a very safe investment because of its short maturity and the strength of the borrowing organizations. It therefore pays a relatively low interest rate, typically about a half point above the three-month treasury bill rate. Rather than bearing interest, the notes are generally discounted like treasury bills. That means the interest is taken out of the price when the note is sold. For example, a six-month, $1 million note paying an annual rate of 6% would sell for approximately ($1M/1.03 =) $970,874.

Commercial paper has one drawback even for the large, strong companies that issue it. The commercial paper market is very rigid and formal. If a company is a little short of cash when a note is due, there's no flexibility in repayment terms. Banks, on the other hand, are generally willing to bend a little to accommodate to business ups and downs.

SHORT-TERM CREDIT SECURED BY CURRENT ASSETS

Several **short-term financing** arrangements are available in which the **debt is secured by the current asset financed**.

Several common arrangements enable firms to borrow to fund working capital using the value of the current assets themselves to guarantee the loan. The assets that provide such credit security are accounts receivable and inventories. The funding sources are often banks, but can also be other financial institutions.

Borrowing against receivables and inventories tends to be more popular in some industries than in others. It's especially common in seasonal businesses where temporary working capital needs are substantial.

The commitments, rules, and procedures vary considerably between different arrangements. We'll consider receivables financing first and then inventory financing.

Receivables Financing

Under normal circumstances, accounts receivable represent cash that is to be received in the near future. Lending institutions are generally willing to recognize the value of this about-to-be-received money, and will extend credit backed by that value where they otherwise would not. A key lending issue is the collectibility of the receivables, which relates to the creditworthiness of the firm's customers rather than to its own creditworthiness. Two receivables arrangements are common, pledging and factoring.

A borrowing firm can **pledge receivables** by agreeing to use the **cash collected** only to **pay off** the loan.

Pledging Accounts Receivable

Pledging receivables involves using their cash value as collateral for a loan. The borrower signs a binding agreement stating that the money collected from pledged receivables will be used to satisfy the loan.

The distinguishing feature of the arrangement is that the receivables continue to belong to the borrowing firm, which receives the cash directly from its customers as it would in the absence of the pledging agreement. In fact, the company's customers are generally unaware that their obligations have been pledged.

Uncollectible accounts remain the **responsibility of the borrower** if the pledging agreement is **with recourse**.

Under a pledging arrangement, if a particular receivable proves uncollectible, the borrowing firm is not relieved of its obligation to the lender. This feature is known as **recourse**. The lender is said *to have recourse* to the borrowing firm for the value of a defaulted receivable.

Pledging can be accomplished in two ways with respect to the receivables offered as security. A lender can provide a *general line of credit* tied to all of the firm's receivables without reviewing individual accounts in detail. In such a case, the lender is unlikely to advance much more than 75% of the receivables balance because of the risk that some accounts may not pay.

In the other approach, the lender reviews each receivable individually, considering the creditworthiness of the customer owing the money. Then funds are advanced only on the basis of acceptable accounts. In this approach, the lender is likely to advance as much as 90% of the balance of accounts accepted.

Under a straight pledging of receivables, the borrowing company continues to do all of its own credit and collection functions. Hence, the lender is relying on the borrower to a great extent for the quality of the assets securing the loan. Some banks offer billing and collection services that the borrower can use for an additional fee.

Pledging receivables is a relatively expensive form of financing. Financing sources generally charge interest at rates 2% to 5% over prime plus an administrative fee of another 1% or 2% of the face value of all the receivables pledged.

Example 16.3

The Kilraine Quilt Company has an average receivables balance of $100,000 that turns over once every 45 days. It generally pledges all of its receivables to the Kirkpatrick County Cooperative Finance Company, which advances 75% of the total at 4% over prime plus a 1.5% administrative fee. If prime is 8%, what total interest rate is Kilraine effectively paying for its receivables financing?

SOLUTION: Because the finance company advances 75% of the receivables balance, the average loan outstanding is $75,000. Traditional interest of (8% + 4% =) 12% is charged on this amount.

The administrative fee is 1.5% of all new receivables. The $100,000 balance turns over every 45 days or (360/45 =) eight times a year. That means ($100,000 × 8 =) $800,000 in new receivables is pledged each year. The administrative fee is 1.5% of this total, or ($800,000 × .015 =) $12,000, which can be stated as a percentage of the average loan balance,

$$\frac{\$12{,}000}{\$75{,}000} = 16\%$$

Hence, the total financing cost including traditional interest and administration is

$$12\% + 16\% = 28\%$$

a high rate indeed.

Factoring Receivables

Factoring differs from the kinds of short-term financing we've considered so far because it doesn't involve borrowing. **Factoring receivables** means *selling them at a*

discount to a financial organization called a *factor*, which can be a commercial bank or a finance company.[7] The cash from the sale of the receivable provides financing to the selling company.

Factoring means **selling receivables** to a finance company, which then becomes responsible for collection.

When a receivable is factored, the factor takes possession of the obligation and generally becomes responsible for its collection. In most cases, the customer owing the money is notified to make payment directly to the factor rather than to the selling company. The factor covers its expenses and makes a profit from the difference between the face value of the receivable and what it pays the selling company. This can be in the neighborhood of 10%, depending on the services provided.

Factors generally review the credit standing of the customers whose receivables they buy, and don't accept everything offered by the selling firm. Rejected accounts have to be handled by the selling firm on its own.

Companies that factor their receivables generally do so continually. That means a routine procedure is set up under which incoming orders are submitted directly to the factor and funded on an ongoing basis.

The procedures just described are the basic factoring function. In practice, factors offer a wide range of services with respect to receivables. They are willing to virtually take over a firm's credit and collection function. However, it isn't necessary to use everything they offer. Firms can select from a menu of services and tailor an arrangement to suit their needs.

The companies that use the other services offered by factors do so because it can save them money. It can be cheaper to hire an expert to do a specialized administrative function than to gear up and do it yourself. This is especially true for smaller firms.

In general, a factor is willing to do any or all of the following things for the appropriate fees.

1. Perform credit checks on potential customers.
2. Advance cash on accounts it accepts or remit cash after collection.
3. Collect cash from customers.
4. Assume the bad-debt risk when customers don't pay.

Item 2 requires a little explanation. Cash advances can be done in either of two ways. The factor can pay the selling firm for a receivable when it's sold or when the underlying cash is collected from the customer. If payment is made when the receivable is taken over, the factor is out the cash until it collects from the customer. Its fee therefore includes interest despite the fact that the receivable has been purchased and there really isn't a loan outstanding.

If payment to the selling firm is delayed until cash is received from the customer, the factor doesn't charge any interest. Notice that in this arrangement the factor isn't really *financing* the receivable—it's just administering collections.

If the selling firm chooses not to pass the bad-debt risk to the factor, we say the factoring arrangement is done with recourse. In that case, bad debts are charged back to the seller. Of course, factors charge substantially more when there's no recourse to the selling firm.

7. The word "customer" can be a little confusing with respect to factoring. The company selling its receivables has customers, and is at the same time the customer of the factor. We'll use the word to mean the customer of the firm selling the receivable. That's the party actually owing the money that gives the receivable value. We'll call the firm selling the receivable the selling firm.

Inventory Financing

Inventory financing uses a firm's inventory as security for short-term loans. The method is popular, but is subject to a number of problems that can make it expensive and difficult to administer.

Financing **secured by inventory** is difficult because specialized or perishable items are **hard to sell**.

A basic problem is the marketability of the inventory in the hands of a lender. Unlike receivables, inventory doesn't turn to cash by itself. It has to be sold, and lenders aren't generally equipped to do that well. That means they have to dispose of defaulted inventory at bargain prices, which reduces the amount they can lend on it.

In particular, specialized inventories such as unique or unusual parts have little collateral value because they're difficult for a lender to sell. Perishable goods have a similar problem in that their value is lost by the time a lender can take possession. Other commodity-type inventories are quite marketable and make good loan collateral. Canned foods are a good example.

If an inventory does have an acceptable collateral value, its availability in the event of a default must somehow be guaranteed to the lender. This is difficult, because the borrowing firm is continuously using and replacing inventory in running its business. Several methods that involve varying amounts of administrative attention and cost are used.

Blanket Liens[8]

A blanket lien gives the lender a lien against all inventories held by the borrower. However, the borrower remains in complete physical control of the inventory, and can draw it down to any level without consulting the lender.

For example, suppose a firm borrows $600,000 collateralized by a blanket lien on an inventory of $1 million verified by a bank representative on the date the loan is disbursed. As long as the lender does not inspect the operating facility, nothing prevents the borrower from suspending inventory purchases while continuing to sell the existing stock until its level has reached, say, $200,000. This can easily put the lender in an unsecured position unless it spends an inordinate amount of time and effort monitoring the borrower's activities.

Trust Receipt or Chattel Mortgage Agreement

In this arrangement, financed inventory is identified by serial number and cannot be sold legally without the lender's permission. When the items are sold, the proceeds must be used to repay the lender. The arrangement is legally binding, but the borrower is still in control of the inventory and might sell it without paying the lender. Guaranteeing that the borrower is in compliance requires inspection by representatives of the lender.

Warehousing

Warehousing companies control secured inventories for the **benefit of lenders**.

Under a **warehousing** arrangement, financed inventory is placed in a warehouse and the borrower's access to it is controlled by a third party. When the borrower draws a piece of inventory, paperwork is created that signals the lender to look for repayment of the money lent to finance that inventory. *Warehousing companies* specialize in administering such arrangements.

There are two kinds of warehousing arrangements. A *field warehouse* is a secured area within the borrower's own facility that's accessible only to employees of the warehousing firm. A floor-to-ceiling chain-link fence can be built to segregate open

8. A lien is a legal money claim attached to specific property. The proceeds of the sale of the property must be used to satisfy the lien.

factory space for the purpose. Employees of the warehousing firm make themselves available during designated hours each week.

A *public warehouse* is operated by the warehousing firm at a site physically removed from the borrower's facility. This arrangement provides the lender maximum security because the material is completely out of the borrower's control.

Warehousing gives lenders excellent security, but tends to be expensive because of the administrative cost of operating the warehouse and tracking individual inventory items.

CASH MANAGEMENT

Although good cash management can improve financial results, it isn't likely to make a weak business strong. Bad cash management, on the other hand, can make a strong company weak to the point of failure. Especially among small firms, it isn't uncommon for companies to be simultaneously profitable and bankrupt. In other words, a firm that doesn't have the cash to pay its bills and meet its payroll goes out of business, regardless of how good its long-term prospects are. For that reason, it pays to understand how cash oils the gears of business and how firms can get the most out of it.

DEFINITIONS AND OBJECTIVES

A firm's *cash* is the money it has on hand in currency and in bank *checking accounts*.[9] The overwhelming bulk of business cash is in checking accounts, because very little commercial activity is transacted in currency.

The Motivation for Holding Cash

Firms have to have cash on hand for three economic and one administrative reason. The economic reasons are transactions demand, precautionary demand, and speculative demand. The administrative reason for holding cash has to do with compensating banks for the services they perform.

Transactions Demand

Firms need money in the bank to pay bills for the goods and services they use. Payments are made to employees, vendors, utility companies, and taxing authorities, to name just a few. At the same time, most receipts come in the form of checks that are deposited in the bank. The constant flow of money in and out of the bank gives rise to an average account balance that we associate with transactions.

Firms **hold cash** to make **transactions**, as a **precaution**, for **speculative** opportunities, and to maintain **compensating balances**.

If firms had perfect knowledge of when cash would come in and when it should go out, transactions balances could be kept very low. However, we don't generally have such knowledge, especially with respect to receipts. It's therefore necessary to keep the balance high enough to support routine operations. It's especially important to have enough cash on hand to take advantage of prompt payment discounts offered by vendors.

Precautionary Demand

Sometimes emergencies arise with little warning. For example, suppose a shipment intended for a demanding customer is accidentally damaged on the loading dock, and

9. A bank checking account is known more formally as a demand deposit. The bank pays money out of the account to third parties on the basis of checks that represent demands of the account owner. In the normal course of business, when buyers and sellers know each other well, checks are accepted as readily as currency. Therefore, the money available in the economy is defined to include checking account balances. The financial definition of cash follows the same principle.

a new shipment has to be produced immediately. That could require extra labor at overtime rates and the quick acquisition of new raw materials. Firms keep cash on hand to pay for such emergency needs.

Speculative Demand

Firms also keep cash available to take advantage of unexpected opportunities. For example, suppose the price of a particular input drops suddenly, but is expected to go up again quickly. If cash is available, a bargain can be had; if not, it has to be passed up. Firms keep money on hand to take advantage of such opportunities.

Compensating Balances

Banks stay in business by investing the money individuals and companies deposit with them for a return. It is therefore customary for banks to require that depositors receiving certain services maintain minimum *compensating balances* to partially offset the cost of those services. This arrangement is equivalent to charging fees for services. We've already discussed the compensating balances associated with loans. Banks also require them for cashing checks and conducting a variety of transactions.

The four reasons for holding cash aren't entirely additive. Money available for transactions also provides some speculative and precautionary capability, and certainly contributes to meeting compensating balance requirements.

The Objective of Cash Management

The problem with cash in the bank is that it generally doesn't earn a return. Banks don't pay interest on the balances in most commercial checking accounts.[10] That means companies have to devote a certain amount of their financial resources to maintaining cash in the bank, but receive little or no return on those resources. For this reason, it's desirable to operate with as little cash as possible.

Good **cash management** implies maintaining adequate **liquidity** with **minimum cash** in the bank.

At the same time, it's clearly easier to run a business with more cash than with less. A firm with a substantial bank balance will never be embarrassed by running out of money. This is described as *liquidity*. An adequately liquid firm will always be able to pay its bills on time, take the appropriate discounts, and take emergencies and opportunities in stride.

Cash management involves striking a balance between these conflicting objectives. Good cash management minimizes the amount of cash in the bank, but at the same time ensures enough is available to operate efficiently. We'll see shortly that there are several relatively standard techniques for doing that.

MARKETABLE SECURITIES

Notice that the precautionary and speculative motives call for having cash on hand that isn't used very often. These demands can be largely satisfied by assets that are only slightly less liquid than cash but do earn a return.

For example, suppose a firm invests some of its cash in short-term treasury bills, and then has an emergency need for funds. Because there's a ready market for government

10. Banks are largely prohibited from offering interest-bearing checking accounts to businesses despite the fact that such accounts are available to consumers. Under current law interest-bearing business checking is available only to nonprofit organizations, sole proprietors, government entities, lawyers, and certain trusts and estates. the laws involved were enacted during the Depression in the 1930s and serve no real purpose today. A movement to change those laws has existed for some time, but Congress has as yet not seen fit to do so. In any event, the issue isn't as important as it might seem. that's because rates banks pay on the business interest checking accounts that do exist are extremely small (usually less than 1%) and the accounts often carry higher fees than non-interest-bearing accounts.

Marketable securities are **liquid** investments that can be held **instead of cash** and earn a **modest return**.

debt, the securities can be sold within a day and the proceeds used to satisfy the emergency need. In the meantime, the treasury bills pay a modest return on the funds invested. This compromise is known as investing in *marketable securities*. It sacrifices a little liquidity for a modest but significant return.

Marketable securities are short-term obligations of very strong organizations, including treasury bills and commercial paper. The fact that the securities are short term is important. That insulates them from changes in value due to interest rate fluctuations. The word "marketable" implies that the issues can be sold quickly. Marketable securities are also referred to as *near cash* or *cash equivalents*.

Investing excess cash in marketable securities is a specialized function carried out within the treasury departments of larger firms. People who work in the area develop considerable expertise about the pros and cons of the various investment vehicles available. We won't delve into the operating details here, but the concept of marketable securities and the fact that most large companies invest in them regularly are very important.

CHECK DISBURSEMENT AND COLLECTION PROCEDURES

The amount of cash companies need is directly related to the method by which the *financial system* gets money from a paying organization (the *payer*) to the receiving party (the *payee*). Understanding the rudiments of this system is key to understanding cash management.

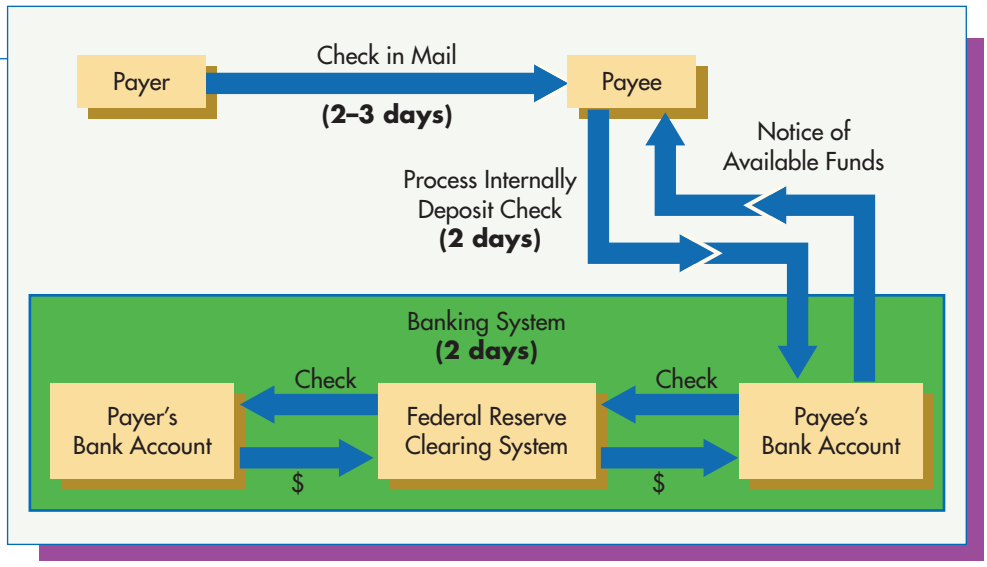
The Basic Procedure for Transferring Cash

Let's look at the routine procedure through which one party pays another with a check through the banking system. The procedure is written out below and portrayed graphically in Figure 16.5. In both, typical elapsed time requirements are indicated in parentheses near each step.

1. The payer writes a check on its bank and mails it to the payee. (2–3 days)
2. The payee receives the check, records it, and processes it internally for deposit.

Figure 16.5

The Check-Clearing Process



3. The payee then deposits the check in its own bank. (2 days—items 2 and 3)
4. The payee's bank sends the check into the Federal Reserve's interbank *clearing system* at a Federal Reserve office.
5. The clearing system processes the check. This transfers money from the payer's account at its bank into the payee's account at its bank. The funds are now available for the payee's use. The canceled check or a facsimile is returned to the payer through its bank. (2 days—items 4 and 5)

Float is money **tied** up in the **check-clearing process**.

It's important to pay particular attention to the length of time taken by each step. Money tied up in the process is called **float**. During the time checks are in the mail they're part of *mail float*, when they're being processed at the payee's office they're in *processing float*, and when they're in the Federal Reserve system they're in *transit float*. Collectively, the money in the entire process is called *check-cashing float* or just *float*.

Notice that there are two important geographic variables in the process we've described. The farther the payer is located from the payee, the longer will be the mail float. And if the payee's bank is far from a Federal Reserve office, extra time may be required to get checks into the clearing system. We'll return to these factors later.

Objectives in Managing Use of the Check-Clearing Process

The check-clearing process normally takes six or seven days. During that time the payee doesn't have the use of the cash even though the payer has written and mailed the check. In fact, funds remain in a payer's account balance and are technically usable until the check clears through the banking system.

Payees are interested in **speeding** the check-clearing process, while **payers** want to **slow** it down.

This leads to two important cash management ideas. First, from the perspective of a payee receiving money, speeding up the collection of checks *after they've been mailed* gets the cash in faster. Second, from the perspective of a payer sending money to someone else, slowing down the payment of checks *after they've been mailed* gives a company use of its cash longer.

All companies are simultaneously payers and payees, so any firm can use both ideas to reduce the funds that need to be committed to cash balances.

ACCELERATING CASH RECEIPTS

In this section, we'll take the point of view of the payee, the party receiving money, and examine approaches to accelerating the receipt of cash.

Lock Box Systems

http://

The Bank of Western Massachusetts offers a number of business banking services including lock boxes and electronic funds transfers. Visit **http://www.bankwmass.com** *for more information.*

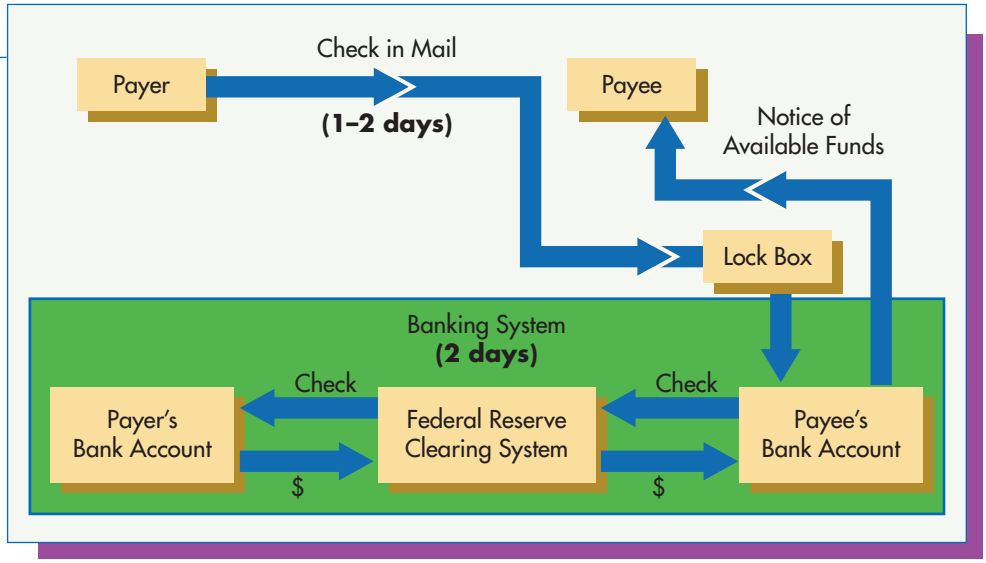
Lock box systems are services provided by banks to accelerate the collection of cash once a check has been mailed to a payee. The idea behind the system is very simple.

Notice that in Figure 16.5 the first step of the payment process involves the payer mailing a check, which is processed and deposited by the payee in the second step. Together, these steps take four to five days. A lock box system reduces this float period by moving the check directly from the payer to the bank, eliminating the stop at the payee's office.

In a lock box system, the payee rents a post office box near its bank. It then orders payers to mail their checks to the post office box rather than to its own headquarters. The bank opens the box several times a day, collects the checks received, and deposits them in the payee's account. This cuts an average of two or three days out of the whole process. The idea is illustrated in Figure 16.6.

Figure 16.6

A Lock Box System in the Check-Clearing Process



INSIGHTS

REAL **APPLICATIONS**

Technology Is Speeding Up the Check Clearing Process: "Check 21," the Check Clearing for the 21st Century Act

Technology and the banking system are poised to take big chunks of time and effort out of the check clearing process. Until recently paper checks entering the bank clearing system had to be physically shipped around the country between banks in a laborious, time-consuming process. Most of the shipping is done by plane, which takes a lot of flights, since approximately 40 billion checks are processed by the banking system each year.

But that's likely to change over the next few years due to the passage of the Check Clearing for the 21st Century Act, known as "Check 21" for short. The Act was passed on October 28, 2003, and became effective a year later.

Basically, the Act allows the banking system to engage in "check truncation." That means at some point in the clearing process a bank can put the information on a check into electronic form and destroy the paper check. From then on the check can be transferred electronically rather than being dragged across the country by air. The process also allows for the creation of a paper "substitute check" if a written copy is necessary somewhere in the system later on. Substitute checks are legally as good as the originals they represent.

The transition to electronics won't happen overnight, because all banks aren't required to use or accept electronic transmissions at this time. They can insist on paper substitute checks if they don't have the technology or the desire to go the electronic route.

Sources: http://www.federalreserve.gov/paymentsystems/truncation; Robin Sidel, Banks, Customers Adapt to Paperless Check Processing, *The Wall Street Journal*, October 28, 2004, B1; http://www.federalreserve.gov/boarddocs/testimony/2003/20030403/default.htm#f1

Lock boxes are located near customers and **shorten mail** and **processing float**.

After the bank deposits the checks, copies are sent to the payee's office. Its internal processing is based on those copies after the deposit has been made and the clearing process has begun.

Fine-Tuning the Lock Box System

Two geographic details can make lock boxes especially effective. Suppose a payer is on the West Coast and the payee and its primary bank are on the East Coast. That means the payer's checks have to make a time-consuming trip across the country before they're received.

The payee can accelerate the process by establishing a lock box at a bank on the West Coast, thus eliminating much of the mail float. When funds clear into the West Coast bank, they're electronically transferred to the payee's primary bank on the East Coast.

The payee can also speed things up by choosing banks that are close to Federal Reserve branches. That minimizes the time required to get checks from the bank into the central clearing system.

Big companies that receive payments from all over the country maintain lock boxes in all the areas in which their customers are concentrated.

Concentration Banking

Concentration banks sweep excess balances in **distant depository** accounts into **central locations** daily.

Large companies often have a great many *depository*[11] bank accounts spread around the country. This is a result of the multiple lock box systems we described in the last section. It also happens when firms have widespread retail outlets, because each store has to deposit its receipts in a local bank every day.

Holding cash in a number of small accounts tends to be administratively inefficient because of duplicated effort and lack of central control. It also makes it difficult to invest in marketable securities, which tend to be traded in large sums. When cash is separated into a number of small bundles under the control of local divisions, no one has enough to take advantage of short-term investment opportunities.

Concentration banking is a system in which a single *concentration bank* manages the balances in remote accounts to target levels, and *sweeps* excess cash into its own central location. Special documents called *depository transfer checks* are used to move funds from one bank to another within a concentration network. Funds can also be moved electronically.

Wire Transfers

Wire transfers move money electronically.

The fastest way of moving money from one bank to another is an electronic wire transfer. Two wire transfer networks are in use by banks. The Federal Reserve Wire Network (Fedwire) is available to member banks and their correspondents. Bank Wire is a private network supporting a large number of banks.

Wire transfer is quick and secure, but the fees involved make it too expensive for regular use with small sums.

Preauthorized Checks

When there's a very good working relationship between a payer and a payee, preauthorized checks can eliminate mail float entirely. In this arrangement the payer, a customer, gives the payee, a vendor, a number of signed check-like documents in

11. A large company's working bank accounts are usually of two kinds for administrative purposes. The depository account receives incoming cash, while outgoing checks are written on the disbursing account.

advance. When the vendor (payee) ships product to the customer (payer), it simply deposits a preauthorized check in its bank account. Clearly this arrangement requires a certain amount of trust on the part of the payer.

MANAGING CASH OUTFLOW

We'll look at managing outflows briefly from the perspective of the payer. There are two goals, maintaining control of disbursements and slowing checks in the clearing process.

Control Issues

Most large companies are decentralized, meaning they have operating divisions in locations remote from headquarters. There are benefits to central control of cash, but there are also benefits associated with decentralized control.

In large companies, most agreements with customers and vendors are made at the division level. Because cash payments are a key element in the process of managing such agreements, it makes sense to place disbursing authority in the hands of division management. However, that results in at least one disbursing account at every division, which in turn leads to an undesirable distribution of cash balances around the country.

Zero Balance Accounts (ZBAs)

Zero balance accounts solve this control problem. They are empty disbursement accounts established at the firm's concentration bank for its various divisions. Divisions write checks on their ZBAs that are automatically funded as they're presented for payment. The funds come out of a master account at the concentration bank. In essence, ZBAs are subdivisions of the master account. Although the ZBA never has a positive balance, it has a number and receives statements that enable the division to use it to manage its business just like any other checking account.

Remote Disbursing

Payers sometimes **disburse** checks from **remote banks** to lengthen float and **slow** cash outflow.

Look back at Figures 16.5 and 16.6 and take the perspective of the payer. Payers would like to slow the check-collection processes and expand float as much as possible to prolong the time cash remains in their bank accounts.

Remote disbursing is a way to keep checks in the bank clearing system. If a check is written on a bank in a distant city or in a small city that isn't the site of a Federal Reserve branch, it will take a day or two longer to leave the bank and get back to it. This delay has the effect of increasing transit float, keeping money in the payer's account longer. For this reason, it isn't uncommon for checks from large companies located in big cities to be drawn on small banks in out-of-the-way places.

EVALUATING THE COST OF CASH MANAGEMENT SERVICES

To be **effective**, a **cash management** system must lower balances enough to **save more** in interest than it **costs**.

Cash management, especially acceleration of receipts, can reduce the financial resources firms have tied up in their cash accounts. The general implication is that a firm can borrow less money by the amount of the reduction in its cash balance, and pay commensurately less interest. This saving has to be measured against the cost of the cash management system to see if it's worthwhile. The calculations are relatively straightforward.

Example 16.4

Kelso Systems Inc. operates primarily on the East Coast, but has a cluster of customers in California that remit about 5,000 checks a year. The average check is for $1,000. West Coast checks currently take an average of eight days from the time they're mailed by customers to clear into Kelso's East Coast account. A California bank has offered Kelso a lock box system for $2,000 a year plus $.20 per check. The system can be expected to reduce the clearing time to six days. Is the bank's proposal a good deal for Kelso if it borrows at 12%?

SOLUTION: The checks represent revenue of $5 million per year. The average amount of West Coast revenue tied up in cash is

$$\frac{8}{365} \times \$5{,}000{,}000 = \$109{,}589$$

The proposal will reduce this to

$$\frac{6}{365} \times \$5{,}000{,}000 = \$82{,}192$$

The difference, $27,397, is the amount of cash freed by the lock box system. If Kelso installs the system, it should be able to borrow an average of this much less money all the time. The interest savings at 12% is

$$\$27{,}397 \times .12 = \$3{,}288$$

However, the cost of the system is the annual fee plus the per-check charge.

$$\$2{,}000 + \$.20(5{,}000) = \$3{,}000$$

Hence, the bank's proposal is only marginally worth doing.

INSIGHTS

ETHICS

Ethical Cash Management

Is remote disbursing ethical? Is it in general right to take advantage of mail float to keep cash longer? Isn't the payer who uses the practice essentially stealing a little interest from the recipient on each check?

Is the situation more sensitive to ethical issues if the payer is a financial institution with a "fiduciary" duty to the payee client? A fiduciary relationship is one of trust and confidence in which one party relies on the professional integrity of the other. It usually exists between certain professionals and their clients where money is involved. Banks, brokers, accountants, and lawyers may be fiduciaries.

In other words, is it less appropriate to take advantage of the other party in a transaction when that party is trusting you to look after his or her interests? Most people would say that it is.

Courts have held that remote disbursing is indeed a violation of the trust implied in relationships between parties, like stockbrokers and clients, and have disallowed the practice in that context. In that way the courts have made something unethical also illegal.

Cash management systems are subject to significant economies of scale, so larger companies benefit more clearly from having sophisticated systems than do smaller firms.

MANAGING ACCOUNTS RECEIVABLE

A firm's accounts receivable represent the obligations of customers for future payments that arise when sales are made on credit. The management of receivables is a relatively unique function in finance in that it involves an interface with customers, something usually reserved for the sales department.

OBJECTIVES AND POLICY

Higher **receivables** improve **sales and customer relations**, but lead to more **bad debts** and **interest expense**.

In general, companies like to operate with as little tied up in receivables as possible. There are basically two reasons for that preference. First, carrying fewer receivables minimizes the interest cost of supporting the receivable asset. Second, it minimizes bad debt losses because whenever money is owed, there's a chance that it will never be collected.

There are trade-offs, however. For several reasons we'll point out shortly, a higher level of receivables generally increases sales and leads to better customer relations.

Managing accounts receivable means striking a balance between these effects. As receivables increase, sales tend to go up, which increases profit. At the same time, interest cost and collection losses increase, which depresses profit.

It's important to notice that the focus of the trade-off is at the EBT level. Managing receivables means finding the point at which *profitability* is maximized as a result of the opposing forces, not the point at which sales are maximized.

The things firms do to influence profitability through receivables management are collectively called *receivables policy* or *credit and collections policy*. Three broad issues are involved.

Receivables policy involves **credit** standards, **terms**, and **collection** procedures.

1. *Credit policy:* How financially strong must a customer be for the firm to sell to it on credit?
2. What *terms of sale* (due dates and discounts) should be offered to credit customers?
3. *Collections policy:* How should customers whose bills aren't paid on time be handled?

Who Is Responsible for Receivables Policy?

Although receivables policy is under the control of financial management in most companies, it has a major effect on sales. Therefore, most policy decisions are joint efforts between financial and sales/marketing management. As a practical matter, it's not unusual for this shared area of responsibility to create quite a bit of conflict between the two organizations. We'll understand why this happens as we go along.

DETERMINANTS OF THE RECEIVABLES BALANCE

The size of a firm's receivables balance is determined primarily by the level of its credit sales. The more it sells for cash, the smaller will be its receivables and the fewer associated problems it will have. It is axiomatic that everyone prefers to sell for cash when they can. However, industrial custom doesn't permit many interbusiness cash sales, and receivables are about 25% of total assets for most firms.[12]

12. The custom is reversed in consumer markets where retailers usually demand cash at the time of sale, either from the customer or from a credit card company.

Credit Policy

Credit policy is the most important decision variable available for influencing the level of receivables. It determines the customers to which a company is willing to make credit sales.

Most firms have *credit departments* staffed by credit specialists. When an order is received from a new customer, or an old customer wants to buy more on credit than it has previously, the credit department has the responsibility of approving or disapproving the request.

To make its decision, the department investigates the creditworthiness of the customer by using a number of information sources. These sources include the reports of *credit agencies* (also called *credit bureaus*), the customer's own financial statements, bank references, and the customer's reputation among other vendors.

The primary source of information is usually the report of a credit agency, an organization that keeps files on the financial condition and bill-paying records of vast numbers of companies. For a fee, the credit agency will provide a vendor with a report on any customer or potential customer.

A company's credit policy revolves around how good a risk a customer has to be before it will be extended credit. A typical policy might require that a customer

- be in business at least three years,
- have a net worth of three times the amount of credit requested,
- have a current ratio of 2.5:1 or higher, and
- have no adverse comments on its credit report from other vendors.

If the conditions aren't met, the firm will sell to the customer only on a cash basis.

It's important to understand that customers whose credit applications are disapproved generally do not buy from the firm. They either can't because they don't have the cash, or they can find another vendor with a more liberal policy.

Hence, a *tighter* credit policy, meaning higher-quality requirements for credit customers, generally has the effect of reducing sales. On the other hand, a *looser* credit policy accepts lower-quality customers and increases sales. However, some of the incremental customers brought in by a looser policy generally prove unable or unwilling to pay their bills. The result is a *credit loss* (also called a *bad debt loss*) of the value of their receivables. The frequency of bad debt losses tends to increase substantially as credit policy is relaxed.

Clearly, setting credit policy requires striking a balance between these effects. We want to find the policy that maximizes *profit*. Unfortunately, there's no formula for doing this; it's a matter of judgment and experience.

http://

Visit Dun and Bradstreet (D&B), a major credit agency, at **http://www.dnb.com/** *Select a company at the upper right of the homepage and check out the kinds of business and credit reports that are available for a fee.*

A firm's **credit policy** is a statement of the **minimum customer quality** it will accept for **credit sales**.

The Conflict with Sales Over Credit Policy

There are often **conflicts** between the **sales** and **credit** departments.

The job of the sales department is generally to sell as much product as it can. When salespeople's compensation is based on commissions, the task becomes a very personal challenge. The philosophy in most companies is that the salesperson delivers a willing buyer to the credit department, which then approves or disapproves a credit sale.

If the sale is approved, the customer gets product on credit, the salesperson gets his or her commission, and everyone is happy. If the credit sale is disapproved, it is generally lost. That means the salesperson doesn't get a commission and has wasted whatever work has gone into the account. This understandably creates a good deal of resentment on the part of the salesperson toward the credit department, especially if the customer's credit quality was marginal.

INSIGHTS

PRACTICAL **FINANCE**

A Practical Management Warning

It's clearly easy to increase sales by easing credit and collections policies, but receivables balances and credit losses go up at the same time. This situation can be dangerous for the senior financial manager. The applause for the increased sales tends to be given to the marketing department, but the blame for a high receivables balance and the associated losses belongs exclusively to the finance department. This can be a political no-win situation for the executive in charge of finance.

In most companies, optimizing collections performance takes a familiarity with customers and their problems that the finance department simply does not have. The best results come only when management directs the sales force to actively participate in identifying and correcting problems.

It's important to make sure the CEO (president, general manager) understands that while receivables are financial, creating them is a joint effort with sales and that problems need to be owned by both organizations.

But what happens if a credit sale is approved and the customer eventually fails to pay? It's logical to assume that the salesperson in such a case would be charged back his or her commission. *However, most companies don't operate that way. The credit decision is viewed as strictly the responsibility of the credit department, so the blame for a bad debt loss is laid at its door alone and the salesperson gets to keep the commission.*

from the **CFO**

This practice can create a counterproductive conflict of interest. Salespeople are generally in close contact with customers and may be aware of things no one else knows about. But if those things are negative, the commission system motivates them not to share the information with the credit department. Credit personnel therefore may harbor some resentment toward salespeople when receivables go sour.

The Terms of Sale

Recall that credit sales are made on terms that specify the number of days after which the net payment is due and a period during which a prompt payment discount may be taken. For example, terms of 2/10, net 30 mean a 2% discount can be taken if payment is made within 10 days; otherwise, the entire amount is due in 30.

The **prompt payment discount** is usually an effective tool for **managing receivables**.

Terms can have an effect on receivables in two ways. First, shortening or extending the net period tends to affect the length of time a nondelinquent customer takes to pay its bill. It would therefore seem that shortening the term would reduce the receivables balance. As a practical matter, however, companies don't have a great deal of latitude in making the net period shorter than whatever is customary in the industry.

The prompt payment discount tends to be a more effective policy variable. A generous discount usually reduces receivables balances because customers pay quickly to save money. As we've said before, however, discounts are expensive for the firm giving them.

Occasionally prompt payment discounts don't help to reduce receivables at all. That happens when a firm's customers are too cash poor to take the discount regardless of how attractive it is. That's often the case when the customers are struggling

small businesses. In such situations, increasing the discount in an effort to reduce receivables can backfire and cost money. The reason is that only customers who are already paying promptly take the increased discount.

Collections Policy

A firm's credit department is usually closely connected with its *collections department*. The function of the collections department is to follow up on overdue receivables to get delinquent customers to pay their bills. The process is known as **dunning** the debtor.

Dunning is the process of following up on **overdue** receivables.

The normal procedure begins with mailing a polite reminder that payment is overdue a few days after the net date on the invoice. If payment isn't received, two or three additional *dunning letters* follow using progressively stronger language. After that, phone calls are made first to the customer's payables department and then to responsible executives. If a customer is substantially in arrears, further shipments usually are stopped until some payment is received.

In the majority of cases, unpaid bills are the result of some product or administrative problem. For example, if the product purchased doesn't work as expected, many firms don't pay the bill. In such a case the collections department gets the customer together with the firm's sales and service personnel to try to straighten out the problem.

Another common problem involves mismatches between the firm's invoice and what the customer's records show as having been ordered and received. If these don't match exactly, many organizations don't pay. In such cases the collections department works to reconcile the paperwork and get the bill paid.

Collection agencies specialize in **pursuing overdue accounts**, and are usually very **aggressive**.

In other cases, customers don't pay because they don't have the cash or are disreputable and just don't pay bills until they're forced to. When that happens, letters and phone calls don't work and the account is eventually turned over to a **collection agency**. Collection agencies are companies that specialize in dunning and collecting overdue accounts for a percentage of the amounts collected. They use the same techniques as the selling firm, but tend to be more persistent, aggressive, and threatening.

If the agency isn't successful, a lawsuit can be filed against the delinquent customer. The filing can be handled by either the company or the collection agency. If the suit is successful the firm is awarded a judgment by the court, which still may not be collectible if the customer is missing or bankrupt.

Collection policy is the **manner** and **aggressiveness** with which a firm **pursues payment** from delinquent customers.

A company's *collections policy* determines how quickly and aggressively it pursues overdue accounts. There's a great deal of difference, for example, between a firm that sends polite letters and calls for several months and one that threatens a lawsuit when a bill is 30 days overdue.

Collections and Customer Relations

Overly aggressive collection efforts can damage customer relations. For example, imagine that a particular shipment has become very confused because of malfunctioning product and mistakes in shipping, receiving, and invoicing. Also suppose the customer and the firm's sales and service departments are working reasonably diligently to straighten out the problems. Now imagine that in the middle of all this the customer is served with a lawsuit initiated by the collections department for payment of the disputed bill.

Clearly, that would create a tendency for the customer to buy from another vendor in the future. It would also upset the sales department, because it wants to continue selling to the customer. On the other hand, it isn't unusual for salespeople to attempt to placate the collections department in order to sell more commissionable product to a customer they know is a payment risk.

REAL **APPLICATIONS**

How Lafarge's Western Region Controls Receivables-Sharing Responsibility for Collections with Sales

Lafarge Group, a giant French company, is a dominant player in the international construction materials business. The firm, with over 85,000 employees worldwide, generates annual sales of about $12 billion from operations in 75 countries. Lafarge North America, a 54% owned subsidiary, is headquartered in Virginia, and is this continent's largest diversified supplier of construction materials. It operates out of regional offices throughout the United States and Canada.

CFO, The Magazine for Senior Financial Executives, posts the *Working Capital Scoreboard,* which ranks 1,000 public companies on the efficiency of their working capital management. A few years ago, Lafarge North America's Western Region, based in Calgary, Alberta, racked up an impressive 36-place advance in its scoreboard position largely due to shortening its average collection period by 11 days. The region's vice president and controller listed 12 fundamentals behind this improvement in collections including the following points.

- Focus all management on collections; it's not just a finance responsibility.
- Assign ownership of customer accounts among the sales staff to prevent passing the buck on delinquent accounts.
- Clearly define Lafarge's responsibilities to customers including terms and conditions of sale.
- Establish monthly collection targets by salesperson.
- Train salespeople to focus on customer profitability (rather than just on sales volume).
- Engage in weekly credit and collections meetings with the sales team, the credit and collections manager, and the general manager.

The message should be clear. Excellence in receivables management depends on making sure the sales department recognizes that it shares the responsibility for collections with finance. At Lafarge, the responsibility is made explicit by holding salespeople accountable for delinquent customer accounts, and engaging in constant management review of overall collections activity.

Sources: Steven L. Mintz, "Dollars in the Details, Winners Sweat the Small Stuff in the Third Annual Analysis of Working Capital," *CFO, The Magazine for Senior Financial Executives* (July 1999): 55. http://www.lafarge.fr and http://www.lafargenorthamerica.com

INVENTORY MANAGEMENT

Inventory is product held for sale to customers. Its significance and the complexity of managing it vary tremendously between businesses. For example, in retailing operations, inventory management is critically important but relatively simple, while in manufacturing it can be as complex as it is crucial. At the other extreme, most services businesses carry only incidental inventories, so the issue is relatively minor.

It's important to realize that in any business in which inventory is significant, its mismanagement has the potential to ruin the company.

WHO IS RESPONSIBLE FOR INVENTORIES?

Unlike cash and receivables, inventory is virtually never the direct responsibility of the finance department. It is usually managed by a functional area such as manufacturing or operations. The executives in charge of those areas generally have broad latitude in choosing inventory levels and management methods.

Finance has an **oversight** responsibility for inventory management.

Finance gets involved in an oversight or policing way. If inventory levels become too high, it's the job of financial management to call attention to the fact that things might be run more efficiently. Financial people generally monitor the level of lost or obsolete inventory that has to be written off and ensure that it doesn't become excessive. They also supervise periodic *physical inventories* (counts) that reconcile quantities actually on hand with the firm's records.

In short, although the finance department does not itself manage the typical firm's inventory, it has a responsibility to ensure that those who do manage it act cost effectively.

THE BENEFITS AND COSTS OF CARRYING INVENTORY

As might be expected, for firms to which inventory is important, it's easier to operate with more usable inventory than with less. However, carrying the extra material costs money, so there's a trade-off between cost and benefit. The idea behind inventory management is to find a level that's close to optimal in balancing the pluses against the minuses.

The Benefits of Carrying Adequate Inventory

In manufacturing, inventory separates and smooths out the work of different production departments. For example, suppose departments A and B work on product sequentially. If product moves directly out of department A into B, everything runs smoothly as long as there are no delays in A's operation. However, if some defect or accident causes a delay in A, department B will run out of work and be idle until the problem is fixed. Clearly, time and money will be wasted. But if some product is inventoried between the two departments, B can avoid idle time by working on it while department A is fixing its problem.

In any business, carrying more inventory rather than less reduces **stockouts** and **backorders**. A stockout occurs when something the company doesn't have on hand is needed in production or by a customer. The firm is out of stock on the item and places a backorder with its supplier to get it. The term "backorder" implies the order is remedial in the sense that the item is currently needed, and usually implies a request for expedited handling.

In manufacturing, stockouts disrupt operations and cause idle time and missed schedules, which cost money. At the point of sale, stockouts mean customers don't get what they want right away. That causes dissatisfaction and can drive customers to other suppliers, which means lost sales. Too many stockouts can drive customers away permanently.

All in all, carrying more active, usable inventory makes operations run more smoothly, improves customer relations, and increases sales.[13]

13. It should be obvious that carrying extra obsolete or damaged inventory doesn't convey these benefits. Hence, we have to look beyond the dollar inventory figure on the balance sheet to see whether the firm has enough or too much.

The Cost of Carrying Inventory

Keeping inventory on hand takes money. The reasons can be separated into traditional costs of the inventory and potential losses in its value. In general, both increase with the amount of inventory carried.

The following traditional costs are associated with holding inventory.

- *Interest:* Firms have to pay a return on the funds used to acquire inventory just as they do on any other asset.
- *Storage and security:* Inventory takes up space and is often subject to pilfering. Storage space has to be provided along with security to prevent theft.
- *Insurance:* Firms generally buy insurance to protect themselves against large inventory losses due to fire, theft, or natural disaster.
- *Taxes:* Many states and localities levy a tax on the value of inventory.

More inventory means fewer **lost sales** and production **delays**, but more **carrying cost**.

Several phenomena cause inventory to lose value. In general, the more inventory a firm carries, the more it exposes to a risk of loss from each of the following causes and the higher is its overall loss.

- *Shrinkage:* In spite of security measures, some inventory inevitably disappears. Such vanishing, presumably due to theft, is known as shrinkage.
- *Spoilage:* Many items have a limited shelf life, after which they lose their value partially or entirely. Even when inventory is monitored carefully, some spoilage of perishable items is expected.
- *Breakage:* Inventory in stock can be run over, stepped on, leaked on or into, or broken in any number of ways.
- *Obsolescence:* New products often do jobs better, faster, or cheaper than their predecessors. When that happens, the old products lose value rapidly because no one wants them unless their prices are heavily discounted.

The costs and losses together can be called the *carrying cost* of inventory.

Ordering Costs

The process of ordering and receiving goods generates a different sort of inventory-related expense. The carrying costs we've talked about so far depend on the amount of inventory on hand during a period. *Ordering costs* reflect the expenses of placing orders with suppliers, receiving shipments, and processing materials into inventory. These costs are related to the number of orders placed rather than to the amount of inventory held.

We'll see shortly that ordering costs and carrying costs tend to vary inversely with one another.

INVENTORY CONTROL AND MANAGEMENT

Companies develop elaborate systems for tracking and controlling their inventories. The cost of such systems and the people to run them are additional expenses associated with inventory. This kind of cost doesn't necessarily increase with incremental inventory or orders. Rather, it's tied to the number of different pieces carried and the way they're used.

Inventory management refers to the overall way a company oversees its inventory and uses its control system to manage the benefits of carrying inventory against the

Inventory management refers to the **overall** way a firm **controls inventory** and its cost.

cost. You can think of the process as defining an acceptable level of operating efficiency in terms of stockouts, backorders, and production problems, and then trying to achieve that level of efficiency with the minimum inventory cost.

There's no single, all-encompassing approach to managing inventory. Success is achieved through frequent reviews, attention to detail, and the use of a variety of mechanized and manual systems. In the rest of this section we'll review some well-known ideas that address pieces of the inventory management process.

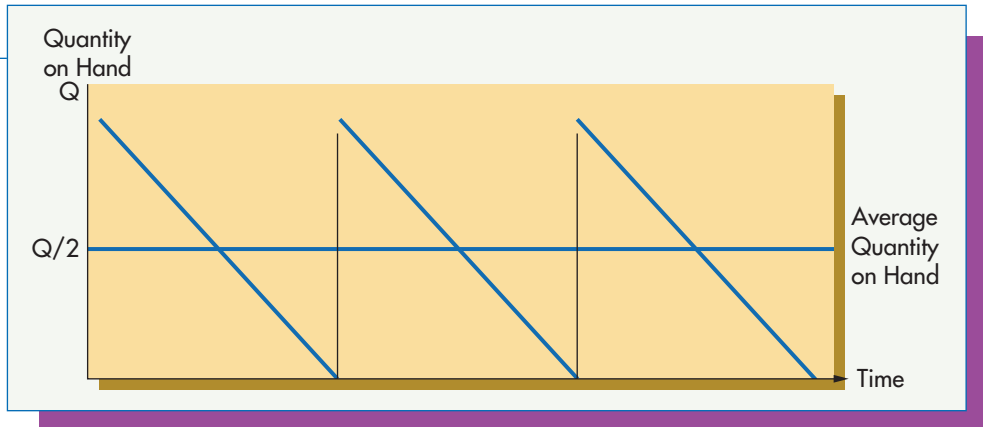
THE ECONOMIC ORDER QUANTITY (EOQ) MODEL

We've defined carrying and ordering costs as being related to inventory in different ways. Carrying costs increase with the amount of inventory held, while ordering costs increase with the number of orders placed to replenish depleted stocks. The total cost of having inventory is the sum of the two. The **economic order quantity (EOQ) model** is an approach to minimizing total inventory cost by recognizing that under certain conditions there's a trade-off between carrying cost and ordering cost.

Imagine that an inventory item is used evenly during the year and is periodically reordered in quantity Q. For the moment we'll ignore time lags in ordering and delivery. We'll assume the item is used steadily until none is left, then is immediately restocked by a delivery of Q units. Figure 16.7 is a plot of the number of units on hand over time under these assumptions.

Figure 16.7

Inventory on Hand for a Steadily Used Item



Notice that inventory in stock decreases steadily along the diagonal lines until it is replenished. Under these conditions, the average quantity on hand is Q/2 units and the number of reorders per year is the annual usage divided by Q.

The model assumes that carrying costs vary directly with the average inventory balance and that ordering costs are fixed on a per-order basis. If C represents yearly carrying cost per unit, total carrying cost can be written as

$$\text{carrying cost} = C\,(Q/2) \tag{16.1}$$

It's clear from equation 16.1 and the diagram that total carrying cost can be reduced by ordering more frequently in smaller quantities. If Q were smaller, Figure 16.7 would have more sawtoothed peaks, but each would be lower and the average quantity on hand (Q/2) would be lower.

However, ordering more frequently will increase the number of orders placed each year. Because each order costs a fixed amount, this increases total ordering cost. If annual demand is D, the firm places

$$N = D/Q \tag{16.2}$$

orders per year. Then if the fixed cost per order is F, total ordering cost will be

$$\text{ordering cost} = FN = F\,(D/Q) \tag{16.3}$$

This expression clearly increases as order size decreases because Q appears in the denominator.

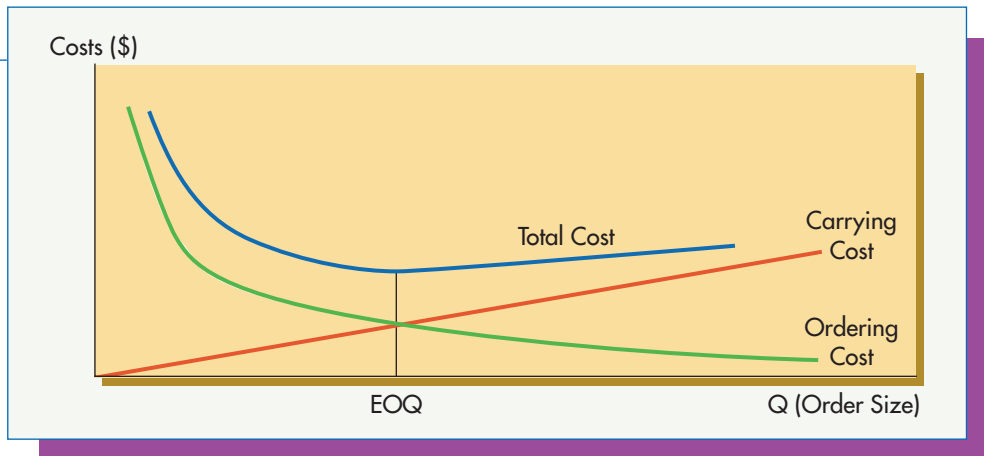
Total inventory cost, which we'll call TC, is the sum of carrying cost and ordering cost. Adding equations 16.1 and 16.3 gives

$$TC = C\,\frac{Q}{2} + F\,\frac{D}{Q} \tag{16.4}$$

These ideas are represented graphically in Figure 16.8. The diagram shows carrying cost increasing and ordering cost decreasing with order size, Q. Notice that the sum of these costs, total cost, first decreases and then increases as Q gets larger. Hence, it's possible to choose an optimal order size that minimizes the cost of inventory. That value of Q is known as the economic order quantity, abbreviated EOQ. On the diagram, it is directly below the minimum point on the total cost line.

Figure 16.8

Inventory Costs and the EOQ



A technique for finding the minimum value of an expression like equation 16.4 is available using calculus. We'll accept the following result without getting into the math.[14]

$$EOQ = \left[\frac{2FD}{C}\right]^{1/2} \tag{16.5}$$

14. The mathematically inclined will recognize the EOQ as a straightforward minimization problem with respect to the variable Q. Differentiate equation 16.4 with respect to Q, and set the result equal to zero to get

$$0 = \frac{C}{2} - \frac{FD}{Q^2}$$

Then solve for Q to get equation 16.5.

Example 16.5

The Galbraith Corp. buys a part that costs $5. The carrying cost of inventory is approximately 20% of the part's dollar value per year. It costs $45 to place, process, and receive an order. The firm uses 1,000 of the $5 parts a year. What ordering quantity minimizes inventory costs, and how many orders will be placed each year if that order quantity is used? What inventory costs are incurred for the part with this ordering quantity?

SOLUTION: First note that the unit carrying cost per year is 20% of the part's price, so

$$C = (.2)(\$5) = \$1$$

Next write equation 16.5 and substitute from the information given.

$$EOQ = \left[\frac{2FD}{C}\right]^{1/2}$$

$$= \left[\frac{2(\$45)(1{,}000)}{\$1}\right]^{1/2}$$

$$= [90{,}000]^{1/2}$$

$$= 300 \text{ units}$$

The annual number of reorders is

$$1{,}000/300 = 3.3333$$

Carrying costs are

$$(300/2) \times \$5 \times .2 = \$150$$

and ordering costs are

$$\$45 \times 3.3333 = \$150$$

Hence, the total inventory cost of the part is $300.

As an exercise, demonstrate that this is a minimum by calculating the cost at several different ordering quantities around 300 units.

Notice from the diagram that the minimum total cost is achieved where the two component cost lines cross one another. That means at the optimal point, carrying cost and ordering cost are equal.

SAFETY STOCKS, REORDER POINTS, AND LEAD TIMES

Notice that the inventory arrangement represented in Figure 16.7 assumes a perfectly even and predictable flow of parts out of inventory. It also assumes an instantaneous delivery of parts whenever needed. In reality, usage rates vary and restocking orders don't always arrive on time.

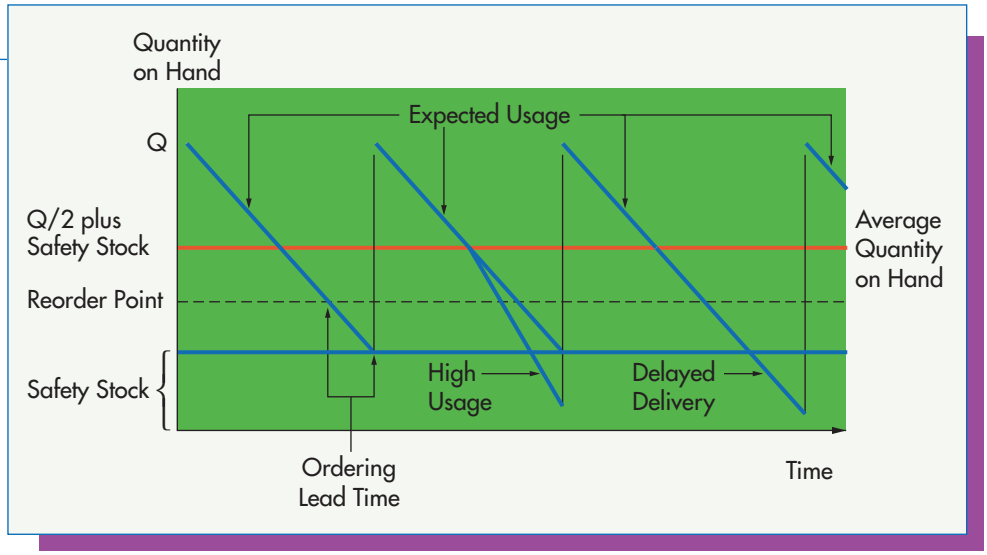
Clearly, these factors can cause the firm to run out of inventory and suffer the problems associated with the stockouts we described earlier. Such outages can be largely avoided by carrying a **safety stock** of inventory for emergencies. A safety stock is simply an additional supply of inventory that is carried all the time to be used when normal working stocks run out.

Safety stock provides a **buffer** against **unexpectedly** rapid use or delayed delivery.

The EOQ model of Figure 16.7 can be modified conceptually to include safety stocks by placing the sawtoothed lines on top of a safety stock as shown in Figure 16.9.

Figure 16.9

Pattern of Inventory on Hand Including Safety Stock Showing Reorder Point, Lead Time, and the Effects of High Usage and Delayed Delivery



Lead Times and Reorder Points

As a practical matter, a restocking order has to be placed in advance of the time at which it's needed. The advance period, known as an *ordering lead time*, is generally estimated by the item's supplier.

Referring to the leftmost diagonal in Figure 16.9, we see that as time passes, the quantity on hand diminishes along the diagonal line until the *reorder point* (indicated on the vertical axis) is reached. At that time an order for resupply is placed with the supplier. The reorder point is calculated so that the expected usage during the ordering lead time will bring the stock to its lowest planned level just as the new supply is delivered.

However, if the usage rate increases after an order is placed, the stock will diminish faster than planned and the inventory balance will dip into the safety stock range. That situation is depicted along the second diagonal in the diagram. If there was no safety stock, the increased usage would result in a stockout.

It is also easy to see that a delay in delivery after a reorder will cause a dip into safety stock. This situation is depicted along the third diagonal, and would also result in a stockout if there were no safety stock.

Safety Stock and the EOQ

The inclusion of safety stocks does not change the EOQ. It just increases the total cost of inventory by the carrying cost of the safety stock. In effect, the EOQ model sits on top of a safety stock level as shown in Figure 16.9.

The Right Level of Safety Stock

Choosing a safety stock level involves another cost trade-off. The extra inventory increases carrying cost but avoids losses from production delays and missed sales. These opposing effects have to be balanced in the choice of an appropriate level of safety inventory. The choice can be difficult because the savings aren't visible. They're the result of problems that didn't happen, so they don't appear anywhere on financial statements. The carrying cost, on the other hand, is quite visible and measurable.

It's rarely advisable to carry so much safety inventory that stockouts are avoided entirely. Under most conditions, that would require a huge amount of inventory at an excessive cost. It's generally best to tolerate an occasional outage to keep inventory levels reasonable. In some businesses, backorders are filled quickly and outages don't cause a lot of trouble. In such cases, safety stocks can be minimal.

TRACKING INVENTORIES—THE ABC SYSTEM

The amount of attention that should be given to controlling inventories of particular items varies with the nature and cost of the item. Some pieces are very expensive, and for that reason alone warrant a great deal of attention. Some items are critical to the firm's processes or to those of customers, and therefore are important whether they cost a lot or not. On the other hand, some items are cheap and easy to get, so spending a lot of effort to control them isn't worthwhile. Common nuts and bolts are a good example.

An **ABC system** segregates items by **value** and places **tighter control** on **higher-cost** pieces.

Most companies recognize this fact and use a variant of the **ABC system** in their inventory control systems. Items designated A are important because of their value or the consequences of running out, and are carefully controlled. They're usually serialized, kept under lock and key, and signed out to a responsible individual when used. C items are cheap and plentiful, kept in a bin accessible to anyone, and reordered when the bin gets low. B items are between As and Cs and are handled accordingly.

Recognizing that inventory items differ in importance enables companies to keep control costs low.

JUST IN TIME (JIT) INVENTORY SYSTEMS

JIT eliminates manufacturing inventory by pushing it **back on suppliers**.

In recent years, a manufacturing inventory concept developed by the Japanese has received a lot of publicity. In theory, the **just in time (JIT)** system virtually eliminates factory inventory. Under JIT, suppliers deliver goods to manufacturers just in time (within a few hours) to be used in production. The idea requires a great deal of faith and cooperation between a manufacturer and its suppliers, because a late delivery can stop a factory's entire production line.

Under JIT the manufacturer is essentially pushing the task of carrying inventory back onto its suppliers. Conceptually, the supplier will push its inventory back onto its suppliers, which do the same to their suppliers. Ultimately, the entire production chain works in a coordinated manner, largely eliminating inventories.

The idea sounds good in theory, and does work under certain conditions, but hasn't proven as successful as its proponents originally hoped. In many situations it doesn't work at all.

JIT works best when the manufacturer is very large and powerful with respect to the supplier and buys most of the supplier's output. In such cases the supplier is willing to do almost anything to keep the manufacturer's business, including orchestrating JIT deliveries. Even then the concept works really well only when the supplier is located near enough to the manufacturer that shipping delays aren't a problem. The automobile industry tends to be organized like that, and has had some success with JIT. The idea was originally developed by Toyota in Japan.

For smaller companies that don't have any particular clout over suppliers that may be located far away, the idea may not be practical. In such cases suppliers have little incentive to go to the trouble and expense of making the precise and timely deliveries that JIT requires.

QUESTIONS

1. Explain the different circumstances under which firms should use short-term or long-term financing.
2. Because companies always have inventory and accounts receivable, most banks are happy to make long-term loans to support those assets. Either refute or support that statement.
3. Describe the maturity matching principle. What are the risks of not matching maturities? How would you characterize a firm that ignores the principle? Can you think of situations in which it would be advisable for an otherwise prudent firm to deviate from the principle?
4. Working capital spontaneously finances itself because it's being turned over all the time. Is this statement true, false, or a little of both? Exactly what is meant by "spontaneous financing"? Does working capital require funding? Why?
5. Working capital is generally defined as the difference between current assets and current liabilities. Is this definition precisely correct? Why?
6. Support or challenge each of the following statements individually.
   a. Because accounts receivable aren't purchased like inventory or fixed assets, they don't require financing.
   b. Cash represents a pool of available money, so it actually reduces financing needs.
7. How does a firm's operating cycle differ from its cash conversion cycle? Explain fully.
8. You work in the finance department of a manufacturing company. Over lunch, a friend in the engineering department said she'd heard that the firm used a lot of temporary working capital. Because temporary equipment is usually of lower quality than permanent material, she wonders why the company, which is quite prosperous, doesn't buy the best and store it when it isn't needed.
   What misconceptions does your friend have? Write a brief explanation for someone who knows nothing about finance to straighten out her understanding.
9. Why does it make sense to finance net working capital separately from fixed assets?
10. You work in the finance department of HiTech Inc. The firm's owner and CEO, Charlie Dollars, is very profit oriented. He understands that short-term interest rates are quite low at the moment, and has suggested that the firm finance all of its working capital needs with short-term loans. The CFO has asked you to prepare a memo for his signature outlining why this may not be the best strategy. In your memo, outline the working capital financing options available to most firms and discuss the trade-offs involved in using long-term versus short-term financing.
11. What are the advantages and disadvantages of stretching payables? If you owned your own business, would you do it? Why or why not?
12. What's the difference between a promissory note, a line of credit, and a revolving credit agreement? Are they mutually exclusive? That is, might one be part of the other?

13. Explain the difference between pledging and factoring receivables. Which is likely to be a more expensive source of financing? Is factoring the same kind of financing as pledging?

14. Factoring may involve interest even though it isn't a loan. How can this come about?

15. What is the biggest problem associated with financing secured by inventory? How is it addressed in practice?

16. Outline the reasons for holding cash and the big cost associated with it. How do these lead to the objective of cash management? How do marketable securities help or hinder achievement of the objective?

17. The Medco Supply Co. operates out of Waco, Texas, and has a number of customers around Portland, Maine. It seems to take a particularly long time for the Portland customers' payment checks to reach Medco. What can the company do to speed things up? Explain how your solution would work.

18. Sally Johnson lives in Baltimore and does business with a large, national brokerage firm. When she sends the broker a check, she mails it to a local address in Baltimore. However, when she receives a check from the broker, it comes from San Francisco. Her sister Joan lives in Los Angeles and uses the same firm. She mails payments to an office a few blocks from her home, but receives checks from an office in Miami. What's going on? Should the Johnson sisters be upset?

19. You're the cash manager for Huge Inc., which has factories and stores all over the country. Each operation has several bank accounts to receive deposits and pay vendors, so the company's cash is spread all over the country under the control of divisional CFOs. It's essential that those divisional executives have control of their cash to run their operations effectively. However, the rather substantial cash total isn't earning anything because it's too dispersed to be invested in marketable securities. Suggest a way to fix this problem and explain how it will work.

20. Every company should take full advantage of the sophisticated cash management services offered by today's banking industry. Right or wrong? Explain.

21. Outline the costs and benefits involved in the trade-off between a tighter versus a looser receivables policy.

22. Inventory management is a shared responsibility between finance and manufacturing just as receivables management involves both sales and finance. Right or wrong? Explain.

23. Because of the advances in computer technology, inventory management is a precise science, and there's no excuse for not having the optimal quantity on hand at all times. Is that statement true or false? Explain.

24. Does the EOQ model when properly applied prevent stockouts? Does it address stockouts at all? Do you think the EOQ model solves very many of management's inventory problems?

25. The Philipps Lighting Company manufactures decorative light fixtures. Its revenues are about $100 million a year. It purchases inputs from approximately 20 suppliers, most of which are much larger companies located in various parts of the country. Sam Spade, the vice president of manufacturing, is a sophisticated executive who has always been impressed by the latest innovative techniques in management.

Last week Sam came into a meeting of the executive team with a proposal to cut inventory costs to almost nothing. Just in time (JIT) is the wave of the future, he said, and proposed that Philipps enter into negotiations with all of its suppliers to implement the concept immediately.

You're the CFO and tend to be more skeptical about new methods. Prepare a memo to the team, tactfully outlining the problems and risks involved in Sam's proposal.

BUSINESS ANALYSIS

1. You're a supervisor in the treasury department of Big Corp. Recently there has been increasing concern about the firm's rising interest expense. Fred Eyeshade is an analyst in your group who transferred from the accounting department a short time ago. He has suggested that senior management mandate a 50% across-the-board cut in cash, inventory, and receivables along with a doubling of payables to reduce the firm's financing needs for net working capital. Explain why this might not be a good idea with respect to each of these elements of net working capital (four accounts).

2. Things tend to run more smoothly and efficiently with more working capital. With respect to each working capital account (four, excluding accruals), explain why this statement isn't absolutely true. In other words, why might a very large inventory or receivables balance not do much good at all?

3. You and your friend Harry have started a business. Harry is a technical whiz, but doesn't know much about business or finance. After several months you've been approved for a $100,000 bank loan at what seems to be a rather high interest rate, 16%. Harry is especially bothered by the rate. He thinks banks shouldn't get any more than 4 or 5%, but doesn't really know why he feels that way. When you both were about to sign the loan papers, the banker mentioned that a minimum balance of $20,000 would have to remain in the bank. Hearing this, Harry pulled out his calculator and made a calculation at which he became outraged. He then stormed out of the meeting.

   Why is Harry so upset? What calculation did he make? Write a short memo explaining banking practices to calm Harry down. Is there a kind of minimum balance requirement that might make Harry's calculation invalid?

4. You're the CFO of the Wachusett Window Company, which sells windows to residential builders. The firm's customers tend to be small, thinly capitalized construction companies that are frequently short of cash. Over the past year, there's been a slump in the housing industry and Wachusett's sales have slowed. Several months ago the marketing department initiated a program to attract new customers to counteract the downward sales trend. The VP of marketing and the president agreed that the firm would have to deal with even smaller, newer builders if it was going to keep sales up. At the time the president overruled your concerns about the credit quality of such customers. He personally approved a number of accounts brought in by the sales department that ordinarily wouldn't have qualified for credit.

   More recently receivables have gone up substantially, and collection efforts have been less successful than usual. Collectors have asked for help from sales representatives in chasing down delinquent customers, but the VP of marketing says they don't have time because "reps have to be out on the street selling."

The president has suddenly become concerned about the receivables increase, and has demanded to know why finance has let it happen. Prepare a memo explaining the processes behind the creation and management of receivables and explain what's behind the increase. Tactfully explain why the blame should not be placed solely on the finance department. Can you argue that finance is completely without fault in this matter?

5. In the situation at Wachusett Window outlined in the last question, do you think a higher prompt payment discount in addition to the new sales program would have kept receivables down? Why?
6. Speculate on the nature of the relationship between the credit and collections department and the sales department at Wachusett Window in the last two questions.
7. Wildebrant Inc. runs out of inventory all the time both in the factory and at the point of sale. However, the company is profitable, and no one worries about it much. Is this OK? What's probably going on that management doesn't see? Why don't they see it? What would you suggest to fix the problem? How would it work?

PROBLEMS

1. Scherbert Industries has the following balance sheet accounts as of 12/31/X3 (not a complete balance sheet):

Accounts Payable	$ 650,000
Accounts Receivable	845,000
Accruals	257,500
Cash	137,200
Common Stock	1,200,000
Fixed Assets (net)	8,250,000
Inventory	655,000
Long-Term Debt	3,500,000

Calculate gross and net working capital.

2. Thompson Inc. has a $10 million revolving credit agreement with its bank. It pays interest on borrowing at 2% over prime and a .25% commitment fee on available but unused funds. Last month Thompson had borrowings of $5 million for the first half of the month and $10 million for the second half. Calculate its interest charges for the month. The bank's prime rate is 6%.
3. The Conejo Corp. borrows from its bank under an $8 million revolving credit arrangement. It pays a base rate of 9% on its outstanding loan plus a .25% commitment fee on the unused balance. The firm had borrowed $2 million going into April and borrowed an additional $4 million on April 11. No further borrowing or repayment was made during the month. Calculate Conejo's interest charges for April.
4. The Grass Ridge Company has the following current asset accounts.

Cash	$1,900,000
Accounts Receivable	4,600,000
Inventory	5,500,000

Its current ratio is 2.5:1. The bank is willing to lend the company enough to finance its working capital needs under a $10 million revolving credit arrangement at a base rate of 12% with a ⅜% commitment fee on the unused balance. If the current accounts stay relatively constant throughout the year, what will Grass Ridge pay the bank for working capital financing?

5. Bridgeport Inc. has a $30 million revolving credit agreement with its bank at prime plus 3.2% based on a calendar year. Prior to the month of April, it had taken down $15 million that was outstanding for the entire month. On April 10, it took down another $5 million. Prime is 8.2%, and the bank's commitment fee is .25% annually. Calculate the charges associated with Bridgeport's revolving credit agreement for the month of April.

6. Southport Inc. has an inventory turnover of 10×, an ACP of 45 days, and turns over its payables once a month. How long are Southport's operating and cash conversion cycles? (Use a 360-day year.)

7. The Langley Corporation is in a seasonal business. It requires a permanent base of net working capital of $10 million all year long, but that requirement temporarily increases to $20 million during a four-month period each year. Langley has three financing options for net working capital.

   a. Finance the peak level year round with equity, which costs 20%, and invest temporarily unused funds in marketable securities, which earn 6%.
   b. Finance permanent net working capital with equity and temporary net working capital with a short-term loan at 12%.
   c. Finance all net working capital needs with short-term debt at 12.5%.

   Calculate the cost of each option. Which would you choose? Why?

8. Calculate the effective interest rate implied by the following terms of sale. (Use a 365-day year.)

   2/10, net 30
   1/5, net 15
   .5/10, net 30
   2.5/10, net 25
   1/5, net 20

9. Rocky Inc. can buy its inventory from any of four suppliers all of which offer essentially the same pricing and quality. Their credit terms, however, vary considerably as follows:

A	2/10, net 30
B	3/5, net 20
C	1/20, net 45
D	3/5, net 90

   a. Calculate the implied interest rate associated with each policy.
   b. If Rocky buys some material from each vendor, which discounts should it take and which should it forego if it pays 18% for working capital financing? Why?

10. What is the effective interest rate on a $750,000 loan at 8% for 120 days if a 20% minimum compensating balance is required?

11. Calculate the effective interest rate on loans with the following minimum compensating balance requirements:

	Loan Rate	Compensating Balance
a.	6.5%	20%
b.	12.0%	10%
c.	10.5%	15%
d.	14.0%	25%
e.	8.5%	30%

12. Jenkins Appliances has cash flow problems and needs to borrow between $50,000 and $60,000 for approximately sixty (60) days. Because the business is small and relatively new, unsecured loans are very hard to get and are expensive when they are available. The bank has offered such a loan at 25%. Climax Inc., a finance company, has offered an alternative loan if receivables are pledged as collateral. Climax will lend 70% of the average receivables balance for 14% plus an administrative fee of $1,200. Jenkins' average receivables balance is $80,000. Which alternative should Jenkins choose? Calculate using a 360-day year. Assume the bank is willing to lend the same amount as Climax.

13. DeSquam Inc. pledges receivables of $250 million per year to the Sharkskin Finance Company, which advances cash equal to 80% of the face value of the accounts pledged. DeSquam's receivables are usually collected in about 36 days, so 10% of the annual amount advanced is generally outstanding at any time. (Thirty-six days is one-tenth of a year, so receivables "turn over" 10 times a year.) Sharkskin charges 14% interest plus an administrative fee of 1.6% of the amount pledged. What is DeSquam's cost of receivables financing? State the result in dollar terms and as a rate.

14. The York Company has an average receivables balance of $55,000, which turns over once every 30 days. It offers all of its receivables to its bank as collateral for short-term borrowing (pledging). The bank generally accepts 60% of the accounts offered and advances cash equal to 85% of those. Interest is 3% over prime and the bank charges a 1% administrative fee on the gross value of all accounts offered. The prime rate is currently 9.5%. What effective rate is York paying for its receivables financing?

15. Southern Fabrics Inc. factors all of its receivables. The firm does $150 million in business each year and would have an ACP of 36.5 days if it collected its own receivables. The firm's gross margin is 35%. The factor operates without recourse and pays immediately upon taking over the accounts. It discounts the gross amount factored by 10% and pays Southern immediately. Because the factor doesn't collect from customers until they pay, it charges interest at 10% in the interim.

    a. Calculate the gross cost of factoring to Southern Fabrics if all receivables are collectible.
    b. What interest rate is implied by the arrangement?
    c. Suppose Southern is considering giving up the factoring arrangement and handling its own collections. Should the firm do it if bad debt losses are expected to average 3% of gross sales and running a collections department will cost

about $1.5 million per year? Assume the interest cost of carrying the receivable balance is also 10%.

d. What is the implied interest rate in the factoring arrangement if the costs in part (c) are taken into account?

16. Central City Bank will lend Williams Inc. 60% of the value of its inventory at 12% if Williams will pledge the inventory as collateral for the loan. The bank also insists that Williams employ a warehousing company to monitor and control the inventoried material. Blyth Warehousing will do the job for an annual fee of $150,000 plus 2% of the value of all the inventory it handles. Williams moves inventory valued at about $15 million through its plant each year at a turnover rate of five times. What will the cost of financing be under this proposal? State the result in both dollar and percentage (of amount borrowed) terms.

17. The Shamrock Company has a raw materials inventory of $20 million, which is completely replaced approximately 10 times a year. The Bridgewater Bank is willing to advance financing of 75% of the value of Shamrock's inventory at an interest rate of 12%. However, it requires a warehousing system to secure its interests. A warehousing company will install and operate the system for $800,000 a year plus .5% of the value of materials entering the system. What is the effective cost of this financing to Shamrock?

18. Tambourines Inc. collects $12 million per year from customers in a remote location. The average remittance check is $1,200. A lock box system would shorten the overall float on these receipts from eight days to seven days, but would cost $2,500 per year plus $.20 per check. The relevant interest rate is 9%. Should Tambourines install the system? Use a 360-day year.

19. The Hadley Motor Company is located in Florida but has a number of customers in the Pacific Northwest. Sales to those customers are $30 million a year paid in checks that average about $1,500. The checks take an average of nine days to clear into Hadley's Florida bank. A bank in Oregon will operate a lock box system for Hadley for $8,000 a year plus $.50 per check. The system can be expected to reduce the clearing time to six days.

    a. Is the lock box system worthwhile if Hadley borrows at 13.5%?
    b. What is the minimum number of days of float time the system has to save (to the nearest tenth of a day) to make it worthwhile?

20. Colburn Inc. is considering a lock box system. The firm has analyzed its credit receipts and determined the following:

    Average time checks are in mail—3 days
    Average internal check-processing time—3 days
    Average to clear the banking system—2 days
    Total credit sales—$180 million
    Average check—$10,000

    Colburn funds its accounts receivable with short-term debt at 8%. First Bank has indicated that its lock box system will reduce mail float by an average of one day and eliminate internal processing time. The cost of the system is $0.50 for each check processed, plus 0.05% of the gross revenues processed. Should Colburn implement the lock box system? If the charge based on gross revenue remains constant, at what per-check charge would Colburn be indifferent to the lock box arrangement?

21. Bozarth Business Machines (BBM) has analyzed the value of implementing a lock box system. The firm anticipates revenues of $630 million with an average invoice of $1,500. BBM borrows at 12% and has made an arrangement with Old Second Bank to manage a lock box for $.24 per check and 0.06% of total receipts. BBM has estimated that the lock box will save $200,000 annually. How many days does BBM expect the system will save in the collection process?

22. The Bailey Machine Tool Company thinks it can increase sales by $10 million by loosening its credit standards somewhat. The firm normally experiences bad debts of about 2% of sales, but marketing estimates that the incremental business would be from financially weaker customers who would not pay about 17% of the time. The firm's gross margin is 18% (production-related costs are 82% of revenue).

    a. Should Bailey lower its credit standards to get the new business?
    b. Would your answer change if taking on the new business also involved incremental collection expenses of $150,000 per year?

23. Over the past few years, the marketing department at Goldston & Co. has convinced the finance department to permit credit sales to increasingly marginal customers. Revenue has risen as a result, but bad debts are now at 6% of sales. Finance has suggested that the credit policy be tightened to reduce bad debt losses. The proposal calls for a more restrictive policy under which sales would fall by 8% but bad debt losses would drop to 2.6% of revenue. Under the current policy, Goldston's revenue forecast is $400 million with a contribution margin of 38%. Implementing the new credit policy would have no effect on contribution margin but would require an additional $500,000 in annual fixed costs.

    a. Should Goldston implement Finance's new credit policy?
    b. What nonfinancial considerations should be evaluated?
    c. Should the new policy be implemented if bad debts are expected to drop only to 4% of revenues?

24. The Kranberry Kids Klothing Kompany is in the volatile garment business. The firm has annual revenues of $250 million and operates with a 30% gross margin on sales. Bad debt losses average 3% of revenues. Kranberry is contemplating an easing of its credit policy in an attempt to increase sales. The loosening would involve accepting a lower-quality customer for credit sales. It is estimated that sales could be increased by $20 million a year in this manner. However, the collections department estimates that bad debt losses on the new business would run four times the normal level, and that internal collection efforts would cost an additional $1 million a year.

    a. Is the policy change a good idea?
    b. Is it likely that coupling an increased prompt payment discount with the looser guidelines would reduce the bad debt losses?
    c. Is it possible that the idea in part (b) could have a net negative impact? How?

25. Sharon's Sweater Shop orders 5,000 sweaters per year from a supplier at a wholesale cost of $65 each. Carrying costs are 22% of inventory, and it costs $52 to place and receive an order. How many orders should Sharon place with the supplier each year, and how large should each be?

26. Smithson Hydraulics Inc. carries an inventory of valves that cost $25 each. The firm's inventory carrying cost is approximately 18% of the value of the inventory. It costs $38 to place, process, and receive an order. The firm uses 20,000 valves a year.

a. What ordering quantity minimizes the inventory costs associated with the valves? (Round to the nearest unit.)
b. How many orders will be placed each year if the EOQ is used?
c. What are the valves' carrying and ordering costs if the EOQ is used?

27. Emmons Motors is a distributor of electric motors. The firm projects product demand of 25,000 units next year. It costs $320 to place an order with suppliers. Management has determined that the EOQ is 1,000 units. How much per year does it cost Emmons to carry a unit of inventory?

28. EverFit Inc. manufactures commercial grade fitness equipment used in spas and health clubs. The firm produces complex resistance exercise machines designed to strengthen specific muscles. EverFit's engineering department designs the equipment and then contracts with metal working shops to produce parts to their specifications. The parts are inventoried at EverFit's factory and assembled for shipment to customers. The $250,000 parts inventory is financed with short-term debt at 6% interest. Shrinkage and obsolescence cost about 1%, while taxes and insurance run about $10,000 per year.

    EverFit has discussed a just in time (JIT) system with it's suppliers all of which are located within 50 miles. The suppliers are small firms that depend on EverFit's business, and are willing to try to deliver parts in accordance with its production schedule.

    However, EverFit's CFO is concerned that although their intentions are good, the suppliers won't be able to manage their operations precisely enough to consistently meet customer JIT requirements. Further, he thinks that when a JIT delivery is missed, it will generally be a day and a half before it is finally received. During that time the assembly staff of 25 people will be idle. Each assembly worker earns about $30 per hour and must be paid for eight hours a day whether working or not.

    a. If the measure of the system is saving money, how many JIT failures can the system tolerate and still break even?
    b. Comment on the advisability of the JIT idea based on your answer to part a.
    c. What qualitative factors might also be concerns?
    d. Suggest a way to test the system before making a final decision.

INTERNET PROBLEM

29. Go to the *Business Owner's Toolkit* at http://www.toolkit.cch.com for information on how to more effectively manage accounts receivable. First click on *Managing Your Business Finances*, then on *Credit and Collections*. Read the introduction and the following sections: *building a credit policy that works*, *improving your collection cycles*, and *accounting for bad debts*. Prepare a one-page report summarizing what you found.