

FINANCIAL PLANNING AND
WORKING CAPITAL MANAGEMENT

Working Capital Management

► **Most of this book** is devoted to long-term financial decisions such as capital budgeting and the choice of capital structure. It is now time to look at the management of short-term assets and liabilities. Short-term, or *current*, assets and liabilities are collectively known as **working capital**. Table 30.1 gives a breakdown of working capital for all manufacturing corporations in the United States in 2009. Note that current assets are larger than current liabilities. **Net working capital** (current assets *less* current liabilities) is positive.

Look also at Figure 30.1, which shows the relative importance of working capital in different industries. For example, current assets constitute over half of the total assets of telecom companies, while they account for less than 10% of the assets of railroad companies. For some companies “current assets” means principally inventory; in others it means accounts receivable or cash and securities. For example, you can see that inventory accounts for the majority of the current assets of retail firms, receivables are more important for oil companies, and cash and short-term securities make up the bulk of the current assets of software companies.

We begin our discussion of working capital management by focusing on the four principal types of current asset. We look first at the management of inventory. To do business, firms need reserves of raw materials, work in process, and finished goods. But these inventories can be expensive to store and they tie up capital. Therefore, inventory management involves a trade-off between the advantages of holding large inventories and the costs. In manufacturing companies the production manager is best placed to make this judgment, and the financial manager is not usually directly involved in inventory management. So we spend

less time on this topic than on the management of other current assets.

Our second task is to look at **accounts receivable**. Companies frequently sell goods on credit, so that it may be weeks or even months before the company is paid. These unpaid bills are shown in the accounts as receivables. We explain how the company’s credit manager sets the terms for payment, decides which customers should be offered credit, and ensures that they pay promptly.

Our next task is to discuss the firm’s cash balances. The cash manager faces two principal problems. The first is to decide how much cash the firm needs to retain and therefore how much can be invested in interest-bearing securities. The second is to ensure that cash payments are handled efficiently. You don’t want to stuff incoming checks into your desk drawer until you can walk them round to the bank; you want to get the money into your bank account as quickly as possible. We describe some of the techniques that firms use to move money around efficiently.

Cash that is not required immediately is usually invested in a variety of short-term securities. Some of these literally pay off the next day; others may mature in a few months. In Section 30-4 we describe the different features of these securities and show how to compare their yields.

For many firms the problem is not where to invest surplus cash, but how to make good a cash shortfall. In Chapter 24 we reviewed some of the types of long-term debt. In the final section of this chapter we review short-term loans. Many of these are provided by banks, but large companies can also sell their short-term debt directly to investors.

TABLE 30.1

Current assets and liabilities for U.S. manufacturing corporations, 1st quarter, 2009 (figures in \$ billions).

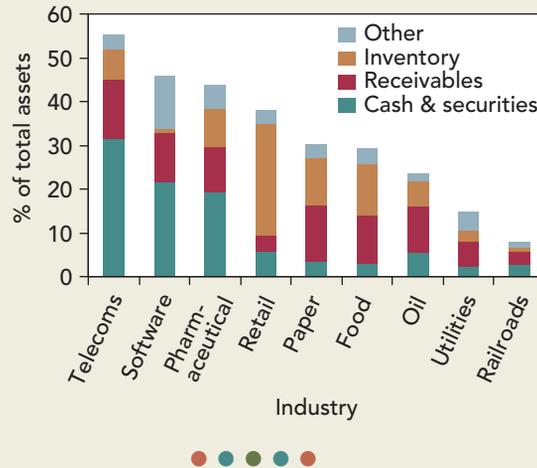
Source: U.S. Census Bureau, *Quarterly Financial Report for U.S. Manufacturing, Mining, and Trade Corporations*, www.census.gov/econ/qfr/index.html.

Current Assets		Current Liabilities	
Cash	\$ 273	\$ 182	Short-term loans
Other short-term financial investments	147	408	Accounts payable
Accounts receivable	601	27	Accrued income taxes
Inventories	626	131	Current payments due on long-term debt
Other current assets	348	768	Other current liabilities
Total	\$1,996	\$1,517	Total

FIGURE 30.1

Current assets as a percentage of total assets in different industries. Figures are the mean percentages for companies in the S&P Composite Index in 2008.

Source: Wharton Research Data Services (WRDS), <http://wrds.wharton.upenn.edu>.



30-1 Inventories

Most firms keep inventories of raw materials, work in process, or finished goods awaiting sale and shipment.

But firms are not obliged to do so. For example, they could buy materials day by day, as needed. But then they would pay higher prices for ordering in small lots, and they would risk production delays if the materials were not delivered on time. They can avoid that risk by ordering more than the firm's immediate needs. Similarly, firms could do away with inventories of finished goods by producing only what they expect to sell tomorrow. But this too could be a dangerous strategy. A small inventory of finished goods may mean shorter and more costly production runs, and it may not be sufficient to meet an unexpected increase in demand.

There are also costs to holding inventories that must be set against these benefits. Money tied up in inventories does not earn interest, storage and insurance must be paid for, and there may be risk of spillage or obsolescence. Therefore, firms need to strike a sensible balance between the benefits of holding inventory and the costs.

EXAMPLE 30.1 • The Inventory Trade-Off

Akron Wire Products uses 255,000 tons a year of wire rod. Suppose that it orders Q tons at a time from the manufacturer. Just before delivery, Akron has effectively no inventories.

Just *after* delivery it has an inventory of Q tons. Thus Akron's inventory of wire rod roughly follows the sawtooth pattern in Figure 30.2.

There are two costs to this inventory. First, each order that Akron places involves a handling and delivery cost. Second, there are carrying costs, such as the cost of storage and the opportunity cost of the capital that is invested in inventory. Akron can reduce the order costs by placing fewer and larger orders. On the other hand, a larger order size

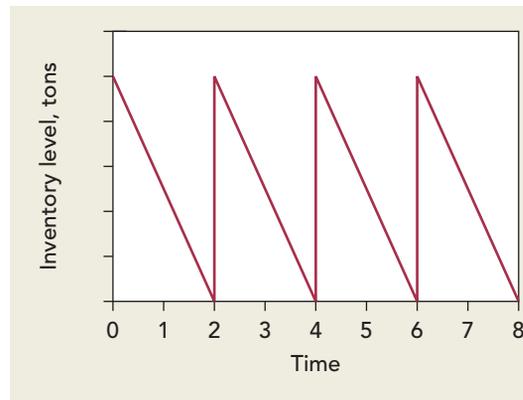


FIGURE 30.2

A simple inventory rule. The company waits until inventories of materials are about to be exhausted and then reorders a constant quantity.

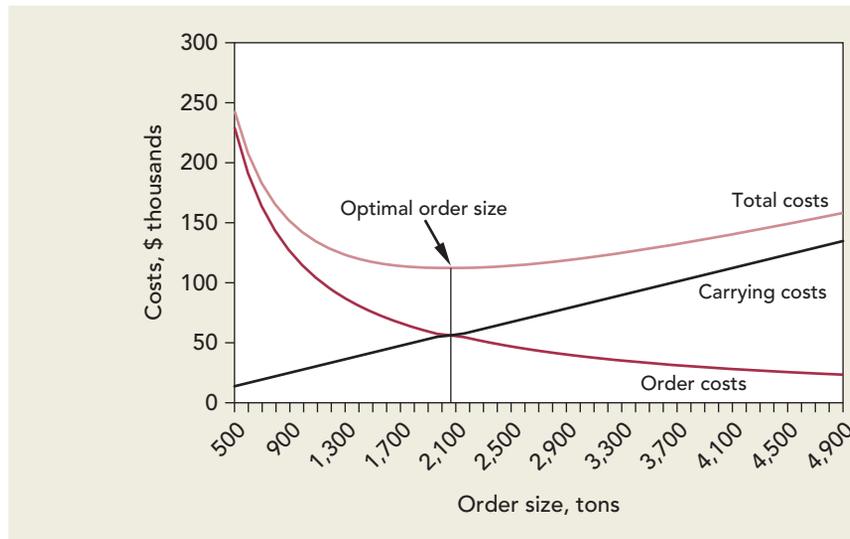


FIGURE 30.3

As the inventory order size is increased, order costs fall and inventory carrying costs rise. Total costs are minimized when the saving in order costs is equal to the increase in carrying costs.

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increases the average quantity held in inventory, so that the carrying costs rise. Good inventory management requires a trade-off between these two types of cost.

This is illustrated in Figure 30.3. We assume here that each order that Akron places involves a fixed order cost of \$450, while the annual carrying cost of the inventory works out at about \$55 a ton. You can see how a larger order size results in lower order costs but higher carrying costs. The sum of the two costs is minimized when the size of each order is $Q = 2,043$ tons.

The optimal order size (2,043 tons in our example) is termed the *economic order quantity*, or *EOQ*.¹ Our example was not wholly realistic. For instance, most firms do not use up their inventory of raw material at a constant rate, and they would not wait until stocks had completely run out before they were replenished. But this simple model does capture some essential features of inventory management:

- Optimal inventory levels involve a trade-off between carrying costs and order costs.
- Carrying costs include the cost of storing goods as well as the cost of capital tied up in inventory.

¹ Where the firm uses up materials at a constant rate as in our example, there is a simple formula for calculating the economic order quantity (or EOQ). Its optimal size = $Q = \sqrt{(2 \times \text{sales} \times \text{cost per order} / \text{carrying cost})}$. In our example $Q = \sqrt{(2 \times 255,000 \times 450 / 55)} = 2,043$ tons.

- A firm can manage its inventories by waiting until they reach some minimum level and then replenish them by ordering a predetermined quantity.²
- When carrying costs are high and order costs are low, it makes sense to place more frequent orders and maintain higher levels of inventory.
- Inventory levels do not rise in direct proportion to sales. As sales increase, the optimal inventory level rises, but less than proportionately.

It seems that carrying costs have been declining, for corporations today get by with lower levels of inventory than they used to. Twenty years ago, inventories held by U.S. companies accounted for 12% of firm assets. Today the figure is about 9%. One way that companies have reduced inventory levels is by moving to a **just-in-time** approach. Just-in-time was pioneered by Toyota in Japan. Toyota keeps inventories of auto parts to a minimum by ordering supplies only as they are needed. Thus deliveries of components to its plants are made throughout the day at intervals as short as one hour. Toyota is able to operate successfully with such low inventories only because it has a set of plans to ensure that strikes, traffic snarl-ups, or other hazards don't halt the flow of components and bring production to a standstill.

Firms are finding that they can also reduce their inventories of finished goods by producing their goods to order. For example, Dell Computer discovered that it did not need to keep a large stock of finished machines. Its customers are able to use the Internet to specify what features they want on their PCs. The computer is then assembled to order and shipped to the customer.³

30-2 Credit Management

We continue our tour of current assets with the firm's *accounts receivable*. When one company sells goods to another, it does not usually expect to be paid immediately. These unpaid bills, or **trade credit**, compose the bulk of accounts receivable. The remainder is made up of **consumer credit**, that is, bills that are awaiting payment by the final customer.

Management of trade credit requires answers to five sets of questions:

1. How long are you going to give customers to pay their bills? Are you prepared to offer a cash discount for prompt payment?
2. Do you require some formal IOU from the buyer or do you just ask him to sign a receipt?
3. How do you determine which customers are likely to pay their bills?
4. How much credit are you prepared to extend to each customer? Do you play it safe by turning down any doubtful prospects? Or do you accept the risk of a few bad debts as part of the cost of building a large regular clientele?
5. How do you collect the money when it becomes due? What do you do about reluctant payers or deadbeats?

We discuss each of these topics in turn.

Terms of Sale

Not all sales involve credit. For example, if you are supplying goods to a wide variety of irregular customers, you may demand cash on delivery (COD). And, if your product is custom-designed, it may be sensible to ask for cash before delivery (CBD) or to ask for progress payments as the work is carried out.

² This is known as a *reorder point* (or *two-bin*) system. Some firms use instead a *periodic review* system, where the firm reviews inventory levels periodically and tops the inventory up to the desired amount.

³ These examples of just-in-time and build-to-order production are taken from T. Murphy, "JIT When ASAP Isn't Good Enough," *Ward's Auto World* (May 1999), pp. 67-73; R. Schreffler, "Alive and Well," *Ward's Auto World* (May 1999), pp. 73-77; "A Long March: Mass Customization," *The Economist*, July 14, 2001, pp. 63-65.

When we look at transactions that do involve credit, we find that each industry seems to have its own particular practices.⁴ These norms have a rough logic. For example, firms selling consumer durables may allow the buyer a month to pay, while those selling perishable goods, such as cheese or fresh fruit, typically demand payment in a week. Similarly, a seller may allow more extended payment if its customers are in a low-risk business, if their accounts are large, if they need time to check the quality of the goods, or if the goods are not quickly resold.

To encourage customers to pay before the final date, it is common to offer a cash discount for prompt settlement. For example, pharmaceutical companies commonly require payment within 30 days but may offer a 2% discount to customers who pay within 10 days. These terms are referred to as “2/10, net 30.”

If goods are bought on a recurrent basis, it may be inconvenient to require separate payment for each delivery. A common solution is to pretend that all sales during the month in fact occur at the end of the month (EOM). Thus goods may be sold on terms of 8/10 EOM, net 60. This arrangement allows the customer a cash discount of 8% if the bill is paid within 10 days of the end of the month; otherwise the full payment is due within 60 days of the invoice date.

Cash discounts are often very large. For example, a customer who buys on terms of 2/10, net 30 may decide to forgo the cash discount and pay on the thirtieth day. This means that the customer obtains an extra 20 days’ credit but pays about 2% more for the goods. This is equivalent to borrowing money at a rate of 44.6% per annum.⁵ Of course, any firm that delays payment beyond the due date gains a cheaper loan but damages its reputation.

The Promise to Pay

Repetitive sales to domestic customers are almost always made on *open account*. The only evidence of the customer’s debt is the record in the seller’s books and a receipt signed by the buyer.

If you want a clear commitment from the buyer before you deliver the goods, you can arrange a **commercial draft**.⁶ This works as follows: You draw a draft ordering payment by the customer and send this to the customer’s bank together with the shipping documents. If immediate payment is required, the draft is termed a *sight draft*; otherwise it is known as a *time draft*. Depending on whether it is a sight draft or a time draft, the customer either pays up or acknowledges the debt by signing it and adding the word *accepted*. The bank then hands the shipping documents to the customer and forwards the money or **trade acceptance** to you, the seller.

If your customer’s credit is shaky, you can ask the customer to arrange for a bank to *accept* the time draft and thereby guarantee the customer’s debt. These **bankers’ acceptances** are often used in overseas trade. The bank guarantee makes the debt easily marketable. If you don’t want to wait for your money, you can sell the acceptance to a bank or to another firm that has surplus cash to invest.

An alternative when you are selling goods overseas is to ask the customer to arrange for an *irrevocable letter of credit*. In this case the customer’s bank sends you a letter stating that it has established a credit in your favor at a bank in the United States. You then know that the money is available and already in the country. You therefore draw a draft on the customer’s bank and present it to your bank together with the letter of credit and the shipping

⁴ Standard credit terms in different industries are reported in O. K. Ng, J. K. Smith, and R. L. Smith, “Evidence on the Determinants of Credit Terms Used in Interfirm Trade,” *Journal of Finance* 54 (June 1999), pp. 1109–1129.

⁵ The cash discount allows you to pay \$98 rather than \$100. If you do not take the discount, you get a 20-day loan, but you pay $2/98 = 2.04\%$ more for your goods. The number of 20-day periods in a year is $365/20 = 18.25$. A dollar invested for 18.25 periods at 2.04% per period grows to $(1.0204)^{18.25} = \$1.446$, a 44.6% return on the original investment. If a customer is happy to borrow at this rate, it’s a good bet that he or she is desperate for cash (or can’t work out compound interest). For a discussion of this issue, see J. K. Smith, “Trade Credit and Information Asymmetry,” *Journal of Finance* 42 (September 1987), pp. 863–872.

⁶ Commercial drafts are sometimes known by the general term *bills of exchange*.

documents. Your bank arranges for this draft to be either accepted or paid, and forwards the documents to the customer's bank.

If you sell your goods to a customer who proves unable to pay, you cannot get your goods back. You simply become a general creditor of the company together with many other unfortunates. You may be able to avoid this situation by making a *conditional sale*, so that you remain the owner of the goods until payment has been made. The conditional sale is common practice in Europe. In the United States it is used only for goods that are bought on an installment basis. So, if you buy a new car and fail to make all the payments, the dealer can repossess the car.

Credit Analysis

There are a number of ways to find out whether customers are likely to pay their debts. For existing customers an obvious indication is whether they have paid promptly in the past. For new customers you can use the firm's financial statements to make your own assessment, or you may be able to look at how highly investors value the firm.⁷ However, the simplest way to assess a customer's credit standing is to seek the views of a specialist in credit assessment. For example, in Chapter 23 we described how bond rating agencies, such as Moody's and Standard and Poor's, provide a useful guide to the riskiness of the firm's bonds.

Bond ratings are usually available only for relatively large firms. However, you can obtain information on many smaller companies from a credit agency. Dun and Bradstreet is by far the largest of these agencies and its database contains credit information on millions of businesses worldwide. Credit bureaus are another source of data on a customer's credit standing. In addition to providing data on small businesses, they can also provide an overall credit score for individuals.⁸

Finally, firms can also ask their bank to undertake a credit check. It will contact the customer's bank and ask for information on the customer's average balance, access to bank credit, and general reputation.

Of course you don't want to subject each order to the same credit analysis. It makes sense to concentrate your attention on the large and doubtful orders.

The Credit Decision

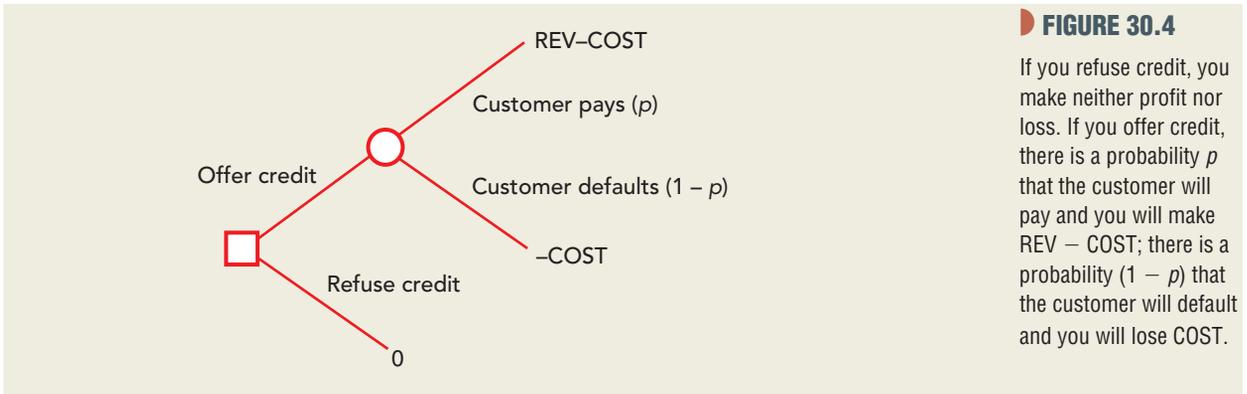
Let us suppose that you have taken the first three steps toward an effective credit operation. In other words, you have fixed your terms of sale; you have decided on the contract that customers must sign; and you have established a procedure for estimating the probability that they will pay up. Your next step is to work out which of your customers should be offered credit.

If there is no possibility of repeat orders, the decision is relatively simple. Figure 30.4 summarizes your choice. On one hand, you can refuse credit. In this case you make neither profit nor loss. The alternative is to offer credit. Suppose that the probability that the customer will pay up is p . If the customer does pay, you receive additional revenues (REV) and you incur additional costs; your net gain is the present value of $REV - COST$. Unfortunately, you can't be certain that the customer will pay; there is a probability $(1 - p)$ of default. Default means that you receive nothing and incur the additional costs. The *expected* profit from each course of action is therefore as follows:

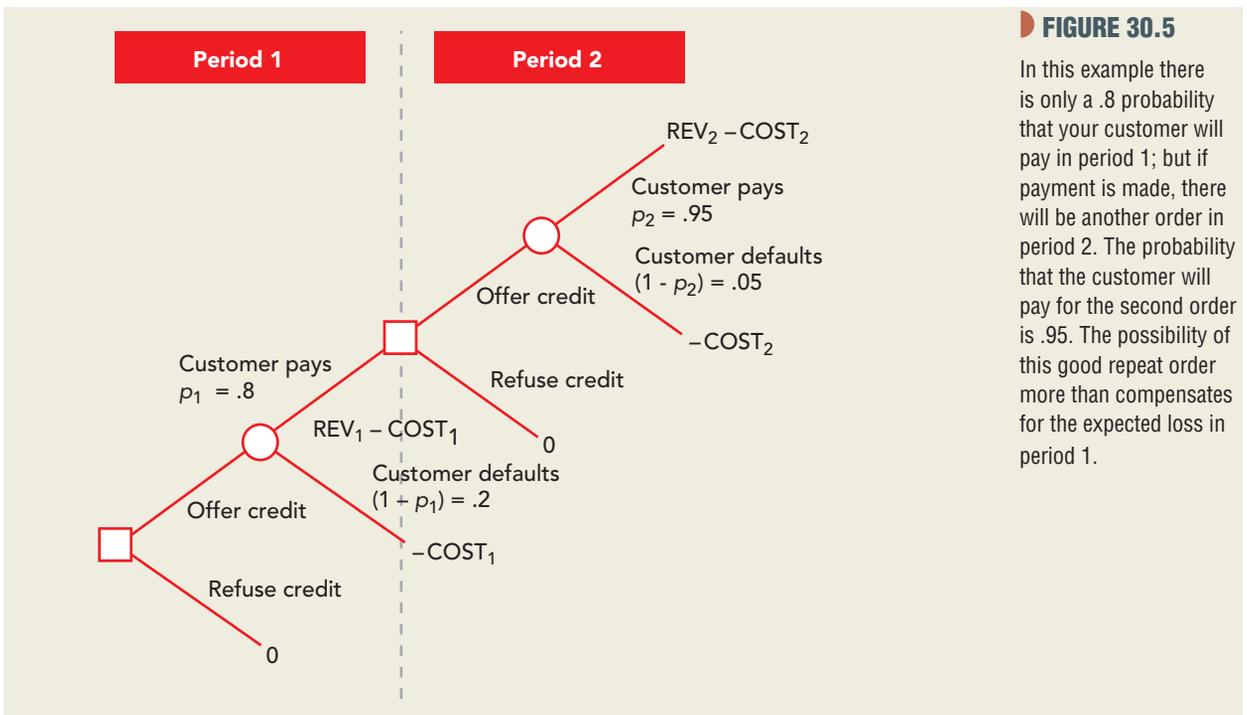
	Expected Profit
Refuse credit	0
Grant credit	$p \text{ PV}(\text{REV} - \text{COST}) - (1 - p) \text{ PV}(\text{COST})$

⁷ We discussed how you can use these sources of information in Section 23-4.

⁸ We discussed credit scoring models in Section 23-4. Credit bureau scores are often called "FICO scores" because most credit bureaus use a credit scoring model developed by Fair Isaac and Company. FICO scores are provided by the three major credit bureaus—Equifax, Experian, and TransUnion.

**FIGURE 30.4**

If you refuse credit, you make neither profit nor loss. If you offer credit, there is a probability p that the customer will pay and you will make $REV - COST$; there is a probability $(1 - p)$ that the customer will default and you will lose $COST$.

**FIGURE 30.5**

In this example there is only a .8 probability that your customer will pay in period 1; but if payment is made, there will be another order in period 2. The probability that the customer will pay for the second order is .95. The possibility of this good repeat order more than compensates for the expected loss in period 1.

You should grant credit if the expected gain from doing so is positive.

Consider, for example, the case of the Cast Iron Company. On each nondelinquent sale Cast Iron receives revenues with a present value of \$1,200 and incurs costs with a value of \$1,000. Therefore the company's expected profit if it offers credit is

$$p \text{ PV}(\text{REV} - \text{COST}) - (1 - p)\text{PV}(\text{COST}) = p \times 200 - (1 - p) \times 1,000$$

If the probability of collection is $5/6$, Cast Iron can expect to break even:

$$\text{Expected profit} = \frac{5}{6} \times 200 - \left(1 - \frac{5}{6}\right) \times 1,000 = 0$$

Therefore Cast Iron's policy should be to grant credit whenever the chances of collection are better than 5 out of 6.

So far we have ignored the possibility of repeat orders. But one of the reasons for offering credit today is that it may help to get yourself a good, regular customer. Figure 30.5 illustrates the problem. Cast Iron has been asked to extend credit to a new customer. You can find little information on the firm, and you believe that the probability of payment is no better than .8. If you grant credit, the expected profit on this customer's order is

$$\begin{aligned}\text{Expected profit on initial order} &= p_1 \text{PV}(\text{REV} - \text{COST}) - (1 - p_1) \text{PV}(\text{COST}) \\ &= (.8 \times 200) - (.2 \times 1,000) = -\$40\end{aligned}$$

You decide to refuse credit.

This is the correct decision if there is no chance of a repeat order. But look again at the decision tree in Figure 30.5. If the customer does pay up, there will be a repeat order next year. Because the customer has paid once, you can be 95% sure that he or she will pay again. For this reason any repeat order is very profitable:

$$\begin{aligned}\text{Next year's expected profit on repeat order} &= p_2 \text{PV}(\text{REV} - \text{COST}) \\ &\quad - (1 - p_2) \text{PV}(\text{COST}) \\ &= (.95 \times 200) - (.05 \times 1,000) = \$140\end{aligned}$$

Now you can reexamine today's credit decision. If you grant credit today, you receive the expected profit on the initial order *plus* the possible opportunity to extend credit next year:

$$\begin{aligned}\text{Total expected profit} &= \text{expected profit on initial order} \\ &\quad + \text{probability of payment and repeat order} \\ &\quad \times \text{PV (next year's expected profit on repeat order)} \\ &= -40 + .80 \times \text{PV}(140)\end{aligned}$$

At any reasonable discount rate, you ought to extend credit. Notice that you should do so even though you expect to take a loss on the initial order. The expected loss is more than outweighed by the possibility that you will secure a reliable and regular customer. Cast Iron is not committed to making further sales to the customer, but by extending credit today, it gains a valuable *option* to do so. It will exercise this option only if the customer demonstrates its creditworthiness by paying promptly.

Of course real-life situations are generally far more complex than our simple Cast Iron examples. Customers are not all good or all bad. Many of them pay consistently late; you get your money, but it costs more to collect and you lose a few months' interest. Then there is the uncertainty about repeat sales. There may be a good chance that the customer will give you further business, but you can't be sure of that and you don't know for how long she will continue to buy.

Like almost all financial decisions, credit allocation involves a strong dose of judgment. Our examples are intended as reminders of the issues involved rather than as cookbook formulas. Here are the basic things to remember.

1. *Maximize profit.* As credit manager, you should not focus on minimizing the number of bad accounts; your job is to maximize expected profit. You must face up to the following facts: The best that can happen is that the customer pays promptly; the worst is default. In the best case, the firm receives the full additional revenues from the sale less the additional costs; in the worst, it receives nothing and loses the costs. You must weigh the chances of these alternative outcomes. If the margin of profit is high, you are justified in a more liberal credit policy; if it is low, you cannot afford many bad debts.⁹
2. *Concentrate on the dangerous accounts.* You should not expend the same effort on analyzing all credit applications. If an application is small or clear-cut, your decision should

⁹ Look back at our Cast Iron example, where we concluded that the company is justified in granting credit if the probability of collection is greater than 5/6. If the customer pays, Cast Iron will earn a profit margin of $200/1200 = 1/6$. In other words, the company is justified in granting credit if the probability of payment exceeds $1 - \text{profit margin}$.

be largely routine; if it is large or doubtful, you may do better to move straight to a detailed credit appraisal. Most credit managers don't make decisions on an order-by-order basis. Instead, they set a credit limit for each customer. The sales representative is required to refer the order for approval only if the customer exceeds this limit.

3. *Look beyond the immediate order.* The credit decision is a dynamic problem. You cannot look only at the present. Sometimes it may be worth accepting a relatively poor risk as long as there is a good chance that the customer will become a regular and reliable buyer. New businesses must, therefore, be prepared to incur more bad debts than established businesses. This is part of the cost of building a good customer list.

Collection Policy

The final step in credit management is to collect payment. When a customer is in arrears, the usual procedure is to send a statement of account and to follow this at intervals with increasingly insistent letters or telephone calls. If none of these has any effect, most companies turn the debt over to a collection agent or an attorney.

Large firms can reap economies of scale in record keeping, billing, and so on, but the small firm may not be able to support a fully fledged credit operation. However, the small firm may be able to obtain some scale economies by farming out part of the job to a **factor**. This arrangement is known as **factoring**.

Factoring typically works as follows. The factor and the client agree on a credit limit for each customer. The client then notifies the customer that the factor has purchased the debt. Thereafter, whenever the client makes a sale to an approved customer, it sends a copy of the invoice to the factor, and the customer makes payment directly to the factor. Most commonly the factor does not have any recourse to the client if the customer fails to pay, but sometimes the client assumes the risk of bad debts. There are, of course, costs to factoring, and the factor typically charges a fee of 1% or 2% for administration and a roughly similar sum for assuming the risk of nonpayment. In addition to taking over the task of debt collection, most factoring agreements also provide financing for receivables. In these cases the factor pays the client 70% to 80% of the value of the invoice in advance at an agreed interest rate. Of course, factoring is not the only way to finance receivables; firms can also raise money by borrowing against their receivables.

Factoring is fairly prevalent in Europe, but in the United States it accounts for only a small proportion of debt collection. It is most common in industries such as clothing and toys. These industries are characterized by many small producers and retailers that do not have long-term relationships with each other. Because a factor may be employed by a number of manufacturers, it sees a larger proportion of the transactions than any single firm, and therefore is better placed to judge the creditworthiness of each customer.¹⁰

If you don't want help with collection but do want protection against bad debts, you can obtain credit insurance. For example, most governments have established agencies to insure export business. In the United States this insurance is provided by the *Export-Import Bank* in association with a group of insurance companies known as the *Foreign Credit Insurance Association (FCIA)*. Banks are much more willing to lend when exports have been insured.

There is always a potential conflict of interest between the collection operation and the sales department. Sales representatives commonly complain that they no sooner win new customers than the collection department frightens them off with threatening letters. The collection manager, on the other hand, bemoans the fact that the sales force is concerned only with winning orders and does not care whether the goods are subsequently paid for.

¹⁰ This point is made in S. L. Mian and C. W. Smith, Jr., "Accounts Receivable Management Policy: Theory and Evidence," *Journal of Finance* 47 (March 1992), pp. 169–200.

There are also many instances of cooperation between the sales force and the collection department. For example, the specialty chemical division of a major pharmaceutical company actually made a business loan to an important customer that had been suddenly cut off by its bank. The pharmaceutical company bet that it knew its customer better than the customer's bank did. The bet paid off. The customer arranged alternative bank financing, paid back the pharmaceutical company, and became an even more loyal customer. It was a nice example of financial management supporting sales.

It is not common for suppliers to make business loans in this way, but they lend money indirectly whenever they allow a delay in payment. Trade credit can be an important source of funds for indigent customers that cannot obtain a bank loan. But that raises an important question: if the bank is unwilling to lend, does it make sense for you, the supplier, to continue to extend trade credit? Here are two possible reasons that it may make sense: First, as in the case of our pharmaceutical company, you may have more information than the bank about the customer's business. Second, you need to look beyond the immediate transaction and recognize that your firm may stand to lose some profitable future sales if the customer goes out of business.¹¹

30-3 Cash

Short-term securities pay interest, cash doesn't. So why do corporations and individuals hold billions of dollars in cash and demand deposits? Why, for example, don't you take all *your* cash and invest it in interest-bearing securities? The answer of course is that cash gives you more *liquidity* than do securities. You can use it to buy things. It is hard enough to get New York cab drivers to give you change for a \$20 bill, but try asking them to split a Treasury bill.

In equilibrium all assets in the same risk class are priced to give the same expected marginal benefit. The benefit from holding Treasury bills is the interest that you receive; the benefit from holding cash is that it gives you a convenient store of liquidity. In equilibrium the marginal value of this liquidity is equal to the marginal value of the interest on Treasury bills. This is just another way of saying that Treasury bills have zero net present value; they are fair value relative to cash.

Does this mean that it does not matter how much cash you hold? Of course not. The marginal value of liquidity declines as you hold increasing amounts of cash. When you have only a small proportion of your wealth in cash, a little extra can be extremely useful; when you have a substantial holding, any additional liquidity is not worth much. Therefore, as financial manager you want to hold cash balances up to the point where the marginal value of the liquidity is equal to the value of the interest foregone.

In choosing between cash and short-term securities, the financial manager faces a task like that of the production manager. After all, cash is just another raw material that you need to do business, and there are costs and benefits to holding large "inventories" of cash. If the cash were invested in securities, it would earn interest. On the other hand, you can't use those securities to pay the firm's bills. If you had to sell them every time you needed to pay a bill, you could incur heavy transactions costs. The financial manager must trade off the cost of keeping an inventory of cash (the lost interest) against the benefits (the saving on transactions costs).

For small firms this trade-off can be important. But for very large firms the transactions costs of buying and selling securities become trivial compared with the opportunity cost of holding idle cash balances. Suppose that the interest rate is 5% a year, or roughly $5/365 = .0137\%$ per day. Then the daily interest earned by \$1 million is $.000137 \times 1,000,000 = \137 . Even at a cost of

¹¹ Of course, banks also need to recognize the possibility of continuing business from the firm. The question therefore is whether suppliers have a *greater* stake in the firm's continuing prosperity. For some evidence on the determinants of the supply and demand for trade credit, see M. A. Petersen and R. G. Rajan, "Trade Credit: Theories and Evidence," *Review of Financial Studies* 10 (Fall 1997), pp. 661-692.

\$50 per transaction, which is generously high, it pays to buy Treasury bills today and sell them tomorrow rather than to leave \$1 million idle overnight. Consider Wal-Mart, which has annual sales of about \$400 billion and an average daily cash flow of \$400,000,000,000/365, or \$1.1 billion. Firms of this size generally end up buying or selling securities once a day every day.

Banks have developed ways to help firms to invest idle cash. For example, they may provide **sweep programs**, where the bank automatically “sweeps” surplus funds into an interest-bearing investment, such as a money-market mutual fund.

Why then do large firms hold any significant amounts of cash? There are basically two reasons. First, cash may be left in non-interest-bearing accounts to compensate banks for the services they provide. Second, large corporations may have literally hundreds of accounts with dozens of different banks. It is often better to leave idle cash in these accounts than to monitor each account daily and make daily transfers among them.

One major reason for this proliferation of bank accounts is decentralized management. You cannot give a subsidiary operating autonomy without giving its managers the right to spend and receive cash. Good cash management nevertheless implies some degree of centralization. It is impossible to maintain your desired cash inventory if all the subsidiaries in the group are responsible for their own private pools of cash. And you certainly want to avoid situations in which one subsidiary is investing its spare cash at 5% while another is borrowing at 8%. It is not surprising, therefore, that even in highly decentralized companies there is generally central control over cash balances and bank relations.

How Purchases Are Paid For

Most small, face-to-face purchases are made with dollar bills. But you probably would not want to use cash to buy a new car, and you can't use cash to make a purchase over the Internet. There are a variety of ways that you can pay for larger purchases or send payments to another location. Some of the more important ways are set out in Table 30.2.

Look now at Figure 30.6. You can see that there are large differences in the ways that people around the world pay for their purchases. For example, checks are almost unknown in Germany, the Netherlands, and Sweden.¹² Most payments in these countries are by debit card or credit transfer. By contrast, Americans love to write checks. Each year individuals and firms in the United States write about 31 billion checks.

Check When you write a check, you are instructing your bank to pay a specified sum on demand to the particular firm or person named on the check.

Credit card A credit card, such as a Visa card or MasterCard, gives you a line of credit that allows you to make purchases up to a specified limit. At the end of each month, either you pay the credit card company in full for these purchases or you make a specified minimum payment and are charged interest on the outstanding balance.

Charge card A charge card may look like a credit card and you can spend money with it as with a credit card. But with a charge card the day of reckoning comes at the end of each month, when you must pay for all purchases that you have made. In other words, you must pay off the entire balance each month.

Debit card A debit card allows you to have your purchases from a store charged directly to your bank account. The deduction is usually made electronically and is immediate. Often, debit cards may be used to make withdrawals from a cash machine (ATM).

Credit transfer With a credit transfer you ask your bank to set up a standing order to make a regular set payment to a supplier. For example, standing orders are often used to make regular fixed mortgage payments.

Direct payment A direct payment (or debit) is an instruction to your bank to allow a company to collect varying amounts from your account, as long as you have been given advance notice of the amount and date. For example, an electric utility company may ask you to arrange an automatic payment of your electricity bills from your bank account.

TABLE 30.2

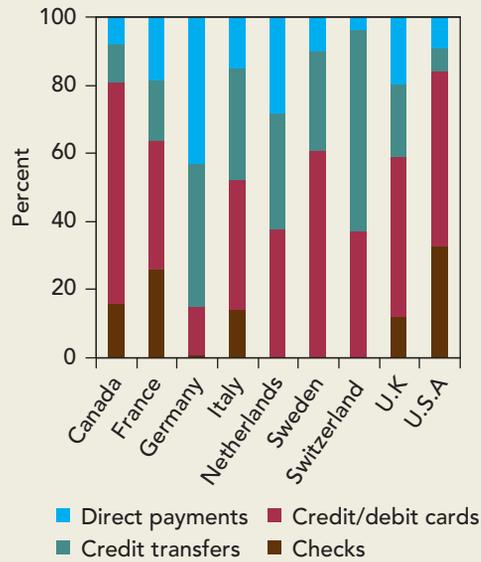
Small, face-to-face purchases are commonly paid for with cash, but here are some of the other ways to pay your bills.

¹² For a discussion of the reasons for these international differences in payment methods, see “Retail Payments in Selected Countries: A Comparative Study,” Committee on Payment and Settlement Systems, Bank for International Settlements, Basel, Switzerland, September 1999.

FIGURE 30.6

How purchases are paid for. Percentage of total volume of cashless transactions, 2007. (Data exclude small usage of card-based e-money.)

Source: Bank for International Settlements, "Statistics on Payment and Settlement Systems in Selected Countries," March 2009, www.bis.org/publ/cpss86.htm.



But throughout the world the use of checks is on the decline. For one-off purchases they are being replaced by credit or debit cards. In addition mobile phone technology and the Internet are encouraging the development of new infant payment systems. For example,

- Electronic bill presentment and payment (or EBPP) allows companies to bill customers and receive payments via the Internet. EBPP is forecasted to grow rapidly. Already in Finland two out of three people regard the Internet as the most typical medium for paying bills.
- Stored-value cards (or e-money) let you transfer cash value to a card that can be used to buy a variety of goods and services. For example, Hong Kong's Octopus card system, which was developed to pay for travel fares, has become a widely used electronic cash system throughout the territory.

There are three main ways that firms send and receive money electronically. These are direct payments, direct deposits, and wire transfers.

Recurring expenditures, such as utility bills, mortgage payments, and insurance premiums, are increasingly settled by *direct payment* (also called *automatic debit* or *direct debit*). In this case the firm's customers simply authorize it to debit their bank account for the amount due. The company provides its bank with a file showing details of each customer, the amount to be debited, and the date. The payment then travels electronically through the **Automated Clearing House (ACH)** system. The firm knows exactly when the cash is coming in and avoids the labor-intensive process of handling thousands of checks.

The ACH system also allows money to flow in the reverse direction. Thus while a *direct payment* transaction provides an automatic debit, a *direct deposit* constitutes an automatic credit. Direct deposits are used to make bulk payments such as wages or dividends. Again the company provides its bank with a file of instructions. The bank then debits the company's account and transfers the cash via the ACH to the bank accounts of the firm's employees or shareholders.

The volume of direct payments and deposits has increased rapidly. Over 50% of U.S. households now use direct payment for recurring expenditures and nearly three-quarters of

	Volume (millions)	Value (\$ trillions)
Checks (2007)	29,000	\$ 42
ACH direct payments and deposits	15,000	30
Fedwire	190	986
Chips	92	509

TABLE 30.3 Use of Payment Systems in the United States, 2008.

Sources: www.federalreserve.gov, www.nacha.org, and www.chips.org.

employees are paid by direct deposit. You can see from Table 30.3 that the total value of ACH transactions is approaching that of checks.¹³

Large-value payments between companies are usually made electronically through Fedwire or CHIPS. Fedwire is operated by the Federal Reserve system, and connects nearly 9,000 financial institutions to the Fed and thereby to each other.¹⁴ CHIPS is a bank-owned system serving more than 1,400 U.S. financial institutions and hundreds of international participants. It mainly handles eurodollar payments and foreign exchange transactions, and is used for over 95% of cross-border payments in dollars.

Table 30.3 shows that the *number* of payments by Fedwire and CHIPS is relatively small, but the sums involved are huge. Both systems are fast and low risk, but they are also relatively expensive. For example, a Fedwire transaction might cost \$20 for each party, whereas an ACH payment might cost 10 to 20 cents. Consequently, where urgency is not an issue, companies sometimes turn to ACH for large-value payments.

Speeding Up Check Collections

Although checks are rarely used for large-value payments, they continue to be the most common method of payment for smaller nonrecurring transactions. About three-quarters of business-to-business (B2B) transactions in the United States are still made by check.

Check handling is a cumbersome and labor-intensive task. However, recent changes to legislation in the United States have helped to reduce costs and speed up collections. The Check Clearing for the 21st Century Act, usually known as Check 21, allows banks to send digital images of checks to one another rather than sending the checks themselves. As the new technology becomes more widespread, there will be fewer cargo planes crisscrossing the country to take bundles of checks from one bank to another. The cost of processing checks is also being reduced by a technological innovation known as check conversion. In this case, when you write a check, the details of your bank account and the amount of the payment are automatically captured at the point of sale, your check is handed back to you, and your bank account is immediately debited.

Firms that receive a large volume of checks have devised a number of ways to ensure that the cash becomes available as quickly as possible. For example, a retail chain may arrange for each branch to deposit receipts in a collection account at a local bank. Surplus funds are then periodically transferred electronically to a **concentration account** at one of the company's principal banks. There are two reasons that concentration banking allows the company to gain quicker use of its funds. First, because the store is nearer to the bank, transfer times are reduced. Second, because the customer's check is likely to be drawn on a local bank, the time taken to clear the check is also reduced.

¹³ The Automated Clearing House also handles the growing number of check conversion transactions (see below) and nonrecurring transactions made by telephone or over the Internet.

¹⁴ Fedwire is a *real-time, gross settlement system*, which means that each transaction over Fedwire is settled individually and immediately. With a net settlement system transactions are put into a pot and periodically netted off before being settled. CHIPS is an example of a net system that settles at frequent intervals.

Concentration banking is often combined with a **lockbox system**. In this case the firm's customers are instructed to send their payments to a regional post-office box. The local bank then takes on the administrative chore of emptying the box and depositing the checks in the company's local deposit account.

International Cash Management

Cash management in domestic firms is child's play compared with cash management in large multinational corporations operating in dozens of countries, each with its own currency, banking system, and legal structure.

A single centralized cash management system is an unattainable ideal for these companies, although they are edging toward it. For example, suppose that you are treasurer of a large multinational company with operations throughout Europe. You could allow the separate businesses to manage their own cash, but that would be costly and would almost certainly result in each one accumulating little hoards of cash. The solution is to set up a regional system. In this case the company establishes a local concentration account with a bank in each country. Any surplus cash is swept daily into a central multicurrency account in London or another European banking center. This cash is then invested in marketable securities or used to finance any subsidiaries that have a cash shortage.

Payments can also be made out of the regional center. For example, to pay wages in each European country, the company just needs to send its principal bank a computer file of the payments to be made. The bank then finds the least costly way to transfer the cash from the company's central accounts and arranges for the funds to be credited on the correct day to the employees in each country.

Rather than physically moving funds between local bank accounts and a regional concentration account, the company may employ a multinational bank with branches in each country and then arrange for the bank to *pool* all the cash surpluses and shortages. In this case no money is transferred between accounts. Instead, the bank just adds together the credit and debit balances, and pays the firm interest at its lending rate on any surplus.

When a company's international branches trade with each other, the number of cross-border transactions can multiply rapidly. Rather than having payments flowing in all directions, the company can set up a netting system. Each branch can then calculate its net position and undertake a single transaction with the netting center. Several industries have set up netting systems for their members. For example, over 200 airlines have come together to establish a netting system for the foreign currency payments that they must make to each other.

Paying for Bank Services

Much of the work of cash management—processing checks, transferring funds, running lockboxes, helping keep track of the company's accounts—is done by banks. And banks provide many other services not so directly linked to cash management, such as handling payments and receipts in foreign currency, or acting as custodian for securities.

All these services need to be paid for. Usually payment is in the form of a monthly fee, but banks may agree to waive the fee as long as the firm maintains a minimum average balance in an interest-free deposit. Banks are prepared to do this, because, after setting aside a portion of the money in a reserve account with the Fed, they can relend the money to earn interest. Demand deposits earmarked to pay for bank services are termed *compensating balances*. They used to be a very common way to pay for bank services, but since banks have been permitted to pay interest on demand deposits there has been a steady trend away from using compensating balances and toward direct fees.

30-4 Marketable Securities

In June 2008 Microsoft was sitting on a \$24.3 billion mountain of cash and fixed income investments, amounting to a third of the company's total assets.¹⁵ The company kept \$3.3 billion in the bank to support day-to-day operations and invested the surplus as follows:

Fixed Income Investments	Value at Cost (\$ millions)
Mutual funds	\$ 1,044
Commercial paper	787
Certificates of deposit	1,580
U.S. government and agency securities	4,200
Foreign government bonds	3,466
Mortgage-backed securities	3,628
Corporate notes and bonds	5,013
Municipal securities	761
Other investments	520
Total	\$20,999

Most companies do not have the luxury of such huge cash surpluses, but they also park any cash that is not immediately needed in short-term investments. The market for these investments is known as the **money market**. The money market has no physical marketplace. It consists of a loose collection of banks and dealers linked together by telephones or through the Web. But a huge volume of securities is regularly traded on the money market, and competition is vigorous.

Most large corporations manage their own money-market investments, but small companies sometimes find it more convenient to hire a professional investment management firm or to put their cash into a money-market fund. This is a mutual fund that invests only in low-risk, short-term securities.¹⁶ Despite its large cash surplus, Microsoft invested a small proportion of its money in money-market funds.

The relative safety of money-market funds has made them particularly popular at times of financial stress. During the credit crunch of 2008 fund assets mushroomed as investors fled from plunging stock markets. Then it was revealed that one fund, the Reserve Primary Fund, had incurred heavy losses on its holdings of Lehman Brothers' commercial paper. The fund became only the second money-market fund in history to "break the buck," by offering just 97 cents on the dollar to investors who cashed in their holdings. That week investors pulled nearly \$200 billion out of money-market funds, prompting the government to offer emergency insurance to investors.

Calculating the Yield on Money-Market Investments

Many money-market investments are pure discount securities. This means that they don't pay interest. The return consists of the difference between the amount you pay and the amount you receive at maturity. Unfortunately, it is no good trying to persuade the Internal Revenue Service that this difference represents capital gain. The IRS is wise to that one and will tax your return as ordinary income.

¹⁵ We described in Chapter 16 how Microsoft decided in July 2004 to pay out a large part of its surplus cash to shareholders.

¹⁶ We discussed money-market funds in Section 17-3.

Interest rates on money-market investments are often quoted on a discount basis. For example, suppose that three-month bills are issued at a discount of 5%. This is a rather complicated way of saying that the price of a three-month bill is $100 - (3/12) \times 5 = 98.75$. Therefore, for every \$98.75 that you invest today, you receive \$100 at the end of three months. The return over three months is $1.25/98.75 = .0127$, or 1.27%. This is equivalent to an annual yield of 5.18%. Note that the return is always higher than the discount. When you read that an investment is selling at a discount of 5%, it is very easy to slip into the mistake of thinking that this is its return.¹⁷

Yields on Money-Market Investments

When we value long-term debt, it is important to take account of default risk. Almost anything may happen in 30 years, and even today's most respectable company may get into trouble eventually. Therefore, corporate bonds offer higher yields than Treasury bonds.

Short-term debt is not risk-free either. When California was mired in the energy crisis of 2001, Southern California Edison and Pacific Gas and Electric were forced to suspend payments on nearly \$1 billion of maturing commercial paper.¹⁸ However, such examples are exceptions; in general, the danger of default is less for money-market securities issued by corporations than for corporate bonds. There are two reasons for this. First, the range of possible outcomes is smaller for short-term investments. Even though the distant future may be clouded, you can usually be confident that a particular company will survive for at least the next month. Second, for the most part only well-established companies can borrow in the money market. If you are going to lend money for just a few days, you can't afford to spend too much time in evaluating the loan. Thus, you will consider only blue-chip borrowers.

Despite the high quality of money-market investments, there are often significant differences in yield between corporate and U.S. government securities. Why is this? One answer is the risk of default. Another is that the investments have different degrees of liquidity or "moneyness." Investors like Treasury bills because they are easily turned into cash on short notice. Securities that cannot be converted so quickly and cheaply into cash need to offer relatively high yields. During times of market turmoil investors may place a particularly high value on having ready access to cash. On these occasions the yield on illiquid securities can increase dramatically.

The International Money Market

In Chapter 24 we pointed out that there are two main markets for dollar bonds. There is the domestic market in the United States and there is the eurobond market centered in London. Similarly, in addition to the domestic money market, there is also an international market for short-term dollar investments, which is known as the *eurodollar* market.

Eurodollars have nothing to do with the euro, the currency of the European Monetary Union (EMU). They are simply dollars deposited in a bank in Europe. For example, suppose that an American oil company buys crude oil from an Arab sheik and pays for it with a \$1 million check drawn on JP Morgan Chase. The sheik then deposits the check with his account at Barclays Bank in London. As a result, Barclays has an asset in the form of a \$1 million credit in its account with JP Morgan Chase. It also has an offsetting liability in the form of a dollar deposit. Since that dollar deposit is placed in Europe, it is called a eurodollar deposit.¹⁹

¹⁷ To confuse things even more, dealers in the money market often quote rates as if there were only 360 days in a year. So a discount of 5% on a bill maturing in 91 days translates into a price of $100 - 5 \times (91/360) = 98.74\%$.

¹⁸ Commercial paper is short-term debt issued by corporations. We describe it in Section 30-5.

¹⁹ The sheik could equally well deposit the check with the London branch of a U.S. bank or a Japanese bank. He would still have made a eurodollar deposit.

Just as there is both a domestic U.S. money market and a eurodollar market, so there is both a domestic Japanese money market and a market in London for euroyen. So, if a U.S. corporation wishes to make a short-term investment in yen, it can deposit the yen with a bank in Tokyo or it can make a euroyen deposit in London. Similarly, there is both a domestic money market in the euro area as well as a money market for euros in London.²⁰ And so on.

Major international banks in London lend dollars to one another at the *London interbank offered rate* (LIBOR). Similarly, they lend yen to each other at the yen LIBOR interest rate, and they lend euros at the **euro interbank offered rate**, or **Euribor**. These interest rates are used as a benchmark for pricing many types of short-term loans in the United States and in other countries. For example, a corporation in the United States may issue a floating-rate note with interest payments tied to dollar LIBOR.

If we lived in a world without regulation and taxes, the interest rate on a eurodollar loan would have to be the same as the rate on an equivalent domestic dollar loan. However, the international debt markets thrive because governments attempt to regulate domestic bank lending. When the U.S. government limited the rate of interest that banks in the United States could pay on domestic deposits, companies could earn a higher rate of interest by keeping their dollars on deposit in Europe. As these restrictions have been removed, differences in interest rates have largely disappeared.

In the late 1970s the U.S. government was concerned that its regulations were driving business overseas to foreign banks and the overseas branches of American banks. To attract some of this business back to the States, the government in 1981 allowed U.S. and foreign banks to establish **international banking facilities (IBFs)**. An IBF is the financial equivalent of a free-trade zone; it is physically located in the United States, but it is not required to maintain reserves with the Federal Reserve and depositors are not subject to any U.S. tax.²¹ However, there are tight restrictions on what business an IBF can conduct. In particular, it cannot accept deposits from domestic U.S. corporations or make loans to them.

Money-Market Instruments

The principal money-market instruments are summarized in Table 30.4. We describe each in turn.

U.S. Treasury Bills The first item in Table 30.4 is U.S. Treasury bills. These are usually issued weekly and mature in four weeks, three months, six months, or one year.²² Sales are by a uniform-price auction. This means that all successful bidders are allotted bills at the same price.²³ You don't have to participate in the auction to invest in Treasury bills. There is also an excellent secondary market in which billions of dollars of bills are bought and sold every week.

Federal Agency Securities “Agency securities” is a general term used to describe issues by government agencies and government sponsored enterprises (GSEs). Although most of this debt is not guaranteed by the U.S. government,²⁴ investors have generally assumed that the

²⁰ Occasionally (but only occasionally) referred to as “euroeuros.”

²¹ For these reasons dollars held on deposit in an IBF are classed as eurodollars.

²² Three-month bills actually mature 91 days after issue, six-month bills mature in 182 days, and one-year bills mature in 364 days. For information on bill auctions, see www.publicdebt.treas.gov.

²³ A small proportion of bills is sold to *noncompetitive* bidders. Noncompetitive bids are filled at the same price as the successful competitive bids.

²⁴ Exceptions are the Government National Mortgage Association (Ginnie Mae), the Small Business Administration, the General Services Administration (GSA), the Financial Assistance Corporation, the Agency for International Development, and the Private Export Funding Corporation. Their debts are backed by the “full faith and credit” of the U.S. government.

Investment	Borrower	Maturities When Issued	Marketability	Basis for Calculating Interest	Comments
Treasury bills	U.S. government	4 weeks, 3 months, 6 months, or 1 year	Excellent secondary market	Discount	Auctioned weekly
Federal agency benchmark bills and discount notes	FHLB, "Fannie Mae," "Sallie Mae," "Freddie Mac," etc.	Overnight to 360 days	Very good secondary market	Discount	Benchmark bills by regular auction; discount notes sold through dealers
Tax-exempt municipal notes	Municipalities, states, school districts, etc.	3 months to 1 year	Good secondary market	Usually interest-bearing with interest at maturity	Tax-anticipation notes (TANs), revenue anticipation notes (RANs), bond anticipation notes (BANs), etc.
Tax-exempt variable-rate demand notes (VRDNs)	Municipalities, states, state universities, etc.	10 to 40 years	Good secondary market	Variable interest rate	Long-term bonds with put options to demand repayment
Nonnegotiable time deposits and negotiable certificates of deposit (CDs)	Commercial banks, savings and loans	Usually 1 to 3 months; also longer-maturity variable-rate CDs	Fair secondary market for negotiable CDs	Interest-bearing with interest at maturity	Receipt for time deposit
Commercial paper (CP)	Industrial firms, finance companies, and bank holding companies; also municipalities	Maximum 270 days; usually 60 days or less	Dealers or issuer will repurchase paper	Usually discount	Unsecured promissory note; may be placed through dealer or directly with investor
Medium-term notes (MTNs)	Largely finance companies and banks; also industrial firms	Minimum 270 days; usually less than 10 years	Dealers will repurchase notes	Interest-bearing; usually fixed rate	Unsecured promissory note placed through dealer
Bankers' acceptances (BAs)	Major commercial banks	1 to 6 months	Fair secondary market	Discount	Demand to pay that has been accepted by a bank
Repurchase agreements (repos)	Dealers in U.S. government securities	Overnight to about 3 months; also open repos (continuing contracts)	No secondary market	Repurchase price set higher than selling price; difference quoted as repo interest rate	Sales of government securities by dealer with simultaneous agreement to repurchase

TABLE 30.4 Money-market investments in the United States.

government would step in to prevent a default. That view was reinforced in 2008, when the two giant mortgage companies, the Federal National Mortgage Association (Fannie Mae) and the Federal Home Loan Mortgage Corporation (Freddie Mac) ran into trouble and were taken into government ownership.

Agencies and GSEs borrow both short and long term. The short-term debt consists of discount notes, which are similar to Treasury bills. They are very actively traded and often held by corporations. These notes have traditionally offered somewhat higher yields than U.S. Treasuries. One reason is that agency debt is not quite as marketable as Treasury issues. In addition, unless the debt has an explicit government guarantee, investors have demanded an extra return to compensate for the (small?) possibility that the government would allow the agency to default.

Short-Term Tax-Exempts Short-term notes are also issued by states, municipalities, and agencies such as state universities and school districts.²⁵ These have one particular attraction—the interest is not subject to federal tax.²⁶ Of course, this tax advantage of municipal debt is recognized in its price. Typically, triple-A municipal debt has yielded 10% to 30% less than equivalent Treasury debt.

Most tax-exempt debt is relatively low risk, and is often backed by an insurance policy, which promises to pay out if the municipality is about to default.²⁷ However, in the turbulent markets of 2008 even the backing of an insurance company did little to reassure investors, who worried that the insurers themselves could be in trouble. The tax advantage of “munis” no longer seemed quite so important and their yields climbed above those on Treasuries.

Variable-Rate Demand Notes There is no law preventing firms from making short-term investments in long-term securities. If a firm has \$1 million set aside for an income tax payment, it could buy a long-term bond on January 1 and sell it on April 15, when the taxes must be paid. However, the danger with this strategy is obvious. What happens if bond prices fall by 10% between January and April? There you are with a \$1 million liability to the Internal Revenue Service, bonds worth only \$900,000, and a very red face. Of course, bond prices could also go up, but why take the chance? Corporate treasurers entrusted with excess funds for short-term investments are naturally averse to the price volatility of long-term bonds.

One solution is to buy municipal variable-rate demand notes (VRDNs). These are long-term securities, whose interest payments are linked to the level of short-term interest rates. Whenever the interest rate is reset, investors have the right to sell the notes back to the issuer for their face value.²⁸ This ensures that on these reset dates the price of the notes cannot be less than their face value. Therefore, although VRDNs are long-term loans, their prices are very stable. In addition, the interest on municipal debt has the advantage of being tax-exempt. So a municipal variable-rate demand note offers a relatively safe, tax-free, short-term haven for your \$1 million of cash.

Bank Time Deposits and Certificates of Deposit If you make a time deposit with a bank, you are lending money to the bank for a fixed period. If you need the money before maturity, the bank usually allows you to withdraw it but exacts a penalty in the form of a reduced rate of interest.

In the 1960s banks introduced the **negotiable certificate of deposit (CD)** for time deposits of \$1 million or more. In this case, when a bank borrows, it issues a certificate of deposit, which is simply evidence of a time deposit with that bank. If a lender needs the money before maturity, it can sell the CD to another investor. When the loan matures, the new owner of the CD presents it to the bank and receives payment.²⁹

Commercial Paper and Medium-Term Notes These consist of unsecured, short- and medium-term debt issued by companies on a fairly regular basis. We discuss both in more detail later in the chapter.

²⁵ Some of these notes are *general obligations* of the issuer; others are *revenue securities*, and in these cases payments are made from rent receipts or other user charges.

²⁶ This advantage is partly offset by the fact that Treasury securities are free of state and local taxes.

²⁷ Defaults on tax-exempts have been rare and for the most part have involved not-for-profit hospitals. However, there have been two major defaults of tax-exempt debt. In 1983 Washington Public Power Supply System (unfortunately known as WPPSS or “WOOPS”) defaulted on \$2.25 billion of bonds. In 1994 Orange County in California also defaulted after losing \$1.7 billion on its investment portfolio.

²⁸ The tendered bonds are then resold to new investors.

²⁹ Some CDs are not negotiable and are simply identical to time deposits. For example, banks may sell low-value nonnegotiable CDs to individuals.

Bankers' Acceptances We saw earlier in the chapter how bankers' acceptances (BAs) may be used to finance exports or imports. An acceptance begins life as a written demand for the bank to pay a given sum at a future date. Once the bank accepts this demand, it becomes a negotiable security that can be bought or sold through money-market dealers. Acceptances by the large U.S. banks generally mature in one to six months and involve very low credit risk.

Repurchase Agreements **Repurchase agreements**, or *repos*, are effectively secured loans that are typically made to a government security dealer. They work as follows: The investor buys part of the dealer's holding of Treasury securities and simultaneously arranges to sell them back again at a later date at a specified higher price.³⁰ The borrower (the dealer) is said to have entered into a *repo*; the lender (who buys the securities) is said to have a *reverse repo*.

Repos sometimes run for several months, but more frequently they are just overnight (24-hour) agreements. No other domestic money-market investment offers such liquidity. Corporations can treat overnight repos almost as if they were interest-bearing demand deposits.

Suppose that you decide to invest cash in repos for several days or weeks. You don't want to keep renegotiating agreements every day. One solution is to enter into an *open repo* with a security dealer. In this case there is no fixed maturity to the agreement; either side is free to withdraw at one day's notice. Alternatively, you may arrange with your bank to transfer any excess cash automatically into repos.

Floating-Rate Preferred Stock Common stock and preferred stock have an interesting tax advantage for corporations, since firms pay tax on only 30% of the dividends that they receive. So, for each \$1 of dividends received, the firm gets to keep $1 - (.30 \times .35) = \$.895$. Thus the effective tax rate is only 10.5%. This is higher than the zero tax rate on the interest from municipal debt but much lower than the rate that the company pays on other debt interest.

Suppose that you consider investing your firm's spare cash in some other corporation's preferred stock. The 10.5% tax rate is very tempting. On the other hand, you worry that the price of the preferred shares may change if long-term interest rates change. You can reduce that worry by investing in preferred shares whose dividend payments are linked to the general level of interest rates.³¹

Varying the dividend payment doesn't quite do the trick, for the price of the preferred stock could still fall if the risk increases. So a number of companies added another wrinkle to floating-rate preferred. Instead of being tied rigidly to interest rates, the dividend can be reset periodically by means of an auction that is open to all investors. Investors can state the yield at which they are prepared to buy the stock. Existing shareholders who require a higher yield simply sell their stock to the new investors at its face value. The idea is similar to the variable-demand note. As long as auction-rate preferred stock can be resold at regular intervals for its face value, its price should not wander far in the interim.³²

In 2007 disaster hit the auction-rate preferred market, when investors found that no one turned up at the auction for their stock. Holders claimed that banks had fraudulently marketed the issues as equivalent to cash, and many of the banks that originally handled the issues agreed to buy them back. Auction-rate preferred stock no longer seemed such a safe haven for cash.

³⁰ To reduce the risk of repos, it is common to value the security at less than its market value. This difference is known as a *haircut*.

³¹ The company *issuing* preferred stock must pay dividends out of after-tax income. So most tax-paying firms would prefer to issue debt rather than floating-rate preferred. However, there are plenty of firms that are not paying taxes and cannot make use of the interest tax shield. Moreover, they have been able to issue floating-rate preferred at yields *lower* than they would have to pay on a debt issue. The corporations buying the preferreds are happy with these lower yields because 70% of the dividends they receive escape tax.

³² Most auction-rate preferred stock was issued by closed-end mutual funds.

30-5 Sources of Short-Term Borrowing

We have looked at how firms can invest any excess cash. But, if your firm is in the opposite position and has a temporary cash shortage, it will probably need to take out a short-term loan. Banks are the principal supplier of these loans, but finance companies are also a major source of cash, particularly for financing receivables and inventories.³³ In addition to borrowing from an intermediary such as a bank or finance company, firms also sell short-term commercial paper or medium-term notes directly to investors. It is time to look more closely at these sources of short-term funds.

Bank Loans

Bank loans come in a variety of flavors. Here are a few of the ways that they differ.

Commitment Companies sometimes wait until they need the money before they apply for a bank loan, but about 90% of commercial loans by U.S. banks are made under commitment. In this case the company establishes a line of credit that allows it to borrow up to an established limit from the bank. This line of credit may be an **evergreen credit** with no fixed maturity, but more commonly it is a **revolving credit** (*revolver*) with a fixed maturity. For example, one common arrangement is a 364-day facility that allows the company over the next year to borrow, repay, and re-borrow as its need for cash varies.

Credit lines are relatively expensive; in addition to paying interest on any borrowings, the company must pay a commitment fee of around .25% on the unused amount. In exchange for this extra cost, the firm receives a valuable option: it has guaranteed access to the bank's money at a fixed spread over the general level of interest rates.

The growth in the use of credit lines has changed the role of banks. They are no longer simply lenders; they are also in the business of providing companies with liquidity insurance. Many companies discovered the value of this insurance in 1998, when Russia stopped payments on part of its debt and created turmoil in the world's debt markets. Companies in the United States suddenly found it much more expensive to issue their own debt to investors. Those who had arranged lines of credit with their banks rushed to take advantage of them. As a result, new debt issues languished, while bank lending boomed.

Maturity Many bank loans are for only a few months. For example, a company may need a short-term **bridge loan** to finance the purchase of new equipment or the acquisition of another firm. In this case the loan serves as interim financing until the purchase is completed and long-term financing arranged. Often a short-term loan is needed to finance a temporary increase in inventory. Such a loan is described as **self-liquidating**; in other words, the sale of goods provides the cash to repay the loan.

Banks also provide longer-maturity loans, known as **term loans**. A term loan typically has a maturity of four to five years. Usually the loan is repaid in level amounts over this period, though there is sometimes a large final *balloon* payment or just a single *bullet* payment at maturity. Banks can accommodate the repayment pattern to the anticipated cash flows of the borrower. For example, the first repayment might be delayed a year until the new factory is completed. Term loans are often renegotiated before maturity. Banks are willing to do this if the borrower is an established customer, remains creditworthy, and has a sound business reason for making the change.³⁴

³³ *Finance companies* are firms that specialize in lending to businesses or individuals. They include independent firms.

³⁴ One study of private debt agreements found that over 90% are renegotiated before maturity. In most cases this is not because of financial distress. See M. R. Roberts and A. Sufi, "Renegotiation of Financial Contracts: Evidence from Private Credit Agreements," *Journal of Financial Economics*, forthcoming.

LIBOR

Each day at around 11 a.m. in London, some 16 major banks provide estimates of the interest rate at which they could borrow funds from another bank in reasonable market size. They produce these estimates for 15 maturities that range from overnight to one year. In each case the top and bottom quarter of the estimates are dropped, and the remainder are averaged to provide the set of London Interbank Offered Rates or LIBOR.

The most commonly quoted LIBOR rates are for borrowing U.S. dollars, but similar sets of LIBOR rates are also produced for nine other currencies—the euro; the Japanese yen; the pound sterling; the Swiss franc; the

Danish kroner; the Swedish krona; and the Canadian, Australian, and New Zealand dollars. The British Bankers' Association, which publishes these rates, estimates that the payments on about \$10 trillion of loans and \$300 trillion of swaps are tied to LIBOR.³⁵

Figure 30.7 plots the three-month dollar LIBOR rate against the rate on Treasury bills. The spread between the two rates is known as the TED spread. For many years the TED spread was typically less than 50 basis points (.5%), but in 2008 it widened dramatically, at one point reaching 460 basis points (4.6%). Suddenly the choice of benchmark for bank loans began to be very important.

FIGURE 30.7

Month-end values for three-month dollar LIBOR and three-month Treasury bills, August 2004 to July 2009.

Source: British Bankers' Association and the Federal Reserve Board.



Rate of Interest Most short-term bank loans are made at a fixed rate of interest, which is often quoted as a discount. For example, if the interest rate on a one-year loan is stated as a discount of 5%, the borrower receives $\$100 - \$5 = \$95$ and undertakes to pay \$100 at the end of the year. The return on such a loan is not 5%, but $5/95 = .0526$, or 5.26%.

For longer-term bank loans the interest rate is usually linked to the general level of interest rates. The most common benchmarks are the London Interbank Offered Rate (LIBOR), the federal funds rate,³⁶ or the bank's prime rate. Thus, if the rate is set at "1% over LIBOR," the borrower may pay 5% in the first three months when LIBOR is 4%, 6% in the next

³⁵ In the case of euro deposits, the European Banking Federation calculates an alternative measure, known as Euribor. You can find historical LIBOR rates on www.bbalibor.com and Euribor rates on www.euribor.org.

³⁶ The federal funds rate is the rate at which banks lend excess reserves to each other.

three months when LIBOR is 5%, and so on. The nearby box describes how LIBOR is set and its relationship to the Treasury bill rate.

Syndicated Loans Some bank loans and credit lines are too large for a single lender. In these cases the borrower may pay an arrangement fee to one or more lead banks, which then parcels out the loan or credit line among a syndicate of banks.³⁷ For example, in 2008 the chemical company Ashland needed to borrow \$1.65 billion to finance its purchase of Hercules. It did so by means of a package of term loans and a revolving credit facility. The package was arranged by BankAmerica and the Bank of Nova Scotia, and other members of the syndicate reportedly included Citibank, SunTrust Banks, Wells Fargo Bank, US Bank, and Fifth Third Bank. The loans had a maturity of around five years and were priced at between 2.75% and 4% above LIBOR. In addition, Ashland was required to pay a commitment fee of .50% on any unused portion of the revolving credit.

The syndicate arranger serves as underwriter to the loan. It prices the loan, markets it to other banks, and may also guarantee to take on any unsold portion. The arranger's first step is to prepare an *information memo* that provides potential lenders with information on the loan. The syndicate desk will then try to sound out the level of interest in the deal before the loan is finally priced and marketed to interested buyers. If the borrower has good credit or if the arranging bank has a particularly good reputation, the majority of the loan is likely to be syndicated. In other cases the arranging bank may need to demonstrate its faith in the deal by keeping a high proportion of the loan on its own books.³⁸

Loan Sales and Collateralized Debt Obligations Bank loans used to be illiquid; once the bank had made a loan, it was stuck with it. This is no longer the case, so that banks with an excess demand for loans may solve the problem by selling a portion of their existing loans to other institutions. For example, about 20% of syndicated loans are subsequently resold, and these sales are reported weekly in *The Wall Street Journal*.

Loan sales generally take one of two forms: *assignments* or *participations*. In the former case a portion of the loan is transferred with the agreement of the borrower. In the second case the lead bank maintains its relationship with the borrower but agrees to pay over to the buyer a portion of the cash flows that it receives.

Loan sales often involve a single loan, but sometimes they can be huge deals involving a portfolio of several hundred loans. The buyer is then entitled to a share of the cash flows on this portfolio. In the early years of the century many banks repackaged the cash flows from a portfolio of loans and sold off separate slices (or *tranches*) known as *collateralized debt obligations* (or *CDOs*).³⁹ The senior tranches had first claim on the cash flows and therefore proved attractive to conservative investors such as insurance companies or pension funds. The riskiest (or *equity*) tranche was retained by the bank or bought by hedge funds or mutual funds that specialized in low-quality debt.⁴⁰

³⁷ For a standard loan to a blue-chip company the fee for arranging a syndicated loan may be as low as 10 basis points, while a complex deal with a highly leveraged firm may carry a fee of up to 250 basis points. For good reviews of the syndicated loan market see S. C. Miller, "A Guide to the Syndicated Loan Market," Standard & Poor's, September 2005 (www.standardandpoors.com); and B. Gadanez, "The Syndicated Loan Market: Structure, Development and Implications," *BIS Quarterly Review*, December 2004, pp. 75–89 (www.bis.org).

³⁸ See A. Sufi, "Information Asymmetry and Financing Arrangements: Evidence from Syndicated Loans," *Journal of Finance* 62 (April 2007), pp. 629–668.

³⁹ CDOs comprise collateralized loan obligations (CLOs), together with collateralized bond obligations (CBOs) and collateralized mortgage obligations (CMOs).

⁴⁰ Rather than backing the CLO with a package of risky loans, banks often created *synthetic CLOs*. In this case the bank kept the loans on its books. The cash flows on the CLO came from the purchase of high-grade bonds and the sale of a default swap on a package of the bank's loans. (We described default swaps in Chapter 23.) If none of the bank loans defaults, the CLO receives a series of fixed cash flows. If there is a default, the seller of the default swap must compensate the buyer for the amount of the loss. This loss would be borne first by the equity tranche of the CLO.

By 2007 over half of the new issues of CDOs involved exposure to subprime mortgages. Because the mortgages were packaged together, investors in these CDOs were protected against the risk of default on an individual mortgage. However, even the senior tranches were exposed to the risk of an economy-wide slump in the housing market. For this reason the debt has been termed “economic catastrophe debt.”⁴¹

Economic catastrophe struck in the summer of 2007, when the investment bank, Bear Stearns, revealed that two of its hedge funds had invested heavily in nearly worthless CDOs. Bear Stearns was rescued with help from the Federal Reserve, but it signalled the start of the credit crunch and the collapse of the CDO market. In 2008 issues of CDOs fell by nearly 90%.⁴²

Security If a bank is concerned about a firm’s credit risk, it will ask the firm to provide security for the loan. This is most common for longer-term bank loans, over half of which are secured.⁴³ The collateral usually consists of liquid assets such as receivables, inventories, or securities. Sometimes the bank will take a *floating charge*. This gives it a general claim if the firm defaults. However, it does not specify the assets in detail, and it sets few restrictions on what the company can do with the assets.

More commonly, banks require specific collateral. For example, suppose that there is a significant delay between the time that you ship your goods and when your customers pay you. If you need the money up front, you can borrow by using these receivables as collateral. First, you must send the bank a copy of each invoice and provide it with a claim against the money that you receive from your customers. The bank will then lend up to 80% of the value of the receivables.

Each day, as you make more sales, your collateral increases and you can borrow more money. Each day also some customers pay their bills. This money is placed in a special collateral account under the bank’s control and is periodically used to reduce the size of the loan. Therefore, as the firm’s business fluctuates, so does the amount of the collateral and the size of the loan.

You can also use inventories as security for a loan. For example, if your goods are stored in a warehouse, you need to arrange for an independent warehouse company to provide the bank with a receipt showing that the goods are held on the bank’s behalf. The bank will generally be prepared to lend up to 50% of the value of the inventories. When the loan is repaid, the bank returns the warehouse receipt and you are free to remove the goods.⁴⁴

Banks are naturally choosy about the security that they will accept. They want to make sure that they can identify and sell the collateral if you default. They may be happy to lend against a warehouse full of a standard nonperishable commodity, but they would turn up their nose at a warehouse of ripe Camemberts.

Banks also need to ensure that the collateral is safe and the borrower doesn’t sell the assets and run off with the money. This is what happened in the great salad oil swindle. Fifty-one banks and companies made loans of nearly \$200 million to the Allied Crude Vegetable Oil Refining Corporation. In return the company agreed to provide security in the form of storage tanks full of valuable salad oil. Unfortunately, cursory inspections failed to notice that the tanks contained seawater and sludge. When the fraud was discovered, the president of Allied went to jail and the 51 lenders were left out in the cold, looking for their \$200 million.

⁴¹ J. D. Coval, J. Jurek, and E. Stafford, “Economic Catastrophe Bonds,” *American Economic Review* 3 (June 2009), pp. 628–666.

⁴² www.sifma.org.

⁴³ The results of a survey of the terms of business lending by banks in the United States are published quarterly in the *Federal Reserve Bulletin* (see www.federalreserve.gov/releases/E2).

⁴⁴ It is not always practicable to keep inventory in a warehouse. For example, automobile dealers need to display their cars in a showroom. One solution is to enter into a floor-planning arrangement in which the finance company buys the cars and the dealer holds them in trust. When the cars are sold, the proceeds are used to redeem the cars from the finance company. The interest or “flooring charge,” depends on how long the cars have been in the showroom.

Commercial Paper

Banks borrow money from one group of firms or individuals and relend the money to another group. They make their profit by charging the borrowers a higher rate of interest than they offer the lender.

Sometimes it is convenient to have a bank in the middle. It saves the lenders the trouble of looking for borrowers and assessing their creditworthiness, and it saves the borrowers the trouble of looking for lenders. Depositors do not care to whom the bank lends: they need only satisfy themselves that the bank as a whole is safe.

There are also occasions on which it is *not* worth paying an intermediary to perform these functions. Large well-known companies can bypass the banking system by issuing their own short-term unsecured notes. These notes are known as **commercial paper (CP)**. Financial institutions, such as bank holding companies and finance companies,⁴⁵ also issue commercial paper, sometimes in very large quantities. For example, at one point GE Capital Corporation had over \$100 billion of commercial paper in issue.⁴⁶ The major issuers of commercial paper have set up their own marketing departments and sell their paper directly to investors, often using the Web to do so. Smaller companies sell through dealers who receive a fee for marketing the issue.

Commercial paper in the United States has a maximum maturity of nine months, though most paper is for 60 days or less. Buyers of commercial paper generally hold it to maturity, but the company or dealer that sells the paper is usually prepared to repurchase it earlier.

The majority of commercial paper is issued by high-grade, nationally known companies.⁴⁷ Issuers generally support their commercial paper by arranging a backup line of credit with a bank, which guarantees that they can find the money to repay the paper.⁴⁸ The risk of default is, therefore, small.

Because investors are reluctant to buy commercial paper that does not have the highest credit rating, companies cannot rely on the commercial paper market to provide them always with the short-term capital that they need. For example, when the rating services downgraded the commercial paper of Ford and General Motors, both companies were forced to reduce sharply their sales of paper. Ford Credit had \$45 billion of unsecured commercial paper outstanding at the end of 2000; five years later it had cut the amount to \$1.0 billion.

Recent years have not been kind to the commercial paper market. In addition to Ford and GM, a number of other major companies have had their commercial paper downgraded. An even bigger shock occurred in 2007, when Lehman Brothers defaulted on its commercial paper. This led to a sharp fall in the volume of issues until the Fed announced plans to buy large volumes of high-grade paper.

In addition to unsecured commercial paper, there is also a market for *asset-backed commercial paper*. In this case the company sells its assets to a special-purpose vehicle that then issues the paper. For example, as the auto companies reduced their sales of unsecured commercial paper, they increasingly relied on asset-backed paper secured by the firm's receivables. As the customers paid their bills, the cash was passed through to the holders of this paper.

⁴⁵ A *bank holding company* is a firm that owns both a bank and nonbanking subsidiaries.

⁴⁶ GE reduced its reliance on commercial paper in 2008.

⁴⁷ Moody's, Standard and Poor's, and Fitch publish quality ratings for commercial paper. For example, Moody's provides three ratings, from P-1 (that is, Prime 1, the highest-grade paper) to P-3. Most investors are reluctant to buy low-rated paper. For example, money-market funds are largely limited to holding P-1 paper.

⁴⁸ For top-tier issuers the credit line is generally 75% of the amount of paper; for lower-grade issuers it is 100%. The company may not be able to draw on this line of credit if it does not satisfy bank covenants. Therefore, lower-rated companies may need to back their paper with an irrevocable line of credit.

Weaknesses in this market surfaced when a number of banks set up structured investment vehicles (SIVs) that invested in mortgage-backed securities financed by asset-backed paper. Because the buyers of the commercial paper bore the credit risk, the banks had less incentive to worry about the quality of the underlying mortgages. Many of the SIVs found it impossible to refinance the maturing paper and went into default.

Medium-Term Notes

New issues of securities do not need to be registered with the SEC as long as they mature within 270 days. So by limiting the maturity of commercial paper issues, companies can avoid the delays and expense of registration. However, large blue-chip companies also make regular issues of unsecured **medium-term notes (MTNs)**.

You can think of MTNs as a hybrid between corporate bonds and commercial paper. Like bonds they are relatively long-term instruments; their maturity is never less than 270 days, though it is typically less than 10 years.⁴⁹ On the other hand, like commercial paper, MTNs are not underwritten but are sold on a regular basis either through dealers or, occasionally, directly to investors. Dealers support a secondary market in these MTNs and are prepared to buy the notes back before maturity.

Borrowers such as finance companies, which always need cash, welcome the flexibility of MTNs. For example, a company may tell its dealers the amount of money that it needs to raise that week, the range of maturities that it can offer, and the maximum interest that it is prepared to pay. It is then up to the dealers to find the buyers. Investors may also suggest their own terms to one of the dealers, and, if these terms are acceptable, the deal is done.

⁴⁹ Occasionally, an MTN registration may be used to issue much longer term bonds. For example, Disney has even used its MTN program to issue a 100-year bond.



SUMMARY

Companies invest in four principal short-term assets—inventories, accounts receivable, cash, and short-term securities. Each of these investments needs to be managed.

Inventories consist of raw materials, work in process, and finished goods. Inventories have benefits. For example, a stock of raw materials reduces the risk that the firm will be forced to shut down production because of an unexpected shortage. But inventories also tie up capital and are expensive to store. The task of the production manager is to strike a sensible balance between these benefits and costs. In recent years many companies have decided that they can get by on lower inventories than before. For example, some have adopted *just-in-time* systems that allow the firm to keep inventories to a minimum by receiving a regular flow of components and raw materials throughout the day.

Credit management (the management of receivables) involves five steps:

1. Establish the length of the payment period and the size of any cash discounts for customers who pay promptly.
2. Decide the form of the contract with your customer. For example, if your customer's credit is somewhat shaky, you can ask the customer to arrange for a banker's acceptance. In this case payment is guaranteed by the customer's bank.
3. Assess your customer's creditworthiness. You can either do your own homework or rely on a credit agency or credit bureau that specializes in gathering information about the credit standing of firms or individuals.
4. Establish sensible credit limits. Remember your aim is not to minimize the number of bad debts, it is to maximize profits. Remember also not to be too shortsighted in reckoning the

expected profit. It may be worth accepting marginal applicants if there is a chance that they may become regular and reliable customers.

5. Collect. You need to be resolute with the truly delinquent customers, but you do not want to offend the good ones by writing demanding letters just because their check has been delayed in the mail.

You can think of cash as just another raw material that the firm needs to do business. There are always advantages to holding large “inventories” of cash. They reduce the risk of a sudden shortage and having to raise more at short notice. On the other hand, there is a cost to holding idle cash balances rather than putting the money to work in marketable securities. In balancing these benefits and costs the cash manager faces a task similar to that of the production manager. This trade-off is more important for small firms, for whom the costs of continually buying and selling securities are relatively large compared with the opportunity cost of holding idle cash balances.

Good cash management involves moving cash around efficiently. For example, if the firm receives a large number of small checks, it needs to ensure that they are not left lying about. We described how concentration banking and lockbox systems are used to speed up collections. Most large payments are made electronically by wire transfer. This allows companies to economize on the use of cash by transferring funds rapidly from local bank accounts to the firm’s main *concentration* bank. Electronic funds transfer also speeds up payments and makes it possible to automate more of the cash management process.

If you have more cash than is currently needed, you can invest it in the money market. There is a wide choice of money-market investments, with different degrees of liquidity and risk. Remember that the interest rate on these investments is often quoted as a discount. The compound return is always higher than the rate of discount. The principal money-market investments in the United States are

- U.S. Treasury bills
- Federal agency notes
- Short-term tax exempts
- Time deposits and certificates of deposit
- Repurchase agreements
- Commercial paper
- Bankers’ acceptances

When long-term finance does not cover the capital requirement, firms must raise short- or medium-term capital. Often they arrange a *revolving line of credit* with a bank that allows them to borrow up to an agreed amount whenever they need financing. This is often intended to tide the firm over a temporary shortage of cash and is therefore repaid in only a few months. However, banks also make *term loans* that sometimes extend for five years or more. In addition to borrowing from their domestic banks, companies may borrow dollars (or any other currency) from overseas banks or the foreign branches of U.S. banks. Very large bank loans are commonly *syndicated* among a group of major banks. Banks do not need to hold these loans until maturity, and they may later decide to sell their holdings to other banks or financial institutions.

The interest rate on very short-term bank loans is generally fixed for the life of the loan, but in other cases the rate floats with the general level of short-term interest rates. For example, it might be set at 1% over LIBOR (the London Interbank Offered Rate).

The interest rate that the bank charges must be sufficient to cover not only the opportunity cost of capital for the loan but also the costs of running the loan department. Large regular borrowers have found it cheaper to bypass the banking system and issue their own short-term unsecured debt. This is called *commercial paper*. Longer-term loans that are marketed on a regular basis are known as *medium-term notes*.

Generally, markets for short-term capital work smoothly, but in the credit crunch of 2008 many of these sources of funds dried up. It remains to be seen whether in each case this was a temporary hiccup or whether the events that year revealed a fatal weakness in security design.

**FURTHER
READING**

Here are some general textbooks on working capital management:

G. W. Gallinger and B. P. Healey, *Liquidity Analysis and Management*, 2nd ed. (Reading, MA: Addison-Wesley, 1991).

N. C. Hill and W. L. Sartoris, *Short-Term Financial Management: Text and Cases*, 3rd ed. (Englewood Cliffs, NJ: Prentice-Hall, Inc., 1994).

K. V. Smith and G. W. Gallinger, *Readings on Short-Term Financial Management*, 3rd ed. (New York: West, 1988).

F. C. Scherr, *Modern Working Capital Management: Text and Cases* (Englewood Cliffs, NJ: Prentice-Hall, Inc., 1989).

A standard text on the practice and institutional background of credit management is:

R. H. Cole and L. Mishler, *Consumer and Business Credit Management*, 11th ed. (New York: McGraw-Hill, 1998).

For a more analytical discussion of credit policy, see:

S. Mian and C. W. Smith, "Extending Trade Credit and Financing," *Journal of Applied Corporate Finance* 7 (Spring 1994), pp. 75–84.

M. A. Petersen and R. G. Rajan, "Trade Credit: Theories and Evidence," *Review of Financial Studies* 10 (Fall 1997), pp. 661–692.

Two useful books on cash management are:

M. Allman-Ward and J. Sagner, *Essentials of Managing Corporate Cash* (New York: Wiley, 2003).

R. Bort, *Corporate Cash Management Handbook* (New York: Warren Gorham and Lamont, 2004).

Two readable discussions of why some companies maintain more liquidity than others are:

A. Dittmar, "Corporate Cash Policy and How to Manage It with Stock Repurchases," *Journal of Applied Corporate Finance* 20 (Summer 2008), pp. 22–34.

L. Pinkowitz and R. Williamson, "What Is the Market Value of a Dollar of Corporate Cash?" *Journal of Applied Corporate Finance* 19 (Summer 2007), pp. 74–81.

For descriptions of the money-market and short-term borrowing and lending opportunities, see:

F. J. Fabozzi, *The Handbook of Fixed Income Securities*, 6th ed. (New York: McGraw-Hill, 2000).

F. J. Fabozzi, S. V. Mann, and M. Choudhry, *The Global Money Markets* (New York: John Wiley, 2002).

Chapter 4 of *U.S. Monetary Policy and Financial Markets*, available on the New York Federal Reserve Web site, www.ny.frb.org.



Select problems are available in McGraw-Hill Connect. Please see the preface for more information.

PROBLEM SETS

BASIC

1. What are the trade-offs involved in the decision of how much inventory the firm should carry? In what way does the cash manager face a similar trade-off?
2. Company X sells on a 1/30, net 60 basis. Customer Y buys goods invoiced at \$1,000.
 - a. How much can Y deduct from the bill if Y pays on day 30?
 - b. What is the effective annual rate of interest if Y pays on the due date rather than on day 30?

- c. How would you expect payment terms to change if
 - i. The goods are perishable.
 - ii. The goods are not rapidly resold.
 - iii. The goods are sold to high-risk firms.
3. The lag between the purchase date and the date on which payment is due is known as the *terms lag*. The lag between the due date and the date on which the buyer actually pays is the *due lag*, and the lag between the purchase and actual payment dates is the *pay lag*. Thus,

$$\text{Pay lag} = \text{terms lag} + \text{due lag}$$

State how you would expect the following events to affect each type of lag:

- a. The company imposes a service charge on late payers.
 - b. A recession causes customers to be short of cash.
 - c. The company changes its terms from net 10 to net 20.
4. The Branding Iron Company sells its irons for \$50 apiece wholesale. Production cost is \$40 per iron. There is a 25% chance that wholesaler Q will go bankrupt within the next year. Q orders 1,000 irons and asks for six months' credit. Should you accept the order? Assume that the discount rate is 10% per year, there is no chance of a repeat order, and Q will pay either in full or not at all.
 5. Look back at Section 30-2. Cast Iron's costs have increased from \$1,000 to \$1,050. Assuming there is no possibility of repeat orders, answer the following:
 - a. When should Cast Iron grant or refuse credit?
 - b. If it costs \$12 to determine whether a customer has been a prompt or slow payer in the past, when should Cast Iron undertake such a check?
 6. Look back at the discussion in Section 30-2 of credit decisions with repeat orders. If $p_1 = .8$, what is the minimum level of p_2 at which Cast Iron is justified in extending credit?
 7. True or False?
 - a. Exporters who require greater certainty of payment arrange for the customers to sign a bill of lading in exchange for a sight draft.
 - b. It makes sense to monitor the credit manager's performance by looking at the proportion of bad debts.
 - c. If a customer refuses to pay despite repeated reminders, the company usually turns the debt over to a factor or an attorney.
 8. How should your willingness to grant credit be affected by differences in (a) the profit margin, (b) the interest rate, (c) the probability of repeat orders? In each case illustrate your answer with a simple example.
 9. How would you expect a firm's cash balance to respond to the following changes?
 - a. Interest rates increase.
 - b. The volatility of daily cash flow decreases.
 - c. The transaction cost of buying or selling marketable securities goes up.
 10. Complete the passage that follows by choosing the appropriate terms from the following list: *lockbox banking, Fedwire, CHIPS, concentration banking*.

Firms can increase their cash resources by speeding up collections. One way to do this is to arrange for payments to be made to regional offices that pay the checks into local banks. This is known as _____. Surplus funds are then transferred from the local bank to one of the company's main banks. Transfers can be made electronically by the _____ or _____ systems. Another technique is to arrange for a local bank to collect the checks directly from a post office box. This is known as _____.
 11. Suppose that you can hold cash that pays no interest or invest in securities that pay interest at 8%. The securities are not easily sold on short notice; therefore, you must make up any

cash deficiency by drawing on a bank line of credit that charges interest at 10%. Should you invest more or less in securities under each of the following circumstances?

- a. You are unusually uncertain about future cash flows.
 - b. The interest rate on bank loans rises to 11%.
 - c. The interest rates on securities and on bank loans both rise by the same proportion.
 - d. You revise downward your forecast of future cash needs.
12. In October 2008, six-month (182-day) Treasury bills were issued at a discount of 1.4%. What is the annual yield?
13. For each item below, choose the investment that best fits the accompanying description:
- a. Maturity often overnight (repurchase agreements/bankers' acceptances).
 - b. Maturity never more than 270 days (tax-exempts/commercial paper).
 - c. Often directly placed with investors (finance company commercial paper/dealer commercial paper).
 - d. Issued by the U.S. Treasury (tax-exempts/three-month bills).
 - e. Quoted on a discount basis (certificates of deposit/Treasury bills).
 - f. Sold by auction (tax-exempts/Treasury bills).
14. Consider three securities:
- a. A floating-rate bond.
 - b. A preferred share paying a fixed dividend.
 - c. A floating-rate preferred.

If you were responsible for short-term investment of your firm's excess cash, which security would you probably prefer to hold? Why? Explain briefly.

15. True or false?
- a. Most commercial bank loans are made under commitment.
 - b. A line of credit provides the lender with a put option.
 - c. Bank term loans typically have a maturity of several years.
 - d. If the interest rate on a one-year bank loan is stated as a discount of 10%, the actual yield on the loan is less than 10%.
 - e. The interest rate on term loans is usually linked to LIBOR, the federal funds rate, or the bank's prime rate.
16. Complete the passage below by selecting the most appropriate terms from the following list: *floating charge, syndicated, commercial paper, warehouse receipt, arranger, collateral, commitment fee, line of credit, medium-term notes, collateralized loan obligations (CLOs)*.

Companies with fluctuating capital needs often arrange a _____ with their bank. This is relatively expensive because companies need to pay a _____ on any unused amount.

Secured short-term loans are sometimes covered by a _____ on all receivables and inventory. Generally, however, the borrower pledges specific assets as _____. For example, if goods are stored in a warehouse, an independent warehouse company may issue a _____ to the lender. The goods can then only be released with the lender's consent.

Very large bank loans are often _____. In this case the lead bank acts as the _____ and will parcel out the loan among a group of banks.

Banks also often sell loans. Sometimes they put together a portfolio of loans and sell separate slices (or tranches). These are known as _____.

Banks are not the only source of short-term debt. Many large companies issue their own unsecured debt directly to investors, often on a regular basis. If the maturity is less than nine months, this debt is generally known as _____. Companies also make regular issues of longer-term debt to investors. These are called _____.

INTERMEDIATE

17. Listed below are some common terms of sale. Can you explain what each means?
- 2/30, net 60.
 - 2/5, EOM, net 30.
 - COD.
18. Some of the items in Problem 17 involve a cash discount. For each of these, calculate the rate of interest paid by customers who pay on the due date instead of taking the cash discount.
19. Phoenix Lambert currently sells its goods cash-on-delivery. However, the financial manager believes that by offering credit terms of 2/10 net 30 the company can increase sales by 4%, without significant additional costs. If the interest rate is 6% and the profit margin is 5%, would you recommend offering credit? Assume first that all customers take the cash discount. Then assume that they all pay on day 30.
20. As treasurer of the Universal Bed Corporation, Aristotle Procrustes is worried about his bad debt ratio, which is currently running at 6%. He believes that imposing a more stringent credit policy might reduce sales by 5% and reduce the bad debt ratio to 4%. If the cost of goods sold is 80% of the selling price, should Mr. Procrustes adopt the more stringent policy?
21. Jim Khana, the credit manager of Velcro Saddles, is reappraising the company's credit policy. Velcro sells on terms of net 30. Cost of goods sold is 85% of sales, and fixed costs are a further 5% of sales. Velcro classifies customers on a scale of 1 to 4. During the past five years, the collection experience was as follows:

Classification	Defaults as Percent of Sales	Average Collection Period in Days for Nondefaulting Accounts
1	.0	45
2	2.0	42
3	10.0	40
4	20.0	80

The average interest rate was 15%.

What conclusions (if any) can you draw about Velcro's credit policy? What other factors should be taken into account before changing this policy?

22. Look again at Problem 21. Suppose (a) that it costs \$95 to classify each new credit applicant and (b) that an almost equal proportion of new applicants falls into each of the four categories. In what circumstances should Mr. Khana not bother to undertake a credit check?
23. Until recently, Augean Cleaning Products sold its products on terms of net 60, with an average collection period of 75 days. In an attempt to induce customers to pay more promptly, it has changed its terms to 2/10, EOM, net 60. The initial effect of the changed terms is as follows:

Percent of Sales with Cash Discount	Average Collection Periods, Days	
	Cash Discount	Net
60	30*	80

* Some customers deduct the cash discount even though they pay after the specified date.

Calculate the effect of the changed terms. Assume

- Sales volume is unchanged.
- The interest rate is 12%.

- There are no defaults.
 - Cost of goods sold is 80% of sales.
24. Look back at Problem 23. Assume that the change in credit terms results in a 2% increase in sales. Recalculate the effect of the changed credit terms.
 25. Knob, Inc., is a nationwide distributor of furniture hardware. The company now uses a central billing system for credit sales of \$180 million annually. First National, Knob's principal bank, offers to establish a new concentration banking system for a flat fee of \$100,000 per year. The bank estimates that mailing and collection time can be reduced by three days. By how much will Knob's cash balances be increased under the new system? How much extra interest income will the new system generate if the extra funds are used to reduce borrowing under Knob's line of credit with First National? Assume that the borrowing rate is 12%. Finally, should Knob accept First National's offer if collection costs under the old system are \$40,000 per year?
 26. Anne Teak, the financial manager of a furniture manufacturer, is considering operating a lockbox system. She forecasts that 300 payments a day will be made to lockboxes, with an average payment size of \$1,500. The bank's charge for operating the lockboxes is *either* \$40 a check *or* compensating balances of \$800,000.
 - a. If the interest rate is 9%, which method of payment is cheaper?
 - b. What reduction in the time to collect and process each check is needed to justify use of the lockbox system?
 27. A parent company settles the collection account balances of its subsidiaries once a week. (That is, each week it transfers any balances in the accounts to a central account.) The cost of a wire transfer is \$10. A check costs \$.80. Cash transferred by wire is available the same day, but the parent must wait three days for checks to clear. Cash can be invested at 12% per year. How much money must be in a collection account before it pays to use a wire transfer?
 28. The financial manager of JAC Cosmetics is considering opening a lockbox in Pittsburgh. Checks cleared through the lockbox will amount to \$300,000 per month. The lockbox will make cash available to the company three days earlier than is currently the case.
 - a. Suppose that the bank offers to run the lockbox for a \$20,000 compensating balance. Is the lockbox worthwhile?
 - b. Suppose that the bank offers to run the lockbox for a fee of \$.10 per check cleared instead of a compensating balance. What must the average check size be for the fee alternative to be less costly? Assume an interest rate of 6% per year.
 - c. Why did you need to know the interest rate to answer (b) but not to answer (a)?
 29. A three-month Treasury bill and a six-month bill both sell at a discount of 10%. Which offers the higher annual yield?
 30. In Section 30-4 we described a three-month bill that was issued on an annually compounded yield of 5.18%. Suppose that one month has passed and the investment still offers the same annually compounded return. What is the percentage discount? What was your return over the month?
 31. Look again at Problem 30. Suppose another month has passed, so the bill has only one month left to run. It is now selling at a discount of 3%. What is the yield? What was your realized return over the two months?
 32. Look up current interest rates offered by short-term investment alternatives. Suppose that your firm has \$1 million excess cash to invest for the next two months. How would you invest this cash? How would your answer change if the excess cash were \$5,000, \$20,000, \$100,000, or \$100 million?
 33. In 2006 agency corporate bonds sold at a yield of 5.32%, while high-grade tax-exempts of comparable maturity offered 3.7% annually. If an investor receives the same *after-tax* return from corporates and tax-exempts, what is that investor's marginal rate of tax? What other factors might affect an investor's choice between the two types of securities?

34. The IRS prohibits companies from borrowing money to buy tax-exempts and deducting the interest payments on the borrowing from taxable income. Should the IRS prohibit such activity? If it didn't, would you advise the company to borrow to buy tax-exempts?
35. Suppose you are a wealthy individual paying 35% tax on income. What is the expected after-tax yield on each of the following investments?
- A municipal note yielding 7.0% pretax.
 - A Treasury bill yielding 10% pretax.
 - A floating-rate preferred stock yielding 7.5% pretax.

How would your answer change if the investor is a corporation paying tax at 35%? What other factors would you need to take into account when deciding where to invest the corporation's spare cash?

36. You need to borrow \$10 million for 90 days. You have the following alternatives:
- Issue high-grade commercial paper, with a backup line of credit costing .3% a year.
 - Borrow from First Cookham Bank at an interest rate of .25% over LIBOR.
 - Borrow from the Test Bank at prime.

Given the rates currently prevailing in the market (see, for example, *The Wall Street Journal*), which alternative would you choose?

37. Suppose that you are a banker responsible for approving corporate loans. Nine firms are seeking secured loans. They offer the following assets as collateral:
- Firm A, a heating oil distributor, offers a tanker load of fuel in transit from the Middle East.
 - Firm B, a wine wholesaler, offers 1,000 cases of Beaujolais Nouveau, located in a warehouse.
 - Firm C, a stationer, offers an account receivable for office supplies sold to the City of New York.
 - Firm D, a bookstore, offers its entire inventory of 15,000 used books.
 - Firm E, a wholesale grocer, offers a boxcar full of bananas.
 - Firm F, an appliance dealer, offers its inventory of electric typewriters.
 - Firm G, a jeweler, offers 100 ounces of gold.
 - Firm H, a government securities dealer, offers its portfolio of Treasury bills.
 - Firm I, a boat builder, offers a half-completed luxury yacht. The yacht will take four months more to complete.

Which of these assets are most likely to be good collateral? Which are likely to be bad collateral? Explain.

CHALLENGE

38. Reliant Umbrellas has been approached by Plumpton Variety Stores of Nevada. Plumpton has expressed interest in an initial purchase of 5,000 umbrellas at \$10 each on Reliant's standard terms of 2/30, net 60. Plumpton estimates that if the umbrellas prove popular with customers, its purchases could be in the region of 30,000 umbrellas a year. After deductions for variable costs, this account would add \$47,000 per year to Reliant's profits.

Reliant has been anxious for some time to break into the lucrative Nevada market, but its credit manager has some doubts about Plumpton. In the past five years, Plumpton had embarked on an aggressive program of store openings. In 2007, however, it went into reverse. The recession, combined with aggressive price competition, caused a cash shortage. Plumpton laid off employees, closed one store, and deferred store openings. The company's Dun and Bradstreet rating is only fair, and a check with Plumpton's other suppliers reveals that, although Plumpton traditionally took cash discounts, it has recently been paying 30 days slow. A check through Reliant's bank indicates that Plumpton has unused

TABLE 30.5

Plumpton Variety Stores: summary financial statements (figures in millions).

	2010	2009		2010	2009
Cash	\$ 1.0	\$ 1.2	Payables	\$ 2.3	\$ 2.5
Receivables	1.5	1.6	Short-term loans	3.9	1.9
Inventory	10.9	11.6	Long-term debt	1.8	2.6
Fixed assets	<u>5.1</u>	<u>4.3</u>	Equity	<u>10.5</u>	<u>11.7</u>
Total assets	\$18.5	\$18.7	Total liabilities	\$18.5	\$18.7
				2010	2009
Sales				\$55.0	\$59.0
Cost of goods sold				32.6	35.9
Selling, general, and administrative expenses				20.8	20.2
Interest				.5	.3
Tax				<u>.5</u>	<u>1.3</u>
Net income				\$.6	\$ 1.3

credit lines of \$350,000 but has entered into discussions with the banks for a renewal of a \$1,500,000 term loan due at the end of the year. Table 30.5 summarizes Plumpton's latest financial statements.

As credit manager of Reliant, how do you feel about extending credit to Plumpton?

39. Galenic, Inc., is a wholesaler for a range of pharmaceutical products. Before deducting any losses from bad debts, Galenic operates on a profit margin of 5%. For a long time the firm has employed a numerical credit scoring system based on a small number of key ratios. This has resulted in a bad debt ratio of 1%.

Galenic has recently commissioned a detailed statistical study of the payment record of its customers over the past eight years and, after considerable experimentation, has identified five variables that could form the basis of a new credit scoring system. On the evidence of the past eight years, Galenic calculates that for every 10,000 accounts it would have experienced the following default rates:

Credit Score under Proposed System	Number of Accounts		
	Defaulting	Paying	Total
Greater than 80	60	9,100	9,160
Less than 80	<u>40</u>	<u>800</u>	<u>840</u>
Total	100	9,900	10,000

By refusing credit to firms with a low credit score (less than 80), Galenic calculates that it would reduce its bad debt ratio to 60/9,160, or just under .7%. While this may not seem like a big deal, Galenic's credit manager reasons that this is equivalent to a decrease of one-third in the bad debt ratio and would result in a significant improvement in the profit margin.

- What is Galenic's current profit margin, allowing for bad debts?
- Assuming that the firm's estimates of default rates are right, how would the new credit scoring system affect profits?
- Why might you suspect that Galenic's estimates of default rates will not be realized in practice? What are the likely consequences of overestimating the accuracy of such a credit scoring scheme?

- d. Suppose that one of the variables in the proposed scoring system is whether the customer has an existing account with Galenic (new customers are more likely to default). How would this affect your assessment of the proposal?
40. Axle Chemical Corporation's treasurer has forecasted a \$1 million cash deficit for the next quarter. However, there is only a 50% chance this deficit will actually occur. The treasurer estimates that there is a 20% probability the company will have no deficit at all and a 30% probability that it will actually need \$2 million in short-term financing. The company can either take out a 90-day unsecured loan for \$2 million at 1% per month or establish a line of credit, costing 1% per month on the amount borrowed plus a commitment fee of \$20,000. If excess cash can be reinvested at 9%, which source of financing gives the lower expected cost?
41. Term loans usually require firms to pay a fluctuating interest rate. For example, the interest rate may be set at "1% above prime." The prime rate sometimes varies by several percentage points within a single year. Suppose that your firm has decided to borrow \$40 million for five years. It has three alternatives. It can (a) borrow from a bank at the prime rate, currently 10%. The proposed loan agreement requires no principal repayments until the loan matures in five years. It can (b) issue 26-week commercial paper, currently yielding 9%. Since funds are required for five years, the commercial paper will have to be rolled over semiannually. That is, financing the \$40 million requirement for five years will require 10 successive commercial paper sales. Or, finally, it can (c) borrow from an insurance company at a fixed rate of 11%. As in the bank loan, no principal has to be repaid until the end of the five-year period. What factors would you consider in analyzing these alternatives? Under what circumstances would you choose (a)? Under what circumstances would you choose (b) or (c)? (*Hint: Don't forget Chapters 3 and 23.*)

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1. The Dun and Bradstreet Web site (www.dnb.com) contains a sample comprehensive report on a small business. Would you extend credit to the firm? Why or why not?
 2. The three main credit bureaus maintain useful Web sites with examples of their business and consumer reports. Log on to www.equifax.com and look at the sample report on a small business. What information do you think would be most useful if you were considering granting credit to the firm?
 3. Log on to the Federal Reserve site at www.federalreserve.gov and look up current money-market interest rates. Suppose your business has \$7 million set aside for an expenditure in three months. How would you choose to invest it in the meantime? Would your decision be different if there were some chance that you might need the money earlier?
 4. The Federal Reserve Bulletin publishes the results of a quarterly survey of bank lending (see www.federalreserve.gov/releases/E2). Use the latest survey to describe the pattern of lending by domestic banks. Examine, for example, whether most loans are secured and whether they are made under commitment. What are the different characteristics of small and large loans? Now compare the results of this survey with an earlier one. Have there been any important changes?



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