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18 Managing Cash

"I've never been poor, but I've been broke."

—Mike Todd

The Importance of Cash

Sirius Satellite Radio reported a 2006 first quarter net loss of $485.5 million. After all, the company has to pay Howard Stern $500 million over five years. It's tough to turn a profit with expenses like that. It had cash and cash equivalents of $631 million though at the end of that quarter.

As of the end of the first quarter of 2006 the company had yet to turn a profit in any quarter of its existence. Its sales were growing though. Will it ever be a profitable company? As you read this, check the company out at one of the financial websites.

What does cash do for a company? It buys time. For a new company such as Sirius it allows the firm to stay in business until it can attract enough paying subscribers to turn a profit. Cash is important for long-standing companies too. It allows companies to weather financial storms. As long as you still have cash you're still in business. Cash gives you a chance to make it to the time when you'll be profitable.

Many college students have negative net income since their expenses exceed their revenues. As long as you have cash in your checking account, however, you can pay your bills and avoid eviction from your apartment and an empty refrigerator.

This chapter will focus on the management of that most important asset, cash.

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Cycling champion
Sentimental geologist*

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Chapter Overview

In this chapter we look at how firms manage cash. Cash flow management can even mean electronic cash, as shown in the chapter opening. Here we start by exploring factors that affect a company's optimal cash balance and learn how to estimate the optimal balance. Then we examine how firms forecast their cash needs, develop a cash budget, and manage cash inflows and outflows.

Cash Management Concepts

Whether they work in a large multinational corporation or a small business, financial managers need to know how much cash to keep on hand. Cash management may sound simple. Shouldn't businesses accumulate as much cash as possible? It's not that easy. Recall from Chapter 17 that cash earns no return for the business owners. In fact, a business that accumulated as much cash as possible and did not invest in any assets would fail because it would earn no return for the stockholders.[1] Cash, then, should not be obtained for its own sake. Rather, it should be considered the "grease" that enables the machinery of the firm to run. Cash management is the process of controlling how much of this grease is needed and where and when to apply it.

Learning Objectives

After reading this chapter, you should be able to:

1. List the factors that affect a company's desired minimum cash balance.

2. List the factors that affect a company's desired maximum cash balance.

3. Apply the Miller–Orr model to establish a target optimal cash balance.

4. Prepare a cash budget.

5. Explain how firms manage their cash inflows and outflows to maximize value.

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[1]In fact, because there would be no investment in earning assets, such a business would never accumulate more cash than was originally contributed by the founders.

Determining the Optimal Cash Balance

To determine how much cash a firm should keep on hand, financial managers must:

- Maintain enough in the cash account to make payments when needed (minimum balance)

- Keep just the needed amount in the cash account so that the firm can invest excess funds and earn returns (maximum balance)

Let's examine the factors that affect the desired minimum cash balance and the desired maximum cash balance.

The Desired Minimum Cash Balance

The size of a firm's desired minimum cash balance depends on three factors: (1) how quickly and cheaply a firm can raise cash when needed; (2) how accurately the firm's managers can predict when cash payment requirements will occur; and (3) how much precautionary cash the firm's managers want to keep to safeguard against emergencies. The effect of these three factors on the desired minimum cash balance is shown in Figure 18-1. We examine the three factors that affect a firm's desired minimum cash balance in the following sections.

Raising Cash Quickly When Needed If a firm's managers could obtain cash instantly whenever they needed it, at zero cost, they wouldn't need to maintain any balance in the cash account at all. All the firm's funds could be invested in short-term income-producing securities as soon as received. In the real world, of course, neither firms nor anyone else can borrow or sell assets to raise all the cash they want anytime, instantly, at zero cost. In practice, obtaining cash usually takes time and has a positive cost. Therefore, businesses maintain at least some cash in their checking accounts.

The question is, how much cash is enough? The answer is, only experience will tell. The more difficult or expensive it is to get cash when needed, the more a firm needs to keep in its checking account. At most—if cash were very difficult to obtain because the firm had no liquid assets, or if short-term interest rates were very high—the firm would want to keep enough cash on hand to cover all foreseeable needs until the next time the firm expects to receive more cash.

Predicting Cash Needs Cash flows can be volatile because of the business environment or the risk of the business. For instance, in a weak economy, people and firms pay bills more slowly. So even though sales may be strong, a firm may not have much cash. Also, in an economy with interest rate fluctuations or inflation, cash flow needs can vary suddenly because of economic factors. To protect against an uncertain business environment, firms may maintain extra cash to cover cash needs.

Similarly, the cash flows of a start-up or high-risk business may vary because the company grows at uneven, often unpredictable rates. Managers, then, may have a tough time estimating the firm's cash needs with certainty. Such firms often keep extra cash to act as a buffer against cash flow volatility.

How much extra cash a firm keeps in its coffers to protect against uncertainty depends on two factors: how difficult and expensive it is to raise cash when needed, and how volatile the firm's cash flow patterns are.
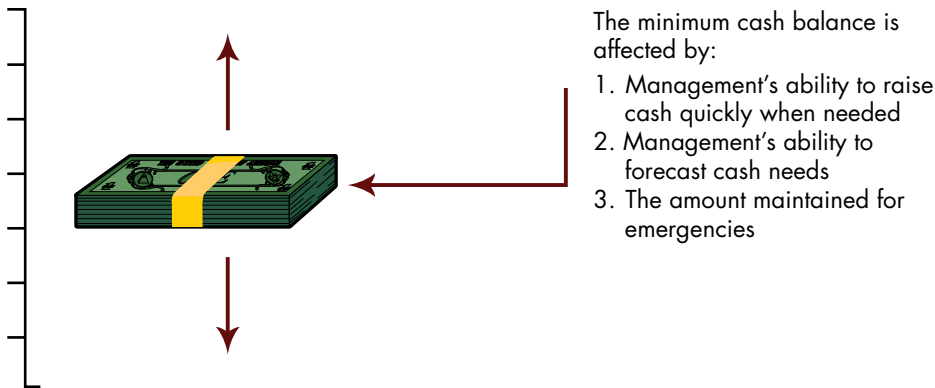
The minimum cash balance is affected by:
1. Management's ability to raise cash quickly when needed
2. Management's ability to forecast cash needs
3. The amount maintained for emergencies

Figure 18-1 Factors Affecting the Desired Minimum Cash Balance

Figure 18-1 shows the three factors that determine the minimum amount a firm will keep in its account.

Coping with Emergencies Most cash payments are expected and planned. But unforeseen emergencies may occur: storms, fires, strikes, riots, and, most often, failure of business plans to materialize. These emergencies can cause unexpected, sometimes large, drains on a firm's cash. Insurance can help, but there is no substitute for having cash ready when you need it. Managers, then, assess the likelihood of potential emergencies and how quickly and easily cash can be obtained in case of an emergency. They adjust their cash balances accordingly. The more *risk averse* managers are, the more precautionary cash they try to keep on hand for emergencies.

The Desired Maximum Cash Balance

Suppose that a firm's managers decide they wish to keep at least $20,000 in the firm's cash account. The next question is, how much should be allowed to accumulate in the cash account before the excess is withdrawn and invested in something that produces a return? If the balance in the cash account is $20,001, for example, should a dollar be withdrawn and invested? Should $30,000 be allowed to accumulate before any is withdrawn and invested? The answer depends on three factors: (1) the available investment opportunities, (2) the expected return from these opportunities, and (3) the transaction cost of withdrawing cash and making an investment. The factors that affect a firm's desired maximum cash balance are summarized in Figure 18-2. We describe the three factors affecting the desired maximum cash balance in detail next.

Available Investment Opportunities All businesses have at least a few (and some have many) alternative short-term income-producing investments in which they could invest their cash. These range from money market mutual funds and CDs to Eurodollars and commercial paper. The more opportunities a firm has, the sooner it will invest rather than allow cash to simply accumulate in the firm's checking account.

Expected Return on Investments The potential return on investments is just as important as the number of investments. If the expected return is relatively high, firms will be quick to invest excess cash. If the expected return is relatively low, however, firms might let more cash accumulate before investing.

The maximum cash balance is affected by:
1. Available investment opportunities
2. Expected return from investment opportunities
3. Transaction cost of making investments

Figure 18-2 Factors Affecting the Desired Maximum Cash Balance

Figure 18-2 shows the three factors that affect a firm's maximum cash balance.
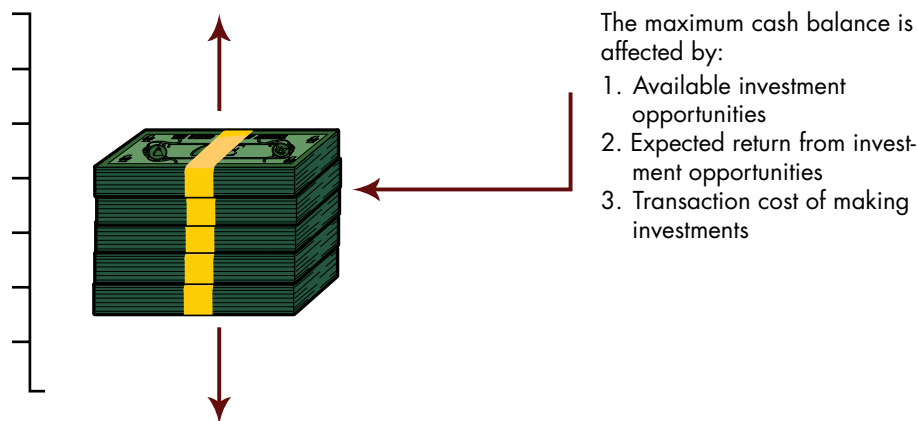
Take Note

The pattern of lottery ticket sales illustrates the principle of expected return on investments. When the jackpot is relatively low, ticket sales are sluggish. When the jackpot is relatively high, ticket sales increase.

Transaction Cost of Making Investments Investing has costs. For instance, when you deposit money in a savings account, someone must search for information about and arrange for the transfer of the funds to the savings account. The search and implementation efforts take time. And that time has a cost.

Monetary and other costs of transferring cash into an investment are **transaction costs**—the costs associated with the transaction. Managers are interested in transaction costs because if the potential income from an investment does not exceed the cost of making the investment, then the investment is not worthwhile. Transaction costs also affect the frequency of a firm's investments. If transaction costs are relatively low, the firm will invest often and will let only a small amount of excess cash accumulate in the cash account. Conversely, if transaction costs are relatively high, the firm will make fewer investments, letting a larger amount of cash accumulate in the meantime.

In this section we have seen that firms determine some minimum and maximum amount to keep in their cash accounts. The minimum amount is based on how quickly and cheaply firms can raise cash when needed, how accurately cash needs can be predicted, and how much precautionary cash a firm keeps for emergencies. The maximum amount depends on available investment opportunities, the expected returns from the investments, and the transaction costs of withdrawing the cash and making the investment.

The Optimal Cash Balance

Financial theorists have developed mathematical models to help firms find an optimal "target" cash balance, between the minimum and maximum limits, that balances liquidity and profitability concerns. In the following sections, we discuss one of these models, the Miller–Orr model.

The Miller–Orr Cash Management Model In 1966 Merton Miller and Daniel Orr developed a cash management model that solves for an optimal target cash balance about which the cash balance fluctuates until it reaches an upper or lower limit.[2] If the upper limit is reached, investment securities are bought, bringing the cash balance down to the target again. If the lower limit is reached, investment securities are sold, bringing the cash balance up to the target. Figure 18-3 shows the operation of the model.

[2]Merton Miller and Daniel Orr, "A Model of the Demand for Money by Firms," *Quarterly Journal of Economics* (August 1966): 413–35.
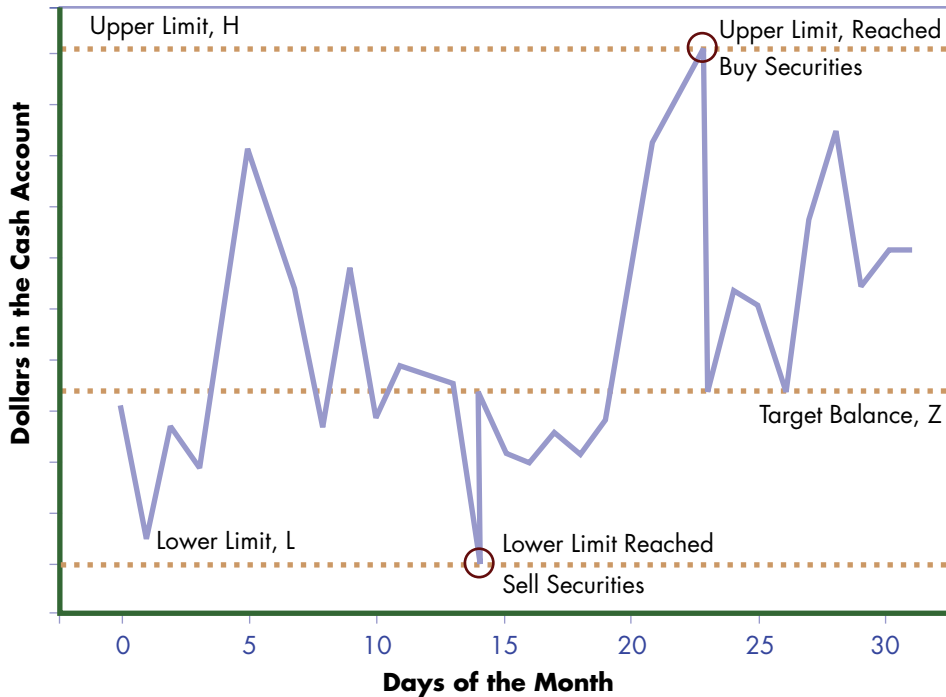
Figure 18-3 Cash Balances in a Typical Month Using the Miller–Orr Model

Figure 18-3 shows a firm's fluctuating cash flows, and its upper, lower, and optimal cash balances according to the Miller–Orr model.

The formula for the target cash balance Z shown in Figure 18-3 follows:

Miller–Orr Model Formula for the Target Cash Balance (Z)

$$Z = \sqrt[3]{\frac{3 \quad TC \quad V}{4 \quad r}} + L$$

(18-1)

where: TC = Transaction cost of buying or selling short-term investment securities

V = Variance of net daily cash flows

r = Daily rate of return on short-term investment securities

L = Lower limit to be maintained in the cash account

Remember that to take the cube root of a number you raise that number to the 1/3 power.

Notice in Figure 18-3 that the target cash balance, Z, is one-third of the way between the lower limit, L, and the upper limit, H. The Miller–Orr formula for the upper limit, H, is as follows:

Miller–Orr Model Formula for the Upper Limit on the Cash Account (H)

$$H = 3Z - 2L$$

(18-2)

In the Miller–Orr model, the lower limit, L, is set by management according to the desired minimum cash balance concerns discussed earlier.

To illustrate how the Miller–Orr model works, assume that short-term investment securities are yielding 4 percent per year and that it costs the firm $30 each time it buys or sells investment securities. Now assume that the firm's cash inflows and outflows occur irregularly and that the variance of the daily net cash flows has been found to be $90,846. Management wants to keep at least $10,000 in the cash account for emergencies, so L = $10,000. Under these circumstances, the firm will have the following target cash balance, according to Equation 18-1:

$$Z = \sqrt[3]{\frac{3}{4} \quad \frac{30}{(.04/365)} \quad \$90,846} + \$10,000$$

$$= \sqrt[3]{\frac{\$8,176,140}{.00043836}} + \$10,000$$

$$= \$2,652 + \$10,000$$

$$= \$12,652$$

With a 4 percent annual return (converted to a daily figure), a lower limit of $10,000, transaction costs of $30, and a variance of $90,846, we see that the firm's target cash balance, Z, is $12,652.

According to Equation 18-2, the firm's upper limit for the target cash balance will be

$$H = (3 \times \$12,652) - (2 \times \$10,000)$$

$$= \$37,956 - \$20,000$$

$$= \$17,956$$

According to the Miller–Orr model, then, the firm in this example will seek to maintain $12,652 in its cash account. If the cash balance increases to $17,956, the firm will buy $5,304 worth of investment securities to return the balance to $12,652. If the cash balance falls to $10,000, the firm will sell $2,652 worth of investment securities to raise the cash balance to $12,652. By finding the optimal cash balance, the firm seeks to accommodate its cash needs, given the volatility of cash inflows and outflows, and maximize its investment opportunities. We see, then, that the Miller–Orr model can help firms find their optimal cash balance.

Now that we have examined factors that affect a firm's minimum, maximum, and optimal cash balances and described how a firm may find its target cash balance, we next look at how a firm can forecast its cash needs.

Forecasting Cash Needs

Financial managers must frequently provide detailed estimates of their firm's future cash needs. The primary purpose of such estimates is to identify when excess cash will be available and when outside financing will be required to make up cash shortages.

Financial managers cannot base future cash estimates on *pro forma* income statements for the appropriate time period. Why? Because income and expenses are not always received and paid for in cash. Remember, if a firm is using an accrual-based accounting system, revenues and expenses may be recognized in one accounting period, but cash may not change hands until another period.

One technique for estimating true future cash needs is to develop a cash budget. A **cash budget** is a detailed budget plan that shows where cash is expected to come from and where it is expected to go during a given period of time.

The best way to learn about cash budgets is to practice creating one. In the following sections we will develop a cash budget for Bulldog Batteries that shows detailed cash flows from month to month throughout the upcoming year.

Developing a Cash Budget

The first step in developing a monthly cash budget is to identify sales revenue for each month of the period covered by the budget. Assume that it is the end of December 2006 and that Bulldog Batteries' 2007 sales are expected to occur as follows:

	Sales
Nov 2006 (reference)	$ 13,441
Dec 2006 (reference)	13,029
Jan 2007	12,945
Feb 2007	14,794
Mar 2007	16,643
Apr 2007	18,492
May 2007	20,341
Jun 2007	22,191
Jul 2007	24,040
Aug 2007	22,191
Sep 2007	20,341
Oct 2007	18,492
Nov 2007	16,643
Dec 2007	14,794
2007 Total	$ 221,907

Next, assume all of Bulldog's sales are on credit, so no cash is received immediately when a sale is made. Experience from past sales reveals that 30 percent of Bulldog's customers will pay off their accounts in the month of sale, 60 percent will pay off their accounts in the month following the sale, and the remaining 10 percent of the customers will pay off their accounts in the second month following the sale. Given this payment pattern, Bulldog's actual cash collections on sales throughout the year will follow the pattern shown in Table 18-1.

In Table 18-1, we computed January's cash collections as follows:

30% of January's 2007's Sales:	. 30 × $12,945 =	$ 3,884
+ 60% of December 2006's Sales:	.60 × $13,029 =	7,817
+ 10% of November 2006's Sales:	.10 × $13,441 =	1,344
= Total Collections in January 2007:		$13,045

Collections for the other months are computed similarly.

The next step in developing the cash budget is to turn to cash outflows. Assume that Bulldog Batteries' cost of materials is 27 percent of sales. Bulldog manufactures batteries expected to be sold in February one month ahead of time in January, and it orders all the materials it needs for January's production schedule one month ahead of time in December. This schedule repeats for each month of the year. Bulldog makes all its purchases on credit and pays for them in cash during the month following the purchase. Therefore, December's purchase orders will be paid for in January, and so on. The situation is summarized in Figure 18-4.

If Bulldog follows the production schedule illustrated in Figure 18-4 throughout 2007, its cash outflows for materials purchases will be as shown in Table 18-2. (Materials purchases for November and December of 2007 are based on sales forecasts for January and February 2008 of $14,342,000 and $14,794,000, respectively.)

For the sake of simplicity, assume Bulldog's remaining cash outflows are all direct expenses paid for in the month incurred as follows:

● Production expenses other than purchases are equal to purchases. (Bulldog's production costs are split evenly between materials cost and other production costs.)

● Sales and marketing expenses are 18.025 percent of sales each month.

● General and administrative expenses are $903,000 each month.

● Interest expense is expected to be $2,971 for the year. We assume that expense will be paid all at one time in December 2007.

● Bulldog's expected income tax bill for 2007 is $19,980. The bill will be paid in four installments in April, June, September, and December.

● Bulldog expects to declare four quarterly dividends of $6,098 in 2007. These will be paid in March, June, September, and December.

Bulldog's total cash outflows, including the preceding expenses and payments for materials purchases, are shown in Table 18-3.

After all the cash inflows and outflows for each month are accounted for (as we have done, see Tables 18-1, 18-2, and 18-3), the next step is to summarize the net gain (or loss) for each month in 2007. Table 18-4 contains the summary.
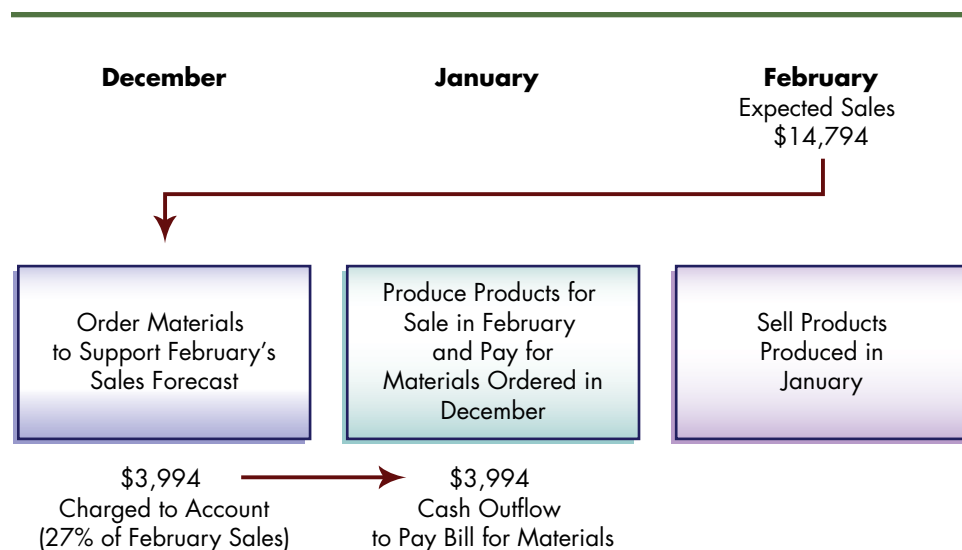

Figure 18-4 Timing for Bulldog Batteries' Cash Payments for Purchases

Figure 18-4 shows Bulldog Batteries' production and cash flow schedule.

Table 18-1 Bulldog Batteries, Actual Cash Collections

	2006		2007											
Cash Inflows	**Nov**	**Dec**	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
Sales (reference only; not a cash flow)	$13,441	$13,029	$12,945	$14,794	$16,643	$18,492	$20,341	$22,191	$24,040	$22,191	$20,341	$18,492	$16,643	$14,794
Cash collections on sales:														
30% in month of sale			$ 3,884	$ 4,438	$ 4,993	$ 5,548	$ 6,102	$ 6,657	$ 7,212	$ 6,657	$ 6,102	$ 5,548	$ 4,993	$ 4,438
60% in first month after sale			$ 7,817	$ 7,767	$ 8,876	$ 9,986	$11,095	$12,205	$13,315	$14,424	$13,315	$12,205	$11,095	$ 9,986
10% in second month after sale			$ 1,344	$ 1,303	$ 1,295	$ 1,479	$ 1,664	$ 1,849	$ 2,034	$ 2,219	$ 2,404	$ 2,219	$ 2,034	$ 1,849
Total collections			$13,045	$13,508	$15,164	$17,013	$18,862	$20,711	$22,561	$23,300	$21,821	$19,971	$18,122	$16,273
Other cash receipts			$ 0	0	0	0	0	0	0	0	0	0	0	0
Total Cash Inflows			**$13,045**	**$13,508**	**$15,164**	**$17,013**	**$18,862**	**$20,711**	**$22,561**	**$23,300**	**$21,821**	**$19,971**	**$18,122**	**$16,273**

Table 18-2 Bulldog Batteries, Cash Outflows for Materials Purchases

	2006		2007											
	Nov	**Dec**	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
Sales (reference only; not a cash flow)	$13,441	$13,029	$12,945	$14,794	$16,643	$18,492	$20,341	$22,191	$24,040	$22,191	$20,341	$18,492	$16,643	$14,794
Materials purchases (27% of sales two months ahead— reference only, not a cash flow)		$ 3,994	$ 4,494	$ 4,993	$ 5,492	$ 5,992	$ 6,491	$ 5,992	$ 5,492	$ 4,993	$ 4,494	$ 3,994	$ 3,872	
Payments for materials purchases: 100% in month after purchase			$ 3,994	$ 4,494	$ 4,993	$ 5,492	$ 5,992	$ 6,491	$ 5,992	$ 5,492	$ 4,993	$ 4,494	$ 3,994	$ 3,872

Take Note
If you are reading this on your computer screen using the Adobe Reader program, click on View/Rotate View/Clockwise to read this table in proper orientation. When you are finished reading the table, click on View/ Rotate View/ Counterclockwise to return to the regular page orientation.

Table 18-3 Bulldog Batteries, Total Cash Outflows

| | 2006 | 2007 | | | | | | | | | | | |
	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Cash Outflows:													
Materials purchases (reference only; not a cash flow)	$3,994	$ 4,494	$ 4,993	$ 5,492	$ 5,992	$ 6,491	$ 5,992	$ 5,492	$ 4,993	$ 4,494	$ 3,994	$ 3,872	$ 3,994
Payments for materials purchases: 100% in month after purchase		$ 3,994	$ 4,494	$ 4,993	$ 5,492	$ 5,992	$ 6,491	$ 5,992	$ 5,492	$ 4,993	$ 4,494	$ 3,994	$ 3,872
Other cash payments: Production costs other than purchases		$ 3,994	$ 4,494	$ 4,993	$ 5,492	$ 5,992	$ 6,491	$ 5,992	$ 5,492	$ 4,993	$ 4,494	$ 3,994	$ 3,872
Selling and marketing expenses		$ 2,333	$ 2,667	$ 3,000	$ 3,333	$ 3,666	$ 4,000	$ 4,333	$ 4,000	$ 3,667	$ 3,333	$ 3,000	$ 2,667
General and administrative expenses		$ 903	$ 903	$ 903	$ 903	$ 903	$ 903	$ 903	$ 903	$ 903	$ 903	$ 903	$ 903
Interest payments													$ 2,971
Tax payments					$ 4,995		$ 4,995			$ 4,995			$ 4,995
Dividend payments				$ 6,098			$ 6,098			$ 6,098			$ 6,098
Total Cash Outflows		**$11,225**	**$12,557**	**$19,987**	**$20,215**	**$16,553**	**$ 28,978**	**$17,219**	**$15,887**	**$25,649**	**$13,223**	**$11,892**	**$25,378**

Table 18-4 Bulldog Batteries, Cash Inflows and Outflows and Net Cash Flows

| | 2007 | | | | | | | | | | | |
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Total Cash Inflows	$13,045	$13,508	$15,164	$17,013	$18,862	$20,711	$22,561	$23,300	$21,821	$19,971	$18,122	$16,273
Total Cash Outflows	$11,225	$12,557	$19,987	$20,215	$16,553	$28,978	$17,219	$15,887	$25,649	$13,223	$11,892	$25,378
Net Cash Gain (Loss)	$ 1,820	$ 951	($ 4,823)	($3,203)	$2,309	($8,267)	$ 5,341	($ 3,828)	$ 6,748	$6,230	($9,105)	

The final step in developing the cash budget is to summarize the effects of the monthly net cash flows on monthly cash balances and list any external financing required. The procedure for January 2007 is shown in Table 18-5. We assume a cash balance of $65,313 at the beginning of January, a desired target cash balance of $65,000, and short-term loans of $302 outstanding at the beginning of the month.

The procedure is repeated for February using January's cash balance at the end of the month after financing as the starting cash balance for February. Table 18-6 contains the 12-month summary for Bulldog Batteries.

After filling out the cash budget through December 2007, Bulldog's managers can see that the firm will have surplus cash in January and February, but external financing will be needed in March, April, June, and September.

According to the budget, the loans can be fully paid off by October, and $66,598 will be in the cash account at the end of the year. Armed with this information, Bulldog's managers would approach their banker to establish a line of credit with a limit higher than $11,201—the largest anticipated loan balance.

For your convenience, Bulldog's complete cash budget for 2007 is shown in Table 18-7. We have described how to forecast a firm's short-term cash needs by constructing a cash budget. Next, we explore ways to manage a firm's short-term cash flow.

> **Take Note**
> Because the financing is only needed for a short time, it is typically obtained from a line of credit or short-term notes.

Managing the Cash Flowing In and Out of the Firm

People who manage a firm's cash should focus on four objectives: (1) to increase the flow of cash into the business; (2) to decrease the flow of cash out of the business; (3) to receive cash as quickly as possible; and (4) to pay cash out as slowly as possible, without missing the due date. This gives you more time to put cash to work earning a return. These four objectives are displayed in Figure 18-5. In the sections that follow, we discuss ways to accomplish the four objectives of cash flow management.

Increasing Cash Inflows

There are really only three ways to increase the amount of cash flowing into a business during any given time period. First, the firm can do more of whatever it is that makes money—that is, a manufacturing business can sell more products or a service business can serve more people. Of course, when sales increase, costs increase too. It is hoped, of course, that the sales revenue increase will be greater than the cost increase. Second, they can raise prices. This may or may not be practical depending on how resistant the market is to price increases. Third, firms can increase the return that the company's assets are earning—that is, find ways to produce more money with the same amount of assets.

Decreasing Cash Outflows

Managers can also increase the *net* amount of cash flowing into their firms during any given time period by decreasing the amount of cash flowing out. That is, by cutting costs.

A less obvious way to decrease cash outflows from the business is to decrease the *risk* of doing business. Risk in business equates to uncertainty, and a business that faces a lot of uncertainty must keep a lot of cash on hand to deal with unexpected events. If a firm could somehow reduce the degree of risk of doing business, the number of unexpected events would drop, and the amount needed in the cash account could be reduced.

> **Take Note**
> Be wary of cost-cutting measures that hurt the business in the long term. For example, a drug company might boost profits now by cutting research and development spending (an expense). But that action will rob the company of new products that would generate extra value later.

Table 18-5   Cash Flow and Financing Requirements Summary, January 2007

Cash Flow Summary

1. Cash balance at start of month	$65,313
2. Net cash gain (loss) during month	1,820
3. Cash balance at end of month before financing	67,133
4. Desired minimum cash balance desired	65,000
5. Surplus cash (deficit) (line 3 – line 4)	$ 2,133

External Financing Summary

6. External financing balance at start of month	$ 302
7. New financing required (negative amount on line 5)	0
8. Financing repayments (positive amount on line 5*)	302
9. External financing balance at end of month	0
10. Cash balance at end of month after financing (balance on line 3 + new financing on line 7 – repayments on line 8)	$66,831

*If the positive amount on line 5 exceeds the external financing balance on line 6, enter the external financing balance on line 6.

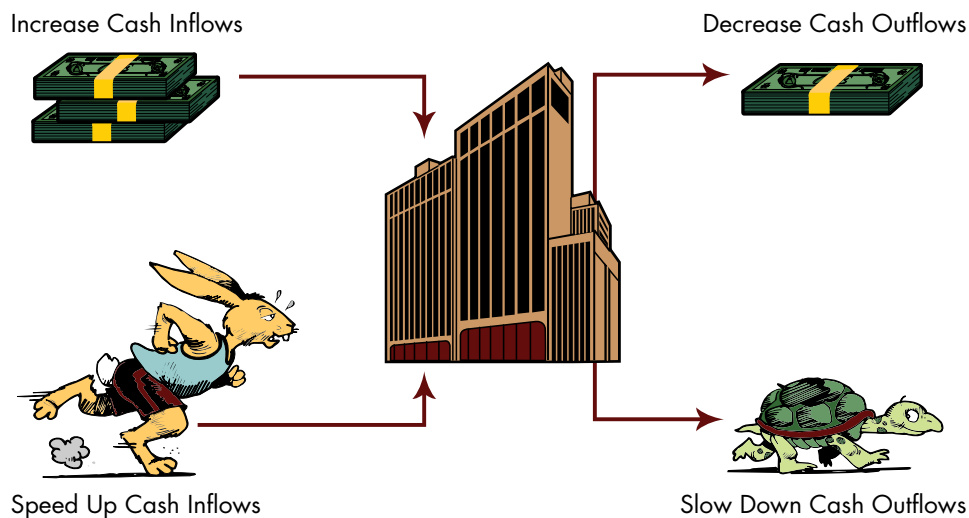Increase Cash Inflows   Decrease Cash Outflows

Figure 18-5 Managing the Cash Flowing In and Out of the Firm

Figure 18-5 shows the four objectives of cash flow management.

Speed Up Cash Inflows   Slow Down Cash Outflows

Speeding Up Cash Inflows

Most business managers would agree that, other things being equal, they would rather have cash earlier than later. This makes sense. The earlier a firm receives cash, the earlier it can put it to work earning a return. Accordingly, managers try to figure out how to speed the flow of cash into their firms.

Collecting funds from the firm's customers more quickly speeds cash inflow. The ideal situation, from a business firm's point of view, would be for all customers to pay for the products or services they buy immediately. However, the realities of the marketplace

Table 18-6 Bulldog Batteries, 12-Month Summary of Cash Flow and Financing Requirements

	2006 Dec	2007 Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Cash Flow Summary													
1. Cash balance at start of month		$65,313	$66,831	$67,782	$65,000	$65,000	$65,000	$65,000	$65,000	$66,554	$65,000	$69,473	$75,704
2. Net cash gain (loss) during month		$ 1,820	$ 951	($ 4,823)	($ 3,203)	$ 2,309	($ 8,267)	$ 5,341	$ 7,413	($ 3,828)	$ 6,748	$ 6,230	($ 9,105)
3. Cash balance at end of month before financing (line 1 plus line 2)		$67,133	$67,782	$62,959	$61,797	$67,309	$56,733	$70,341	$72,413	$62,725	$71,748	$75,704	$66,598
4. Minimum cash balance desired		$65,000	$65,000	$65,000	$65,000	$65,000	$65,000	$65,000	$65,000	$65,000	$65,000	$65,000	$65,000
5. Surplus cash (deficit) (line 3 minus line 4)		$ 2,133	$ 2,782	($ 2,041)	($ 3,203)	$ 2,309	($ 8,267)	$ 5,341	$ 7,413	($ 2,275)	$ 6,748	$10,704	$ 1,598
External Financing Summary													
6. External financing balance at start of month	$302	$ 302	$ 0	$ 0	$ 2,041	$ 5,243	$ 2,934	$11,201	$ 5,860	$ 0	$ 2,275	$ 0	$ 0
7. New financing required (negative amount from line 5)		$ 0	$ 0	$ 2,041	$ 3,203	$ 0	$ 8,267	$ 0	$ 0	$ 2,275	$ 0	$ 0	$ 0
8. Financing repayments (positive amount from line 5 not to exceed line 6)		$ 302	$ 0	$ 0	$ 0	$ 2,309	$ 0	$ 5,341	$ 5,860	$ 0	$ 2,275	$ 0	$ 0
9. External financing balance at end of month		$ 0	$ 0	$ 2,041	$ 5,243	$ 2,934	$11,201	$ 5,860	$ 0	$ 2,275	$ 0	$ 0	$ 0
10. Cash balance at end of month after financing (line 3 + line 7 – line 8)	$66,831	$67,782	$65,000	$65,000	$65,000	$65,000	$65,000	$65,000	$66,554	$65,000	$69,473	$75,704	$66,598

Take Note
If you are reading this on your computer screen using the Adobe Reader program, click on View/ Rotate View/Clockwise to read this table in proper orientation. When you are finished reading the table, click on View/Rotate View/ Counterclockwise to return to the regular page orientation.

Table 18-7 Bulldog Batteries, Complete Cash Budget

	2006 Nov	2006 Dec	2007 Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Cash Inflows:														
Sales (reference only; not a cash flow)	$13,441	$13,029	$12,945	$14,794	$16,643	$18,492	$20,341	$22,191	$24,040	$22,191	$20,341	$18,492	$16,643	$14,794
Cash collections on sales:														
30% in month of sale			$3,884	$4,438	$4,993	$5,548	$6,102	$6,657	$7,212	$6,657	$6,102	$5,548	$4,993	$4,438
60% in first month after sale			$7,817	$7,767	$8,876	$9,986	$11,095	$12,205	$13,315	$14,424	$13,315	$12,205	$11,095	$9,986
10% in second month after sale			$1,344	$1,303	$1,295	$1,479	$1,664	$1,849	$2,034	$2,219	$2,404	$2,219	$2,034	$1,849
Total collections			$13,045	$13,508	$15,164	$17,013	$18,862	$20,711	$22,561	$23,300	$21,821	$19,971	$18,122	$16,273
Other cash receipts			0	0	0	0	0	0	0	0	0	0	0	0
Total Cash Inflows			**$13,045**	**$13,508**	**$15,164**	**$17,013**	**$18,862**	**$20,711**	**$22,561**	**$23,300**	**$21,821**	**$19,971**	**$18,122**	**$16,273**
Cash Out flows:														
Materials purchases (reference only; not a cash flow)		$3,994	$4,494	$4,993	$5,492	$5,992	$6,491	$5,992	$5,492	$4,993	$4,494	$3,994	$3,872	$3,872
Payments for materials purchases:														
100% in month after purchase			$3,994	$4,494	$4,993	$5,492	$5,992	$6,491	$5,992	$5,492	$4,993	$4,494	$3,994	$3,872
Other cash payments:														
Production costs other than purchases			$3,994	$4,494	$4,993	$5,492	$5,992	$6,491	$5,992	$5,492	$4,993	$4,494	$3,994	$3,872
Selling and marketing expenses			$2,333	$2,667	$3,000	$3,333	$3,666	$4,000	$4,333	$4,000	$3,667	$3,333	$3,000	$2,667
General and administrative expenses			$903	$903	$903	$903	$903	$903	$903	$903	$903	$903	$903	$903
Interest payments														$2,971
Tax payments						$4,995		$4,995			$4,995			$4,995
Dividend payments					$6,098			$6,098			$6,098			$6,098
Total Cash Outflows			**$11,225**	**$12,557**	**$19,987**	**$20,215**	**$16,553**	**$28,978**	**$17,219**	**$15,887**	**$25,649**	**$13,223**	**$11,892**	**$25,378**
Net Cash Gain (Loss)			**$1,820**	**$951**	**($4,823)**	**($3,203)**	**$2,309**	**($8,267)**	**$5,341**	**$7,413**	**($3,828)**	**$6,748**	**$6,230**	**($9,105)**
Cash Flow Summary														
1. Cash balance at start of month			$65,313	$66,831	$67,782	$65,000	$65,000	$65,000	$65,000	$65,000	$66,554	$65,000	$69,473	$75,704
2. Net cash gain (loss) during month			$1,820	$951	($4,823)	($3,203)	$2,309	($8,267)	$5,341	$7,413	($3,828)	$6,748	$6,230	($9,105)
3. Cash balance at end of month before financing (line 1 plus line 2)			$67,133	$67,782	$62,959	$61,797	$67,309	$56,733	$70,341	$72,413	$62,725	$71,748	$75,704	$66,598
4. Minimum cash balance desired			$65,000	$65,000	$65,000	$65,000	$65,000	$65,000	$65,000	$65,000	$65,000	$65,000	$65,000	$65,000
5. Surplus cash (deficit) (line 3 minus line 4)			$2,133	$2,782	($2,041)	($3,203)	$2,309	($8,267)	$5,341	$7,413	($2,275)	$6,748	$10,704	$1,598
External Financing Summary														
6. External financing balance at start of month			$302	$0	$0	$2,041	$5,243	$2,934	$11,201	$5,860	$0	$2,275	$0	$0
7. New financing required (negative amount from line 5)			$0	$0	$2,041	$3,203	$0	$8,267	$0	$0	$2,275	$0	$0	$0
8. Financing repayments (positive amount from line 5, not to exceed line 6)			$302	$0	$0	$0	$2,309	$0	$5,341	$5,860	$0	$2,275	$0	$0
9. External financing balance at end of month		$302	$0	$0	$2,041	$5,243	$2,934	$11,201	$5,860	$0	$2,275	$0	$0	$0
10. Cash balance at end of month after financing (line 3 plus line 7 minus line 8)			$66,831	$67,782	$65,000	$65,000	$65,000	$65,000	$65,000	$66,554	$65,000	$69,473	$75,704	$66,598

demand that credit be extended.[3] Given that credit often must be extended, the business firm's goal is to encourage customers to pay off their accounts as quickly as possible. The firm might even offer customers a discount if they pay their bills early, say, within 10 days. This technique works, and the firm's managers hope that the return they can earn by getting the cash early outweighs the amount lost through the discount.[4]

Another way to speed up cash inflows is to make use of computerized fund transfers wherever possible. An **electronic funds transfer** is the act of crediting one account and debiting another automatically by a computer system. Electronic transfer is much faster than checks, which can take over a week to mail and clear.

Another method of speeding cash collections is a lockbox system. A **lockbox system** allows customers to send checks to a nearby post office box. The firm arranges for these funds to be deposited in a bank in or near the customer's town for electronic transfer to the receiving firm's account. Here's how a lockbox system works. A San Francisco-based business that has customers nationwide rents post office boxes in major cities all around the country. The firm directs its customers to send payments for their bills to the post office box in the city nearest them. The firm arranges for a bank in each city to pick up the mail from the post office box at least once a day and to deposit any payments received in the firm's account at the bank. From that point on, the funds are immediately available for the firm's use, either from the individual banks directly or by having the banks electronically transfer the funds to the firm's bank in San Francisco. By using the lockbox system, the firm can receive cash two to five days faster than if customers mailed all their payments to San Francisco.[5]

Slowing Down Cash Outflows

Just as speeding up the flow of cash into the firm gives managers more time to earn a return on the cash, so does slowing down the flow of cash out of the firm. Either way, the idea is to increase the amount of time that the firm has possession of the cash. One obvious way to slow down cash outflows is to delay paying bills as long as possible. However, the firm must take great care not to overstep the bounds of good sense and fair play in applying this principle. Imagine what would happen if a firm didn't pay its employees on time or delayed paying suppliers. Its business operations would suffer or it might not stay in business at all. Firms shouldn't pay bills that are due at the end of the month on the first of the month, but neither should they take unfair advantage of creditors by making late payments.

What's Next

This chapter examined how firms manage cash and the factors that determine how large a firm's cash balance will be. In Chapter 19 we study another component of working capital management: accounts receivable and inventory management.

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[3]A quick example illustrates why businesses must grant credit: Suppose two firms in town both sold office supplies. One will let you, a business owner, order supplies over the phone any time you want, and you are billed once a month. The other demands that you go to the store and pay cash each time you want to buy supplies. How long do you think the second store will be able to stay in business?

[4]This subject is discussed more fully in Chapter 19.

[5]Before implementing such a system, of course, the firm would have to evaluate whether the extra amount that could be earned on the funds collected two to five days early is greater than the cost of maintaining the lockbox system.

Summary

1. List the factors that affect a company's desired minimum cash balance.

Having a minimum balance ensures that enough money is maintained in the cash account to make payments when needed. The base level to be maintained is affected by: (1) how quickly and cheaply the firm can raise cash when needed; (2) how accurately the firm can predict cash needs; and (3) how much extra the firm wants to keep in the cash account for emergencies.

2. List the factors that affect a company's desired maximum cash balance.

Having a maximum balance ensures that firms limit the cash balance so that the firms invest and earn a return on as much cash as possible. The maximum amount to be maintained is affected by three factors: (1) available investment opportunities; (2) expected returns from these opportunities; and (3) the transaction costs of withdrawing the cash and making the investments.

3. Apply the Miller–Orr model to establish a target optimal cash balance.

The Miller–Orr model recognizes that a firm's cash balance might fluctuate up and down in an irregular fashion over time. The model solves for an optimal target cash balance about which the cash balance fluctuates until it reaches an upper or lower limit. If the upper limit is reached, short-term investment securities are bought, bringing the cash balance down to the target again. If the lower limit is reached, short-term investment securities are sold, bringing the cash balance up to the target.

4. Prepare a cash budget.

Managers use a cash budget to estimate detailed cash needs for future periods. Cash budgets are necessary because pro forma income statements and balance sheets do not indicate the actual flow of cash in and out of the firm. A monthly cash budget shows detailed cash flows from month to month throughout the year and how much over or short the firm's cash account will be at the end of each month. By using a cash budget, managers can estimate when it will be necessary to obtain short-term loans from their bank.

5. Explain how firms manage their cash inflows and outflows to maximize value.

The four objectives of cash management are to increase the flow of cash into the business, to decrease the flow of cash out of the business, to receive cash more quickly, and to pay cash out more slowly.

  Ways to increase the flow of cash into the firm include selling more products, serving more customers, and increasing the return earned by the firm's assets. Ways to reduce the flow of cash out of the business include cutting costs and decreasing the degree of risk in the business. Ways to speed up the flow of cash into the business include helping customers pay off their credit accounts more quickly and using electronic funds transfer or lockbox techniques. Ways to slow down the flow of cash out of the firm include taking advantage of credit terms whenever possible.

Equations Introduced in This Chapter

Equation 18-1.   Formula for Miller–Orr Model Target Cash Balance:

$$Z = \sqrt[3]{\frac{3}{4} \times \frac{TC \times V}{r}} + L$$

where: TC = Transaction cost of buying or selling short-term investment securities

   V = Variance of net daily cash flows

    r = Daily rate of return on short-term investment securities

   L = Lower limit to be maintained in the cash account

Equation 18-2   Formula for the Upper Limit in the Miller–Orr Model:

$$H = 3Z - 2L$$

where: Z = The target cash balance

    L = Lower limit to be maintained in the cash account

Self-Test

ST-1. Assume that short-term investment securities are yielding 5 percent, and it costs a firm $20 each time it buys or sells investment securities. The variance of the firm's daily net cash flows has been found to be $20,000. Management wants to keep at least $1,000 in the cash account for emergencies. Given these conditions, what is the firm's target cash balance?

ST-2. What is the maximum amount the firm in question ST-1 will let accumulate in its cash account before investing excess cash in marketable securities?

ST-3. Continuing with the firm in ST-1 and ST-2, how much will the firm invest in marketable securities if the upper limit in ST-2 is reached?

ST-4. Assume a company has $1,000 in its cash account at the beginning of a month and short-term loan balances of $3,500. If the company experiences a $14,000 net cash inflow during the month and its desired target cash balance is $3,000, how much of the outstanding loans can be paid off this month?

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Review Questions

1. What are the primary reasons that companies hold cash?

2. Explain the factors affecting the choice of a desired minimum cash balance amount.

3. What are the negative consequences of a company holding too much cash?

4. Explain the factors affecting the choice of a desired maximum cash balance amount.

5. What is the difference between pro forma financial statements and a cash budget? Explain why pro forma financial statements are not used to forecast cash needs.

6. What are the benefits of "collecting early" and how do companies attempt to do this?

7. What are the benefits of "paying late" (but not too late) and how do companies attempt to do this?

8. Refer to the Bulldog Batteries Company's cash budget in Table 18-7. Explain why the company would probably not issue $1 million worth of new common stock in January to avoid all short-term borrowing during the year.

Build Your Communication Skills

CS-1. Assume the company you work for has $10,000 in its cash account on January 1, 2007 and short-term loans outstanding in the amount of $15,000. Net cash flows for January, February, and March 2007 are forecasted to be +$2,000, –5,000, and +$8,000, respectively. Prepare a report for your company's CEO showing any new borrowing required and any possible debt payoffs that may be made during the three-month period. Your company's minimum desired cash balance is $5,000. (Hint: Use the format in Table 18-5.)

CS-2. Assume you work for an electric utility that serves several western states and your boss is concerned that there is too much delay between the time the company's customers pay their bills and the time the cash is actually deposited in the corporation's cash account. Prepare a briefing for your boss outlining a method for streamlining cash collection procedures in such a way that the delay in making cash available is minimized.

Problems

18-1. Your company wants to have a desired minimum cash balance of $3,000 and an upper-limit cash balance equal to $9,000. What would be your target cash balance?

Miller–Orr Model

18-2. Selena Rogers, the financial analyst of Keep-Fit Health Equipment Company, has a short-term investment yield of 3 percent and transaction cost of $40 per transaction. The cash inflows and outflows have traditionally been irregular with a variance of daily net cash flows equal to $39,000. Management of the company wants a desired minimum cash balance of $2,200. Calculate:

a. The target cash balance

b. The upper limit of cash balance

Miller–Orr Model

18-3. Will Clark, the financial analyst of Get-Fit Health Equipment Company, a competitor of Keep-Fit of problem 18-2, has the same yield and transaction cost. However, the variance of daily net cash flows is equal to $52,000. Management of the company wants a desired minimum cash balance of $3,900. Calculate:

a. The target cash balance

b. The upper limit of cash balance

Miller–Orr Model

18-4. Nire Ltd. has determined that its short-term investments are yielding 5 percent annually, and the cost is $25 each time it buys and sells securities. Nire's total assets amount to $150,000, its variance of net daily cash flows is estimated to be $65,580, and it wants to keep a minimum 10 percent of total assets in a cash account. What is the firm's target cash balance according to the Miller–Orr model?

Miller–Orr Model

18-5. Using the information in problem 18-4, find Nire's upper limit for the cash account according to the Miller–Orr model.

Miller–Orr Model

18-6.   Marion Crane, a financial analyst of Lifelong Appliances Company, is trying to develop a cash budget for each month of 2007. The sales are expected to occur as follows:

Month	Sales (in thousand dollars)
Nov 2006 (reference)	$131
Dec 2006 (reference)	$129
Jan 2007	$126
Feb 2007	$133
Mar 2007	$139
Apr 2007	$143
May 2007	$191
Jun 2007	$226
Jul 2007	$242
Aug 2007	$224
Sep 2007	$184
Oct 2007	$173
Nov 2007	$166
Dec 2007	$143
Jan 2008 (reference)	$136
Feb 2008 (reference)	$139

Assume all of Lifelong's sales are on credit, so no cash is received immediately when a sale is made. It is expected that 20 percent of Lifelong's customers will pay off their accounts in the month of sale, 70 percent will pay off their accounts in the month following the sale, and the remaining 10 percent of the customers will pay off their accounts in the second month following the sale. Given this payment pattern, help Marion in calculating Lifelong's actual monthly cash collections throughout 2007.

18-7.   Use the same sales data given in problem 18-6. To improve the cash collections, Marion has decided to undertake stricter credit terms. With this change she expects that 40 percent of Lifelong's customers will pay off their accounts in the month of sale, 55 percent will pay off their accounts in the month following the sale, and the remaining 5 percent of the customers will pay off their accounts in the second month following the sale. Given this payment pattern, what would be Lifelong's actual monthly cash collections throughout 2007?

18-8. The following is an estimate of sales revenues for 2007 for Kcir, Inc.

● **Cash Inflows**

	Sales
January	$17,956
February	$16,523
March	$18,366
April	$19,500
May	$22,890
June	$22,980
July	$23,157
August	$23,000
September	$21,650
October	$19,250
November	$18,920
December	$19,069

All purchases are made on credit. History shows that 45 percent of customers will pay off their accounts in the month the purchase is made, 40 percent of customers will pay off their accounts the month following the purchase month, and the remaining 15 percent will pay off their accounts in the second month following the purchase month. Find the cash collections for:

a. March

b. June

c. September

18-9. Kcir, Inc., has estimated expenses as follows: (Use the table in Problem 18-8 for sales figures needed to calculate expenses.)

● **Cash Outflows**

- General and administrative: $2,000/month

- Material purchases: 5 percent of sales (paid the month following the purchase)

- Interest expense: $750.00/year (paid in monthly installments)

- Income tax: $4,500/year (paid in quarterly installments)

Find the cash outflows for the following months.

a. February

b. June

c. November

18-10. Use the same sales data given in problem 18-6. Assume that Lifelong's cost of materials is 30 percent of sales. Appliances that are expected to be sold in February will be manufactured one month ahead of time in January, and all the materials needed for January's production schedule will be ordered one month ahead of time in December. This schedule repeats for each month of the year. Lifelong makes all of its purchases on credit and pays for them in cash during the month following the purchase. That is, December's purchase orders are paid for in January, and so on. Assume Lifelong's remaining cash outflows are all direct expenses paid for in the month incurred as follows:

- Production expenses other than purchases are equal to 80 percent of purchases.

- Sales and marketing expenses are 19 percent of sales each month.

- General and administrative expenses are $11,000 each month.

- Interest expense is expected to be $31,000 for the year. Assume it will be paid all at once in December 2007.

- Lifelong's income tax bill for 2007 is expected to be $100,000. The bill will be paid in four equal installments in April, June, September, and December.

- Two semiannual dividends of $50,000 each are expected to be declared in 2007. These will be paid in June and December.

Calculate Lifelong's total cash outflows, including the preceding expenses and payments for materials purchases.

18-11. Use the same data given in problem 18-10, except for the payment schedule for materials purchased. Now assume that Lifelong pays for the material purchased in the following manner: 30 percent is paid in cash in the month of purchase, and the remaining 70 percent is paid in cash during the month following the purchase. That is, 30 percent of December's purchase orders are paid for in December, and the balance of 70 percent is paid in January, and so on. With this change, calculate Lifelong's total cash outflows, including the preceding expenses, dividends, and payments for materials purchases.

18-12. Rose Sayer, a financial analyst of Fit-and-Forget Fittings Company, is trying to develop a cash budget for each month of 2007. The sales are expected to occur as follows:

EXCEL SPREADSHEET

Month	Sales (in thousands dollars)
Nov 2006 (reference)	$2,266
Dec 2006 (reference)	$2,230
Jan 2007	$2,116
Feb 2007	$2,300
Mar 2007	$2,402
Apr 2007	$2,420
May 2007	$3,390
Jun 2007	$3,909
Jul 2007	$4,164
Aug 2007	$3,933
Sep 2007	$3,163
Oct 2007	$2,912
Nov 2007	$2,886
Dec 2007	$2,424
Jan 2008 (reference)	$2,353
Feb 2008 (reference)	$2,442

Assume all of Fit-and-Forget's sales are on credit, so no cash is received immediately when a sale is made. It is expected that 30 percent of Fit-and-Forget's customers will pay off their accounts in the month of sale, 65 percent will pay off their accounts in the month following the sale, and the remaining 5 percent of the customers will pay off their accounts in the second month following the sale.

Assume that Fit-and-Forget's cost of materials is 20 percent of sales. Fit-and-Forget manufactures fittings expected to be sold in February one month ahead of time, in January. They order all the materials they need for January's production schedule one month ahead of time, in December. This schedule repeats for each month of the year. Fit-and-Forget makes all purchases on credit and pays for the material purchased in the following manner: 20 percent is paid in cash in the month of ordering, and the balance of 80 percent is paid in cash during the month following the purchase. That is, 20 percent of December's purchase orders are paid for in December, and the balance of 80 percent is paid in January, and so on. Assume Fit-and-Forget's remaining cash outflows are all direct expenses paid for in the month incurred as follows:

- Production expenses other than purchases are equal to 14 percent of purchases.

- Sales and marketing expenses are 16 percent of sales each month.

- General and administrative expenses are $180,000 each month.

- Interest expense is expected to be $500,000 for the year. Assume it will be paid all at once in December 2007.

- Fit-and-Forget's income tax bill for 2007 is expected to be $1,600,000. The bill will be paid in four equal installments in April, June, September, and December.

- Two semiannual dividends of $855,000 each are expected to be declared in 2007. These will be paid in June and December.

Assuming a cash balance of $1,133,000 at the beginning of January, a desired target cash balance of $1,110,000, and short-term loans of $50,000 outstanding at the beginning of the month, calculate total cash inflows, total cash outflows, net cash gain (loss), cash flow summary, and external financing (if any) summary in the same format as in Table 18-7.

Answers to Self-Test

ST-1. Per Equation 18-1, the firm's target cash balance per the Miller–Orr model is

$$Z = \sqrt[3]{\frac{3}{4} \cdot \frac{20 \cdot \$20,000}{(.05/365)}} + \$1,000$$

$$= \sqrt[3]{\frac{\$1,200,000}{.000547945}} + \$1,000$$

$$= \$1,299 + \$1,000$$

$$= \$2,299$$

ST-2. Per Equation 18-2, the upper limit will be

$$H = (3 \times \$2,299) - (2 \times \$1,000)$$

$$= \$6,897 - \$2,000$$

$$= \$4,897$$

ST-3. If the upper limit is reached, the firm will invest the amount necessary to bring the cash balance back down to the target balance level. This amount is

$$4,897 - \$2,299 = \$2,598$$

ST-4. A summary of the company's cash flows and external financing is shown next:

Cash Flow Summary

1. Cash balance at start of month	$ 1,000
2. Net cash gain (loss) during month	14,000
3. Cash balance at end of month before financing	15,000
4. Desired minimum cash balance desired	3,000
5. Surplus cash (deficit) (line 3 minus line 4)	$12,000

External Financing Summary

6. External financing balance at start of month	$ 3,500
7. New financing required (negative amount on line 5)	0
8. Financing repayments (the entire loan balance)	3,500
9. External financing balance at end of month	0
10. Cash balance at end of month after financing (balance on line 3 plus new financing on line 7 minus repayments on line 8)	$11,500

As shown on line 8 of the preceding summary, the company can pay off the entire $3,500 short-term loan balance this month.

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