CHAPTER 3

The Cash Budget

After studying this chapter, you should be able to:

1. *Explain the purpose of the cash budget and how it differs from an income statement.*
2. *Calculate a firm's expected total cash collections and disbursements for a particular month.*
3. *Calculate a firm's expected ending cash balance and short-term borrowing needs.*
4. *Demonstrate how Excel can be used to determine the optimal timing of major cash expenditures.*
5. *Use the Scenario Manager to evaluate different assumptions in a model.*
6. *Use the debugging tools that Excel provides to find and fix errors in formulas.*

Of all the topics covered in this book, perhaps no other task benefits so much from the use of spreadsheets as the cash budget. As we'll see, the cash budget can be a complex document with many interrelated entries. Manually updating a cash budget, especially for a large firm, is not a chore for which one volunteers. However, once the initial cash budget is set up in a spreadsheet, updating and playing "what if" becomes very easy.

A *cash budget* is simply a listing of the firm's anticipated cash inflows and outflows over a specified period. Unlike a pro forma income statement (discussed in Chapter 5), the cash budget includes only actual cash flows. For example, depreciation expense (a noncash expense) does not appear on the cash budget, but principal payments on debt obligations

(which are not on the income statement) do. Because of its emphasis on cash income and expenditures, the cash budget is particularly useful for planning short-term borrowing and the timing of expenditures. As with all budgets, another important benefit of the cash budget comes from reconciling actual after-the-fact cash flows with those from the forecast.

We'll see that a cash budget is composed of three parts:

1. The worksheet area, where we will do some preliminary calculations;
2. A listing of each of the cash inflows (collections) and outflows (disbursements); and
3. Calculation of the ending cash balance and short-term borrowing needs.

We are simplifying things somewhat. In reality, many of the given variables in this chapter would come from other budgets. For example, a firm would usually have at least a sales budget from which the sales forecasts are taken, a salary budget, a capital expenditure budget, and so on. All of these different budgets would be created before the final cash budget and require a great deal of thought and research. The cash budget worksheet would then pull values from those other budgeting worksheets.

Throughout the chapter, we will create a complete cash budget for June to September 2012 for Bithlo Barbecues, a small manufacturer of barbecue grills. The financial staff of the firm has compiled the following set of assumptions and forecasts to be used in the cash budgeting process:

1. Actual and expected sales through October are as given in Table 3-1.
2. 40% of sales are for cash. Of the remaining 60% of sales, 75% is collected in the following month and 25% is collected two months after the sale.
3. Raw materials inventory purchases are equal to 50% of the following month's sales (e.g., June purchases are 50% of expected July sales). 60% of purchases are paid for in the month following the purchase, and the remainder are paid in the following month.
4. Wages are forecasted to be equal to 20% of expected sales.
5. Payments on leases for equipment are $10,000 per month.
6. Interest payments of $30,000 on long-term debt are due in June and September.
7. A $50,000 dividend will be paid to shareholders in June.
8. Tax prepayments of $25,000 will be paid in June and September.
9. $200,000 is scheduled to be paid in July for a capital investment, but management is flexible on the scheduling of this outlay.
10. Bithlo Barbecues must keep a minimum cash balance of $15,000 by agreement with its bank. Its cash balance at the end of May was $20,000.

The Worksheet Area

The worksheet area is not necessarily a part of the cash budget. However, it is useful because it summarizes some of the most important calculations in the budget. This section includes a breakdown of expected sales, collections on accounts receivable, and payments for materials (inventory) purchases. This section could, perhaps should, be included on a separate worksheet along with all of the assumptions. Alternatively, the values could be drawn from separate budget worksheets (e.g., the expected sales figure could be linked to the sales budget worksheet, which would include a sales forecast for each product line). It might also include some other preliminary calculations. Because our model is small, we will keep all of the assumptions and preliminary calculations on one worksheet.

Open a new workbook and rename Sheet1 to `Cash Budget`. Like any other financial statement, we begin the cash budget with the titles. In A1 enter: `Bithlo Barbecues`; in A2 type: `Cash Budget`; and in A3 enter: `For the Period June to September 2012`. Center these titles across columns A to I. Next, enter the names of the months from Table 3-1 in C4:I4 using the AutoFill feature (see page 11).

Using Date Functions

As we will see, a cash budget spreadsheet is ideally suited for reuse in future budget cycles. After all, why should you recreate the entire worksheet just because the dates and numbers will be different in the future? With a little bit of planning, we can set up the worksheet to make it easy to use for future budgets.

Let's start by reconsidering how we enter the dates into row 4. Instead of typing the names of the months, we can mostly automate them with formulas. In particular, we would like to be able to change the date in C4 and have the other dates automatically update. To do so, we will need to use the **DATE** function in combination with the **YEAR**, **MONTH**, and **DAY** functions.

Recall that Excel treats dates as the number of days that have elapsed since January 1, 1900. The **DATE** function calculates the serial number for any date and is defined as:

DATE(*YEAR*, *MONTH*, *DAY*)

For example, enter the formula `=Date(2012,2,4)` into a blank cell (say, K4). This will return 40,943, which is the serial number for February 4, 2012. This number can be formatted using any built-in or custom date format to be displayed as a date instead of an integer.

We can also reference a cell that contains a date and extract the year, month, or day using the appropriately named functions:

YEAR(*SERIAL_NUMBER*)

MONTH(*SERIAL_NUMBER*)

DAY(*SERIAL_NUMBER*)

In each case, ***SERIAL_NUMBER*** represents a date serial number. For example, type `=Year(K4)` into K5 and the result will be 2012. Similarly, `=Month(K4)` would return 2, and `=Day(K4)` would return 4.

With that as background, enter `4/1/2012` into C4. This is the date that will control the others. In D4 enter the formula: `=DATE(YEAR(C4),MONTH(C4)+1,DAY(C4))`. That formula looks at the date in the cell C4 and returns a date that is exactly one month later. Now copy the formula from D4 to E4:I4.

If you now change the date in C4, the others will update automatically. Note also that, because we are using dates instead of text, we can use these cells as the basis for calculations. For example, an entry in the budget might vary depending on the month of the year. We can now calculate that automatically so that it is always correct, no matter how the dates change. Now apply the custom number format "mmmm" to the values in C4:I4 so that only the month names are displayed.

Calculating Text Strings

It is often useful to calculate text results, just as we calculate numeric results. For example, it would be helpful if the heading in A3, which shows the relevant period for the cash budget, was updated when the date in C4 is changed. We can accomplish this by using string concatenation and the **TEXT** function.

Concatenation is the process of joining two or more text strings into one. Excel has a built-in function to perform this task:

CONCATENATE(*TEXT1*, *TEXT2*, ...)

but it is rarely used. Instead, the & operator is used because it performs the same task and is much more economical to type. For example, type `Hello` into K8 and `World` into K9. In K10 enter the formula: `=K8&" "&K9` and the result will be the string Hello World. Note that to produce a space between the words, we had to include an empty string.

The **TEXT** function takes a number (or the result of a formula) as an argument and converts it to text with a particular number format. It is defined as:

TEXT(*VALUE*, *FORMAT_TEXT*)

where ***VALUE*** is the number and ***FORMAT_TEXT*** is a custom number format mask (see page 51).

Finally, enter the formula: `="For the Period "&TEXT(E4,"mmmm")&" to "&TEXT(H4,"mmmm")&" "&TEXT(M1,"#")` into A4. Now change the date in C4 a few times to understand how it works.

Sales and Collections

The starting point for a cash budget is the sales forecast. Many of the other forecasts in the cash budget are driven (at least indirectly) by this forecast. The sales forecast has been provided for us by Bithlo's marketing department in Table 3-1. In A5 enter the label `Sales`, and then copy the expected sales from the table into C5:I5 in your worksheet.

TABLE 3-1
BITHLO BARBECUES ACTUAL AND EXPECTED SALES FOR 2012*

Month	Sales
April	291,000
May	365,000
June	387,000
July	329,000
August	238,000
September	145,000
October	92,000

* April and May sales are actual.

Note that sales have a strong seasonal component. In this case, barbecuing is mostly a summer phenomenon, and we expect that sales will peak in June before falling dramatically in the fall and winter months. Such seasonality is important in many types of business: for example, sales in the fourth quarter may be 30% or more of annual sales for many retailers.[1] Seasonal patterns must be included in your sales forecast if your cash budget is to be accurate.

For most firms, at least a portion of sales are made on credit. It is therefore important to know how quickly the sales can be collected. In the case of Bithlo Barbecues, experience has

1. As an example, at Target Corp. fourth-quarter revenues averaged about 31% of full year sales in fiscal years 2007 to 2011. The comparable first quarter average was only about 22%.

shown that in the past about 40% of its sales are cash and 60% are on credit. Of the 60% of sales made on credit, about 75% will be collected during the month following the sale and the remaining 25% will be collected two months after the sale. In other words, 45% (= 0.60 × 0.75) of total sales in any month will be collected during the following month, and 15% (= 0.60 × 0.25) will be collected within two months.[2]

Our goal is to determine the total collections in each month. In A6 type: `Collections:`, and then in A7 enter the label: `Cash`. This will indicate the cash sales for the month. In A8 enter: `First Month` to indicate collections from the sales made in the previous month. In A9 enter: `Second Month` to indicate collections on sales made two months earlier. Because our estimates of the collection percentages may change, it is important that they not be entered directly into formulas. Instead, enter these percentages in B7:B9.

Because the budget is for June to September, we will begin our estimates of collections in E7. (April and May sales are included here only because we need to reference sales from the two previous months to determine the collections from credit sales.) To calculate the cash collections for June we multiply the expected June sales by the percentage of cash sales, so enter: `=E5*$B7` into E7. To calculate collections from cash sales for the other months, simply copy this formula to F7:H7.

Collections on credit sales can be calculated similarly. In E8, we will calculate June collections from May sales with the formula: `=D5*$B8`. Copy this formula to F8:H8. Finally, collections from sales two months ago, in E9, can be calculated with the formula: `=C5*$B9`. After copying this formula to F9:H9, calculate the total collections in row 10 for each month by using the **SUM** function. Check your numbers against those in Exhibit 3-1 and format your worksheet to match. This is a good time to save your workbook.

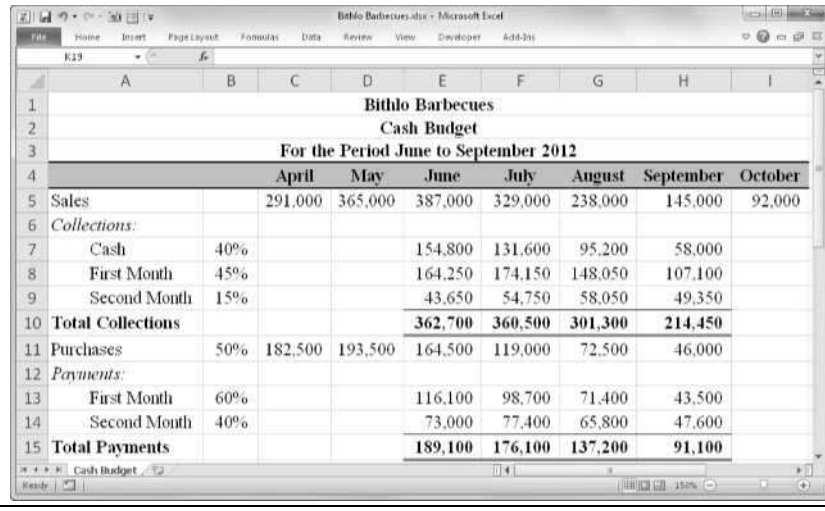
Purchases and Payments

In this section of the worksheet area, we calculate the payments made for inventory purchases. Bithlo Barbecues purchases inventory (equal to 50% of sales) the month before the sale is made. For example, June inventory purchases will be 50% of expected July sales. However, it does not pay for the inventory immediately. Instead, 60% of the purchase price is paid in the following month, and the other 40% is paid two months after the purchase.

We first need to calculate the amount of inventory purchased in each month. As noted, this is 50% of the following month's sales. So in A11 type: `Purchases` and in B11 enter: `50%`. We will calculate April purchases in C11 with the formula: `=$B11*D5`. Copying this formula to D11:H11 completes the calculation of purchases.

2. For simplicity, we assume that 100% of sales will be collected. Most firms would include an allowance for "bad debts" or returns based on historical patterns.

EXHIBIT 3-1
CALCULATING COLLECTIONS AND PAYMENTS IN THE WORKSHEET AREA



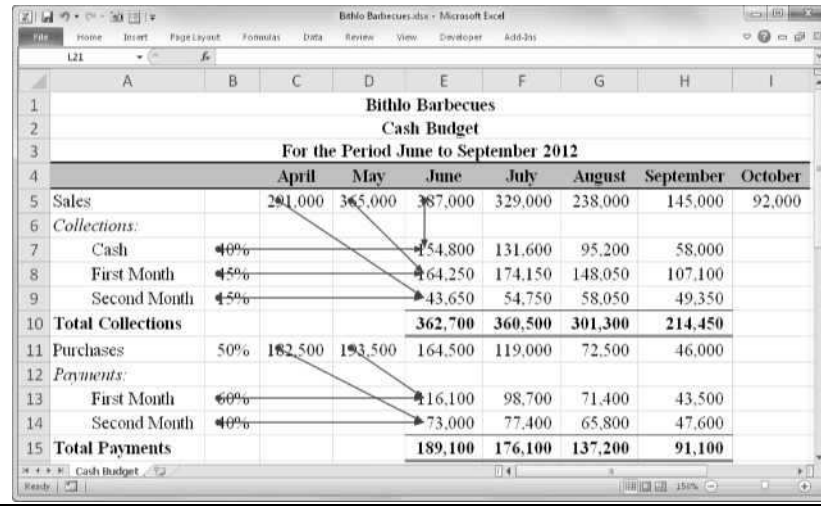
	A	B	C	D	E	F	G	H	I
1	Bithlo Barbecues								
2	Cash Budget								
3	For the Period June to September 2012								
4			April	May	June	July	August	September	October
5	Sales		291,000	365,000	387,000	329,000	238,000	145,000	92,000
6	*Collections:*								
7	Cash	40%			154,800	131,600	95,200	58,000	
8	First Month	45%			164,250	174,150	148,050	107,100	
9	Second Month	15%			43,650	54,750	58,050	49,350	
10	**Total Collections**				**362,700**	**360,500**	**301,300**	**214,450**	
11	Purchases	50%	182,500	193,500	164,500	119,000	72,500	46,000	
12	*Payments:*								
13	First Month	60%			116,100	98,700	71,400	43,500	
14	Second Month	40%			73,000	77,400	65,800	47,600	
15	**Total Payments**				**189,100**	**176,100**	**137,200**	**91,100**	

Credit purchases are not cash outflows, so we need to calculate the actual cash payments for inventory in each month. This is very similar to the way we calculated total cash collections. First, enter labels. In A12 type: `Payments:`. In A13 and A14 enter: `First Month` and `Second Month`, respectively, and enter: `Total Payments` in A15. Now enter `60%` in B13 and `40%` in B14. In June, Bithlo Barbecues will pay for 60% of purchases made in May. So the formula in E13 is: `=$B13*D11`. Copy this to F13:H13 to complete the first month's payments. To calculate the June payment for April purchases in E14, use the formula: `=$B14*C11`. Copy this to F14:H14 and then calculate the total payments for each month in row 15.

At this point, your worksheet should look like the one in Exhibit 3-1. Check your numbers carefully to make sure that they agree with those in the exhibit. To clarify the logic of these formulas, examine Exhibit 3-2 which is the same as Exhibit 3-1, except it has arrows drawn in to show the references for June.

Because this portion of the cash budget contains only preliminary calculations, it isn't necessary that it be visible at all times. Therefore, we can hide it using Excel's group and outline feature as discussed on page 62. Select rows 5:16 and then go to the Data tab. In the Outline group, click the upper portion of the Group button and then collapse the outline. When it is necessary to view this area we can simply expand the outline.

EXHIBIT 3-2
THE WORKSHEET AREA OF A CASH BUDGET



	A	B	C	D	E	F	G	H	I
1	Bithlo Barbecues								
2	Cash Budget								
3	For the Period June to September 2012								
4			April	May	June	July	August	September	October
5	Sales		291,000	365,000	387,000	329,000	238,000	145,000	92,000
6	*Collections:*								
7	Cash	40%			154,800	131,600	95,200	58,000	
8	First Month	45%			164,250	174,150	148,050	107,100	
9	Second Month	15%			43,650	54,750	58,050	49,350	
10	**Total Collections**				**362,700**	**360,500**	**301,300**	**214,450**	
11	Purchases	50%	182,500	193,500	164,500	119,000	72,500	46,000	
12	*Payments:*								
13	First Month	60%			116,100	98,700	71,400	43,500	
14	Second Month	40%			73,000	77,400	65,800	47,600	
15	**Total Payments**				**189,100**	**176,100**	**137,200**	**91,100**	

Collections and Disbursements

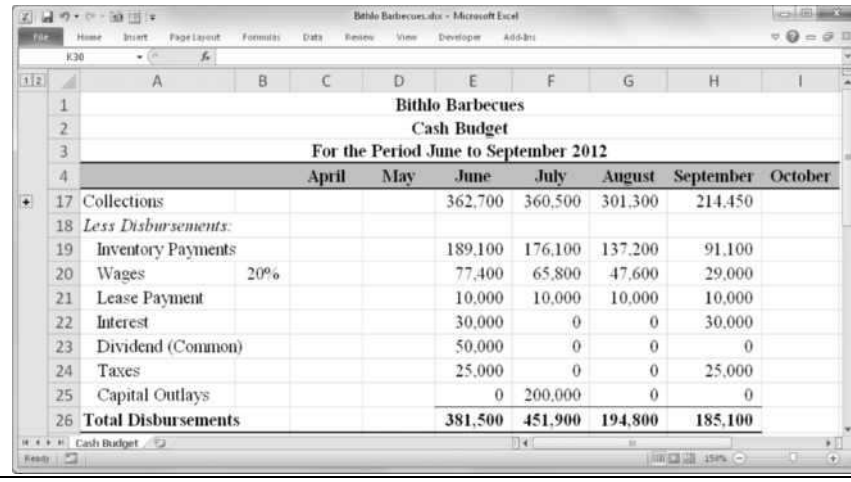
This section of the cash budget is the easiest to set up in a spreadsheet because there are no complex relationships between the cells as there are in the worksheet area. The collections and disbursements area is very much like a cash-based income statement. However, note that there are no noncash expenses listed, and certain items (e.g., principal payments) that are not on the income statement will be on the cash budget. We need to list all of the actual cash flows that are expected for each month, whether they are on the income statement or not.

We will begin by summarizing the cash collections for each month. Enter the label: `Collections` in A17. In E17:H17 the formulas simply reference the total collections that were calculated in E10:H10. So, for example, the formula in E17 is: `=E10`. Copy this formula to F17:H17. Had there been other cash inflows expected, for example proceeds from a loan, then they would also be listed in this section.

In A18, enter the label: `Less Disbursements:`. The first cash outflow that we will enter is the inventory payment, which was calculated in the worksheet area. Enter `Inventory Payments` as the label in A19 and the formula in E19 is: `=E15`. Wages are assumed to be equal to 20% of sales. In A20 add the label: `Wages` and in B20 type: `20%`, which will be used to calculate the expected monthly wage expense. The formula to calculate wages in

E20 is: `=$B20*E5`. Now copy these formulas to F20:H20. By now, you should be able to finish this section by entering the remaining labels and numbers as pictured in Exhibit 3-3.

EXHIBIT 3-3
COLLECTIONS AND DISBURSEMENTS



	A	B	C	D	E	F	G	H	I
1	Bithlo Barbecues								
2	Cash Budget								
3	For the Period June to September 2012								
4			April	May	June	July	August	September	October
17	Collections				362,700	360,500	301,300	214,450	
18	*Less Disbursements:*								
19	Inventory Payments				189,100	176,100	137,200	91,100	
20	Wages	20%			77,400	65,800	47,600	29,000	
21	Lease Payment				10,000	10,000	10,000	10,000	
22	Interest				30,000	0	0	30,000	
23	Dividend (Common)				50,000	0	0	0	
24	Taxes				25,000	0	0	25,000	
25	Capital Outlays				0	200,000	0	0	
26	**Total Disbursements**				**381,500**	**451,900**	**194,800**	**185,100**	

There are a couple of points to note about this portion of the cash budget. First, we have assumed that the only cash inflows are from selling the firm's products. In other cases, however, it is possible that the firm might plan to sell some assets or bonds or stock. Any of these actions would bring cash into the firm and should be included under collections.

Second, we have included dividend payments, which do not appear on the income statement, on row 23. The reason that they are on the cash budget is that dividends represent a very real cash expenditure for the firm. They don't appear on the income statement because dividends are paid from after-tax dollars. In other problems, there may be other similar outlays, such as a principal payment to be made on a loan. Remember, the cash budget is not an income statement. For the cash budget, we do not use accrual accounting; we include all cash inflows and outflows when they are expected to occur, whether they will be on the income statement or not.

Finally, Bithlo Barbecues has scheduled capital outlays of $200,000 in July. Even though they are paying the full cost in July, it is unlikely that they would be allowed to expense this entire amount during 2012. Instead, the income statement would reflect the depreciation of these assets over a longer period of time. Regardless of tax laws or accounting conventions, it is important to include all expected cash inflows and outflows on the cash budget when they are scheduled to occur.

Calculating the Ending Cash Balance

This last section of the cash budget calculates the expected ending cash balance at the end of each month. This is an important part of the cash budget because it helps the manager understand how the firm's cash balance will fluctuate and thus its short-term borrowing needs. Knowing the borrowing requirements in advance allows managers to arrange for financing before they need it and provides the time necessary to evaluate possible alternatives. Managers can also use this information to determine the best timing for major expenditures.

TABLE 3-2
CALCULATING THE ENDING CASH BALANCE

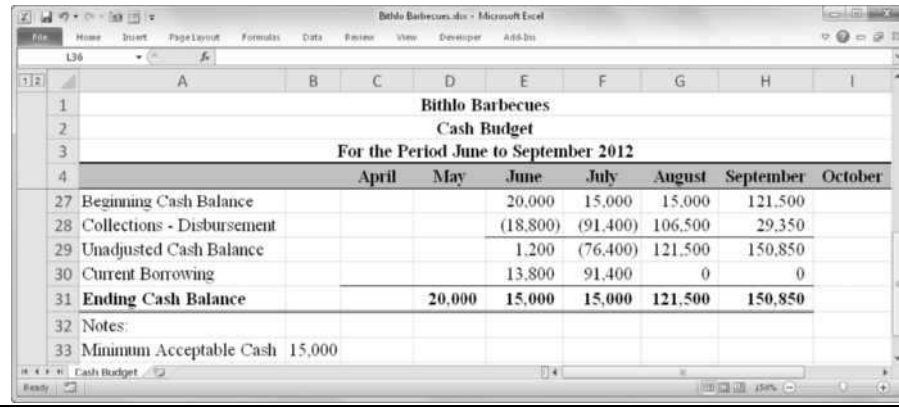
	Beginning Cash Balance
+	Total Collections
–	Total Disbursements
=	Unadjusted Cash Balance
+	Current Borrowing
=	Ending Cash Balance

Table 3-2 shows the series of calculations necessary to determine the firm's ending cash balance. Essentially, this is the same procedure we saw in Table 2-2 on page 58 with the addition of short-term borrowing. In the next section we will add a few steps to this calculation, but the basic procedure is always as outlined in Table 3-2.

We have already made most of the calculations necessary to complete the cash budget. Before we finish this last section, however, we need to add another detail. The management of Bithlo Barbecues has decided that they would like to keep a minimum cash balance of $15,000 to meet any unexpected expenses. If the projected cash balance falls below this amount, they will need to borrow to bring the balance back to this minimum. In A32 enter the label: `Notes:`. We will use cells below A32 to list important assumptions about our cash budget. The first of these is the minimum cash balance requirement. In A33 enter the label: `Minimum Acceptable Cash` and in B33 enter: `15,000`.

In cells A27:A31 enter the labels as shown in Exhibit 3-4. (Notice that this is exactly the same as was outlined in Table 3-2.) We start with the ending cash balance in May. Enter: `20,000` into D31. The ending cash balance for the month is simply the unadjusted cash balance plus current borrowing, so the formula in E31 is: `=sum(E29:E30)`. This formula will be the same for each month, so copy it across to F31:H31.

EXHIBIT 3-4
ENDING CASH BALANCE CALCULATION



	A	B	C	D	E	F	G	H	I
1	Bithlo Barbecues								
2	Cash Budget								
3	For the Period June to September 2012								
4			April	May	June	July	August	September	October
27	Beginning Cash Balance				20,000	15,000	15,000	121,500	
28	Collections - Disbursement				(18,800)	(91,400)	106,500	29,350	
29	Unadjusted Cash Balance				1,200	(76,400)	121,500	150,850	
30	Current Borrowing				13,800	91,400	0	0	
31	**Ending Cash Balance**			**20,000**	**15,000**	**15,000**	**121,500**	**150,850**	
32	Notes:								
33	Minimum Acceptable Cash	15,000							

The beginning cash balance for any month is the same as the ending cash balance from the previous month. Therefore, we can simply reference the previous month's ending cash balance calculation. In E27 enter the formula: `=D31` and copy this across to F27:H27. At this point, your beginning cash balance for each month, except for June, will be 0 because we have not yet entered any formulas in E28:H30.

Because we have already calculated the total collections and total disbursements, there is no need to have separate rows for those calculations in this section. Instead, we will calculate the net collections for June in E28 with the formula: `=E17-E26`. Copy this formula to F28:H28. For June, the result is –$18,800, which indicates that the firm expects to spend more than it will collect. In other words, the cash balance is expected to decline by $18,800 in June. This decline will be reflected in the unadjusted cash balance.

The unadjusted cash balance is what the cash balance would be if the firm did not have any short-term borrowing during the month. We simply add the beginning cash balance and the net collections for the month. The formula in E29 is: `=Sum(E27:E28)`. The result is $1,200, which is less than the firm's minimum acceptable cash balance of $15,000. Therefore, Bithlo Barbecues will need to borrow $13,800 to bring the balance up to this minimum.

How did we determine that the firm needs to borrow $13,800? It is probably obvious to you, even without giving it much thought. However, you need to think it through carefully to create a formula that will work under all circumstances. We could use the following equation:

$$\text{Current Borrowing} = \text{Minimum Cash} - \text{Unadjusted Cash} \quad \textbf{(3-1)}$$

In this case we find that Bithlo Barbecues needs to borrow:

$$\$13{,}800 = \$15{,}000 - \$1{,}200$$

Equation (3-1) works in this case, but it is not appropriate in all circumstances. Suppose, for example, that the unadjusted cash balance had been $20,000. This would suggest that the firm needs to borrow –$5,000, which is absurd.[3] In a case such as this, we would like to see current borrowing at 0.

The calculation that we need can be stated as follows: "**If** the unadjusted cash balance is less than the minimum, **then** we borrow an amount equal to minimum cash – unadjusted cash. **Otherwise**, current borrowing is zero." With the formulas that we have used so far, this type of calculation is impossible. However, Excel has a built-in function that can handle situations where the result depends on some condition—the **IF** statement.

The **IF** statement returns one of two values, depending on whether a statement is true or false:

IF (*LOGICAL_TEST*, *VALUE_IF_TRUE*, *VALUE_IF_FALSE*)

LOGICAL_TEST is any statement that can be evaluated as being either true or false (i.e., boolean), and ***VALUE_IF_TRUE*** and *VALUE_IF_FALSE* are the return values that depend on whether ***LOGICAL_TEST*** was true or false. If you are familiar with computer programming, you will recognize this as the equivalent of the If–Then–Else construct that is supported by most programming languages.

The formula to calculate the firm's borrowing needs for June, in E30, is: `=IF(E29<=$B33,$B33-E29,0)`. Because the unadjusted cash balance is only $1,200, the result should indicate the need to borrow $13,800 as we found earlier. Copy this formula to F30:H30 to complete the calculation of current borrowing. Notice that, because of large positive net collections, the firm does not need to borrow funds in August or September.

We have already entered formulas for the ending cash balance in each month. You should now check your numbers and formatting against those in Exhibit 3-4.

3. Unless, of course, you assume that negative borrowing is the same as investing. But we will consider investing excess funds in the next section.

Repaying Short-Term Borrowing

In the previous section, we calculated the amount that the firm needs to borrow each month, but it wasn't repaid when excess cash was available. For example, in August the firm is expecting to have a large unadjusted cash balance that could be used to reduce the loan balance. It should be obvious that keeping the outstanding short-term loan balance as small as possible is a good idea.

Before altering our formulas to account for loan repayment, we need to know the outstanding loan balance at the end of each month. Select row 32 and insert a row. In A32 enter the label: `Cumulative Borrowing`. In D32 enter the formula: `=C32+D30`, which determines the cumulative loan balance by adding the previous balance to any new borrowing during the month. Copy this formula across E32:H32.

We can now change the formula in E30 so that it incorporates repayment. Note that the *VALUE_IF_FALSE* part of the formula was set to 0 if the firm doesn't need to borrow. This is where we will calculate the amount to repay whenever there is excess cash.

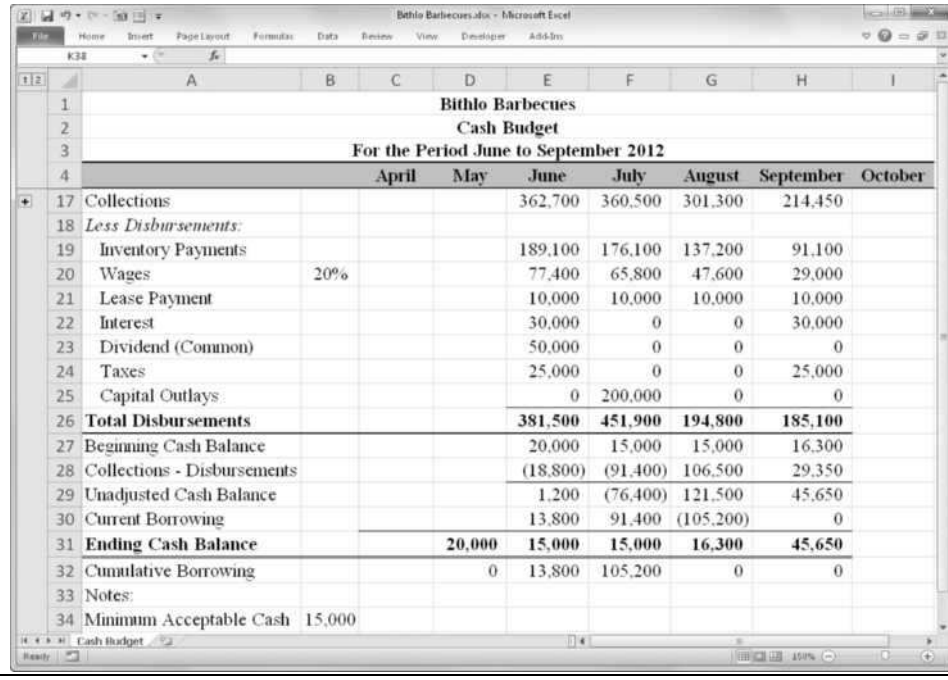
Look at the unadjusted cash balance for August in Exhibit 3-4. This is the first month in which the firm has a short-term loan balance and also excess cash. How much can they afford to pay back without going below the minimum cash balance? Obviously, they can repay the entire $105,200. However, we can't just assume that repaying the entire loan will always be the correct decision as that will sometimes leave the firm with a cash balance below the minimum, or negative. Instead, we need figure out which is smaller: the loan balance or the amount of excess cash. In order to do this we will use the **MIN** function, which returns the smallest of the arguments and is defined as:

MIN(*NUMBER1*, *NUMBER2*, …)

In E30 our new formula is: `=IF(E29<=$B34,$B34-E29,-MIN(D32,E29-$B$34))`. Note that the second part of the IF statement will be triggered only if there is excess cash available, and that it will never overpay the loan. That is, Current Borrowing will be 0 whenever there is excess cash without a loan balance.

At this point, the managers of Bithlo Barbecues know that they will need to arrange to borrow $13,800 before June and $91,400 before July. It is also obvious that they will have enough cash to pay off these borrowings in August. Your worksheet should look like the one in Exhibit 3-5.

EXHIBIT 3-5
A COMPLETED SIMPLE CASH BUDGET



	A	B	C	D	E	F	G	H	I
1	Bithlo Barbecues								
2	Cash Budget								
3	For the Period June to September 2012								
4			April	May	June	July	August	September	October
17	Collections				362,700	360,500	301,300	214,450	
18	*Less Disbursements:*								
19	Inventory Payments				189,100	176,100	137,200	91,100	
20	Wages	20%			77,400	65,800	47,600	29,000	
21	Lease Payment				10,000	10,000	10,000	10,000	
22	Interest				30,000	0	0	30,000	
23	Dividend (Common)				50,000	0	0	0	
24	Taxes				25,000	0	0	25,000	
25	Capital Outlays				0	200,000	0	0	
26	**Total Disbursements**				**381,500**	**451,900**	**194,800**	**185,100**	
27	Beginning Cash Balance				20,000	15,000	15,000	16,300	
28	Collections - Disbursements				(18,800)	(91,400)	106,500	29,350	
29	Unadjusted Cash Balance				1,200	(76,400)	121,500	45,650	
30	Current Borrowing				13,800	91,400	(105,200)	0	
31	**Ending Cash Balance**			**20,000**	**15,000**	**15,000**	**16,300**	**45,650**	
32	Cumulative Borrowing			0	13,800	105,200	0	0	
33	Notes:								
34	Minimum Acceptable Cash	15,000							

Using the Cash Budget for What If Analysis

Besides being useful for planning the firm's short-term borrowing needs, the cash budget can be useful in timing collections and expenditures. For example, suppose that the firm is concerned about the amount of borrowing that will be necessary in June and July. What we may want to do is to see what happens if we make certain changes in our assumptions.

One way that the firm may be able to reduce borrowing needs is to try to speed up collections on sales and to slow down the payments for inventory purchases (it will effectively be borrowing from suppliers instead of the bank). Suppose that the firm is able to collect 50% of sales during the first month, thereby reducing collections in the second month to 10%. Furthermore, assume that it can slow down its payments for inventory purchases to 50% in the first month after the purchase instead of the current 60%.

Change B8 to `50%`, B9 to `10%`, B13 to `50%`, and B14 to `50%`. You will see that borrowing will fall in June to $9,000 from $13,800. Borrowing in July will rise to $93,200 from $91,400. Therefore, the total amount of borrowing will decrease from the original $105,800

to $102,200. This has two benefits: It reduces the interest cost of borrowing (which we will consider in the next section), and it shifts that interest expense to a later point in time. Of course, there may also be an opportunity cost in the form of lost discounts due to paying suppliers later, and customers may go to competitors who offer better credit terms. Before moving on, make sure to change the percentages back to their original values.

As another example, consider Bithlo Barbecues' $200,000 capital expenditure currently planned for July 2012. This expenditure is the primary cause of the borrowing need in July. Indeed, without this $200,000 outlay, the firm wouldn't need to borrow in July.

Assuming that there is some flexibility in scheduling this outlay, in which month should the expenditure be made? The answer, of course, depends on a number of factors, but we might decide to make the decision based on minimizing borrowing needs. That is, schedule the project such that the firm's short-term borrowing needs are minimized. This might be especially important if the firm expected borrowing needs in excess of its line of credit in a given month.

You can experiment a bit by changing the month in which the capital expenditure is made. First, however, it would be helpful to know the maximum expected borrowing for the four-month period. To do this we can make use of the **MAX** function, which is similar to **MIN** except that it returns the largest of the arguments:

MAX(*NUMBER1,* *NUMBER2*, …)

In J32, enter the formula: `=MAX(D32:H32)` to calculate maximum borrowing. Now, by moving the capital expenditure to different months, you should be able to verify the numbers in Table 3-3.

TABLE 3-3
OPTIMAL SCHEDULING FOR A CAPITAL EXPENDITURE

Month of Outlay	Total Four-Month Borrowing
June	$213,800
July	105,200
August	13,800
September	13,800

Obviously, by this criteria, the best time to schedule the outlay would be in either August or September. Before continuing, be sure to move the $200,000 outlay back to July.

The Scenario Manager

In the previous section, we performed what has come to be called a "What if?" analysis. That is, we changed the timing of the large capital expenditure to see what would happen to the total amount of borrowing for the period. The problem with doing it "by hand" as we did is that you lose the original results of your analysis after it is done. Also, every person who looks at your spreadsheet will need to perform that same analysis. Excel provides a better way—the Scenario Manager.

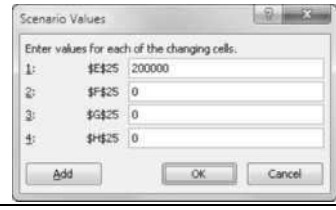
This tool allows us to store several scenarios (alternative input variables) in the spreadsheet and to display them at will. Once the scenario inputs are defined, we simply select a scenario from the list and Excel will enter the appropriate numbers into the spreadsheet and recalculate. Figure 3-1 shows the Scenario Manager dialog box before any scenarios have been created.

FIGURE 3-1
SCENARIO MANAGER DIALOG BOX WITH NO SCENARIOS DEFINED

To launch this tool, go to the Data tab. In the Data Tools group, click the What-If Analysis button and then choose **S**cenario Manager. When the dialog box is displayed, we can create our four scenarios. To begin, click the **A**dd button. In the next dialog box enter: `Expenditure in June` for the Scenario **n**ame. The Changing **c**ells are those cells that will contain different numbers under each scenario. In this case, they will be the capital outlay for each month, so enter: `E25:H25` and click the OK button.

You will now be prompted to enter values for each of the changing cells for this scenario. Because our first scenario calls for the expenditure to be made in June, enter `200000` in the first box and `0` in each of the others. The Scenario Values dialog box should look like that in Figure 3-2.

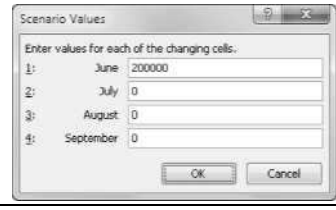
FIGURE 3-2
SCENARIO VALUES DIALOG BOX FOR JUNE EXPENDITURE



Click the **A**dd button to create the next scenario. Repeat these steps until you have four scenarios with the expenditure occurring in different months.

Note that the Scenario Values dialog box prompts you for values by using the cell addresses as labels. That can be confusing, especially if the cells are not visible on the screen. One way to make this situation better is to use defined names for the cells, as was discussed in Chapter 1 (page 10). Close the Scenario Manager and then select E25. On the Formulas tab, click the Define Name button. Now, type `June` in the **N**ame edit box. Select the worksheet name from the **S**cope drop-down list to limit this name to this worksheet and then click the OK button. Name the other cells similarly. Launch the Scenario Manager and select the "Expenditure in June" scenario. Click the **E**dit button, then the OK button on the Edit Scenario dialog, and your Scenario Values dialog box should look like the one in Figure 3-3.

FIGURE 3-3
SCENARIO VALUES DIALOG BOX WITH DEFINED NAMES



Many of the other tools supplied with Excel work with range names in a similar way. This is a useful trick to remember as it can simplify entering data. As we will see shortly, using range names will also improve the Scenario Summary sheets. After creating your scenarios, the Scenario Manager dialog box will look like the one in Figure 3-4.

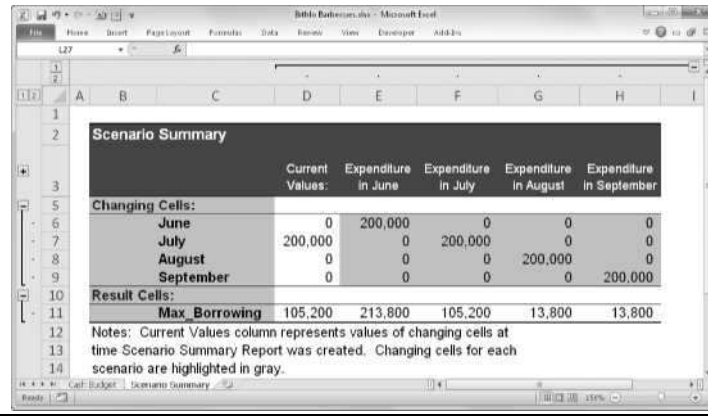
FIGURE 3-4
SCENARIO MANAGER DIALOG BOX WITH FOUR SCENARIOS

To display a particular scenario, simply select it from the list and click the **S**how button. Excel will alter the contents of your changing cells to reflect the values that you entered. Of course, the entire worksheet will be recalculated and you can see the results of the selected scenario. Note that to be able to scroll around and see the entire worksheet you must click the Close button on the Scenario Manager dialog box. Take a look at the results of each scenario, but remember to reset the scenario to "Expenditure in July" (our default case) before continuing. If you forget to reset to the default scenario, Excel will always display the last chosen scenario. This can cause confusion when you later open your workbook.

Being able to quickly change between scenarios is quite helpful, but the real advantage of the Scenario Manager is its ability to summarize the results of all of your scenarios. In this case, we would like to compare the total borrowing that results under each scenario to determine the best time for the expenditure. Recall that we added a formula in J32 to calculate the maximum borrowing for the period. Before continuing, define a name for this cell such as "Max_Borrowing." (Remember that we use the underscore in place of a space because spaces are not allowed in range names.)

Return to the Scenario Manager and click on the S**u**mmary button. You will be asked to enter **R**esult cells. A result cell is a cell (or several cells) that shows the end result of each scenario. In this case, we are interested in maximum borrowing, so enter: `J32` as the **R**esult cell and click the OK button. Excel will now create a new worksheet that summarizes your scenario results. For our scenarios, the results are in Exhibit 3-6. Note that these results are exactly the same as those in Table 3-3.

EXHIBIT 3-6
SCENARIO SUMMARY



Scenario Summary

	Current Values:	Expenditure in June	Expenditure in July	Expenditure in August	Expenditure in September
Changing Cells:					
June	0	200,000	0	0	0
July	200,000	0	200,000	0	0
August	0	0	0	200,000	0
September	0	0	0	0	200,000
Result Cells:					
Max_Borrowing	105,200	213,800	105,200	13,800	13,800

Notes: Current Values column represents values of changing cells at time Scenario Summary Report was created. Changing cells for each scenario are highlighted in gray.

Column D contains the values that were active when the scenario summary was created. In most cases that will just be a repeat of one of the existing scenarios. It is a good practice to make sure that one of your scenarios reflects the default assumptions so that you can return to the defaults easily. In this example, the numbers in columns D and F are identical, so column D can be safely deleted.

Adding Interest and Investment of Excess Cash

In the previous section you created a basic cash budget for Bithlo Barbecues. In this section we will refine the calculation of the ending cash balance by considering two additional factors. First, we will add interest payments on borrowed funds and then we will consider the investment of excess cash.

Before beginning, let's create a copy of the previous cash budget in the same workbook. Right-click the sheet tab labeled "Cash Budget" and select **M**ove or Copy… from the menu. In the dialog box make sure to check the box labeled **C**reate a copy and select "(move to end)" from the list. The copied sheet will now be named Cash Budget (2). Right-click the sheet tab and rename the new sheet to `Complex Cash Budget`.

Next, we will need to make a few additions to the notes at the bottom of the worksheet. We will now assume that Bithlo Barbecues will invest any cash in excess of $40,000. In A35 add the label: `Maximum Acceptable Cash` and in B35 enter: `40,000`. Furthermore, the firm will have to pay interest on its short-term borrowings and will earn interest on invested

funds. In A36 type: `Borrowing Rate (Annual)` and in B36 enter: `8%`. In A37 add the label: `Lending Rate (Annual)` and enter: `6%` in B37.

Because we are working with monthly time periods, we need to convert these annual rates into monthly rates of interest. So, in C36 and C37 enter the label: `Monthly`. We will convert the annual rate to a monthly rate by dividing by 12. In D36 enter the formula: `=B36/12`, and copy this to D37.[4] You should see that the monthly borrowing rate is 0.67% and the monthly lending rate is 0.50%.

We are now ready to expand the cash budget to include investing and the interest expense and income. Before entering any new formulas we need to insert a few new rows. Select row 23 (the dividend on common stock), and then click the upper half of the Insert button on the Home tab. This will insert a row above the selection. In A23 enter the label: `Short-Term Interest Expense (Inc.)`. Next, select row 32 (the ending cash balance), insert a row, and enter: `Current Investing` into A32. Finally, select row 35 and insert a row. In A34 change the label to: `Cumulative Borrowing (Investing)` and in A35 type: `Cumulative Interest Expense (Inc.)`. We need to keep track of the cumulative amount that is borrowed/invested so that we can calculate the monthly short-term interest expense/income.

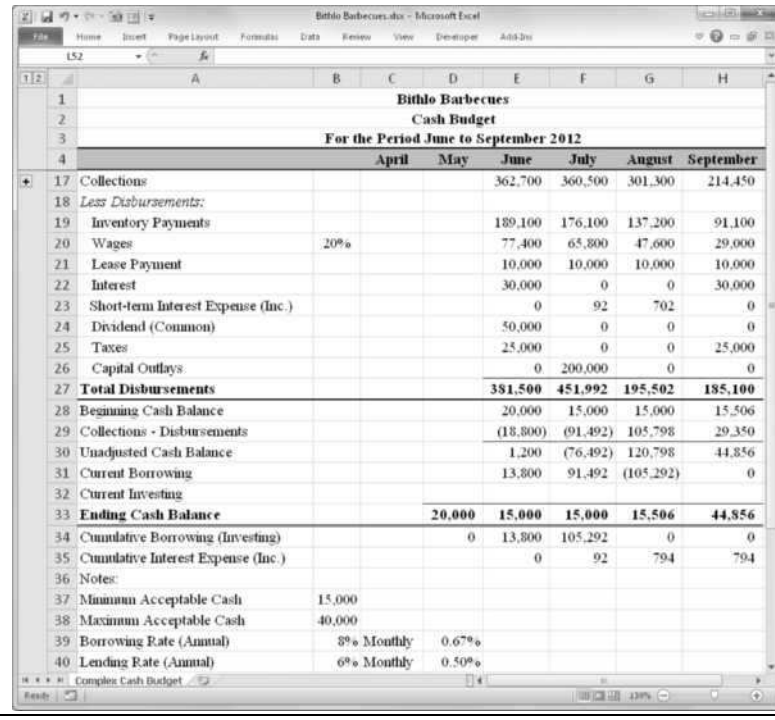
We will start by entering the formulas to calculate the cumulative amount of borrowing (investing) in D34. Positive amounts will represent borrowing, while negative numbers will represent investing. To calculate the *cumulative* amount, we need to add the previous period's cumulative amount to current borrowing and subtract current investing. For May, in D34, the formula is: `=C34+D31-D32`, and the result should be 0. Copy this formula to E34:H34. Note that at this point the result for each month should be equal to the cumulative current borrowing.

Short-term interest expense (income) can now be calculated by multiplying the cumulative amount of borrowing (investing) from the previous month by the appropriate interest rate. So, in E23 we will use an **IF** statement to determine which rate to use. If the cumulative amount of borrowing (investing) is positive, we will multiply it by the borrowing rate. Otherwise, use the lending rate. The formula for June, E23, is: `=IF(D34>0,D34*$D$39,D34*$D$40)`. For June, because the firm has not had previous borrowing or lending, the result should be 0. Copy this across to F23:H23.

We can now calculate the cumulative interest expense (income) in E35. To do this, we simply add the previous month's interest expense (income) to the current month's interest expense (income). For June, the formula is: `=D35+E23`. This formula should be copied

4. Entering the 12 into the denominator might seem to violate our prohibition on entering numbers into formulas. However, there will always be 12 months in a year, so this number will never change.

EXHIBIT 3-7
THE WORKSHEET WITH INTEREST CALCULATIONS



	A	B	C	D	E	F	G	H
1	**Bithlo Barbecues**							
2	**Cash Budget**							
3	**For the Period June to September 2012**							
4			**April**	**May**	**June**	**July**	**August**	**September**
17	Collections				362,700	360,500	301,300	214,450
18	*Less Disbursements:*							
19	Inventory Payments				189,100	176,100	137,200	91,100
20	Wages	20%			77,400	65,800	47,600	29,000
21	Lease Payment				10,000	10,000	10,000	10,000
22	Interest				30,000	0	0	30,000
23	Short-term Interest Expense (Inc.)				0	92	702	0
24	Dividend (Common)				50,000	0	0	0
25	Taxes				25,000	0	0	25,000
26	Capital Outlays				0	200,000	0	0
27	**Total Disbursements**				**381,500**	**451,992**	**195,502**	**185,100**
28	Beginning Cash Balance				20,000	15,000	15,000	15,506
29	Collections - Disbursements				(18,800)	(91,492)	105,798	29,350
30	Unadjusted Cash Balance				1,200	(76,492)	120,798	44,856
31	Current Borrowing				13,800	91,492	(105,292)	0
32	Current Investing							
33	**Ending Cash Balance**			**20,000**	**15,000**	**15,000**	**15,506**	**44,856**
34	Cumulative Borrowing (Investing)			0	13,800	105,292	0	0
35	Cumulative Interest Expense (Inc.)				0	92	794	794
36	Notes:							
37	Minimum Acceptable Cash	15,000						
38	Maximum Acceptable Cash	40,000						
39	Borrowing Rate (Annual)	8% Monthly		0.67%				
40	Lending Rate (Annual)	6% Monthly		0.50%				

across to F35:H35. The only purpose of this row is to help evaluate the results of a scenario that we will examine later. At this point, your worksheet should resemble the one in Exhibit 3-7.

Calculating Current Borrowing

Determining the amount of current borrowing and current investing is the most complex part of this cash budget. We have already calculated current borrowing, but because we are now considering investments and interest, the formula will need to be changed. For current borrowing, the logic can be explained this way: "If the unadjusted cash balance is less than the minimum acceptable cash, then borrow enough to bring the balance to the minimum. However, if the firm has some investments, reduce the amount of borrowing by the amount of the investments (or total borrowing needs, whichever is less). If the unadjusted cash balance is greater than the minimum and the firm has previous borrowing, then use the cash

above the minimum to reduce the outstanding borrowing." Writing a formula to implement this logic is complex, and it should be built in small pieces. After each piece, verify the result and then add on the next piece.

Writing this formula requires the use of nested **IF** statements. That is, we embed additional **IF** statements within the first. In pseudocode this is:

```
If Unadjusted Cash < Minimum Cash then {Firm needs to raise funds}
   If Cumulative Borrowing (Investing) < 0 then {Firm has investments it can sell}
      Current Borrowing = Max(Minimum Cash + Cumulative Borrowing (Investing) – Unadjusted Cash, 0)
   Else Current Borrowing = Minimum Cash – Unadjusted Cash {Must Borrow it all}
Else {Firm doesn't need to raise funds}
   If Cumulative Borrowing (Investing) > 0 then {Use excess funds to reduce previous borrowings}
      Current Borrowing = –Min(Cumulative Borrowing (Investing), Unadjusted Cash – Minimum Cash)
   Else Current Borrowing = 0
End If
```

The formula to calculate current borrowing in June, E31, is:
`=IF(E30<$B$37,IF(D34<0,MAX($B$37+D34-E30,0),$B$37-E30),IF(D34>0,-MIN(D34,E30-$B$37),0))`. Type this formula carefully, and then copy it to F31:H31. Note that we have also used the built-in **MAX** and **MIN** functions as discussed earlier in the chapter. In this formula, the **MAX** function is required to be sure that we don't end up with negative borrowing if the investments are more than sufficient to cover cash needs (i.e., we don't want to sell all of the investments if we don't need to). The **MIN** function is used when the firm has excess cash and has some outstanding loans to pay off. It finds the minimum of either (1) the cumulative amount of borrowing outstanding or (2) the difference between the unadjusted cash balance and the minimum acceptable cash balance. Note that we had to negate the result of the **MIN** function in order to get the correct result.

Using the Formula Auditing Tools to Avoid Errors

Sometimes the logic you need to solve a problem can get a bit complicated, as above. It is important to carefully think it through and build your formulas one small piece at a time. In this way we can slowly build up to a large, complex formula that always works. That's exactly how the above formula was created. However, no matter how careful you are in building a complex formula there is always the possibility of errors creeping in. Fortunately, there are several ways to identify these errors before they become serious problems (i.e., cost you or your company real money).

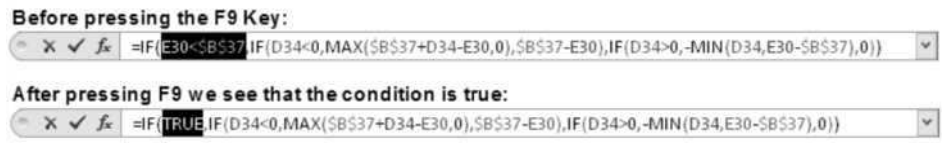
One of the best ways to avoid errors is to thoroughly test your formulas. The easiest way to do this is to change some numbers that the formula depends on and make sure that you are still getting correct answers. For example, we might temporarily change our ending cash balance in May. Then, carefully work through the ending cash balance calculations to make sure they are working correctly.

Finding errors in the first version of a complex formula is very common. Fortunately, Excel provides several tools to help find and correct the cause. In the following subsections, we will take a short detour from our example to discuss these tools.

Using the F9 Function Key

One of Excel's first, most useful, and probably least known debugging tools is the F9 function key. Normally, pressing F9 causes a worksheet to recalculate, but when you use it in the formula bar it shows the contents of a cell address or the result of a calculation. For example, select E31 and highlight the first condition in the **IF** statement as shown in Figure 3-5.

FIGURE 3-5
USING THE F9 KEY IN THE FORMULA BAR



When you press F9, Excel evaluates the expression "E30<B37" and then reports that the result is true (E30 is, in fact, less than B37). Note that we also could have highlighted just the "E30" part of this expression and, after pressing F9, Excel would show that the value in E30 is equal to 1,200. Now, applying the same technique to the other part of the expression would show that B37 is equal to 15,000. At this point, the first part of the formula would show as "1200<15000" which is obviously true. This technique is very useful for checking parts of a formula to make sure they are accurate.

One important caveat is that if you now press Enter to return to the worksheet, your formula will be changed to include the results instead of reverting to the cell addresses. It is crucial to press the Esc key rather than Enter in order to avoid locking in the changes you've made.

Color-Coded Cell Addresses

Another member of the error-checking toolkit is the use of color-coding in formulas. When you create or edit a formula, Excel colors the cell addresses and highlights each of those cells in that same color. This makes it easy to see which cells are being used. If you notice that you've used an incorrect cell or range, you can grab the colored outline and expand, contract, or move it to another location. This will change the appropriate cell or range of cells in your formula.

Formula Auditing Tools

The tools in the Formula Auditing group help you to trace errors, step through a calculation sequence, and watch the result in one cell as you edit another. To access these tools, click the Formulas tab of the Ribbon.

FIGURE 3-6
THE FORMULA AUDITING TOOLBAR

Tracing Precedent and Dependent Cells

The three buttons on the left side of the Formula Auditing group are for tracing precedent or dependent cells. A precedent cell is one upon which a formula depends, while a dependent cell is one that depends on the result of the formula in the active cell. If the active cell contains a formula, clicking Trace Precedents will display arrows from the precedent cells. The arrows in Exhibit 3-2 (page 76) were created in this way. The Trace Dependents icon works in the same way, except that the arrows point to dependent cells.

To remove all of the arrows click the Remove Arrows button, or save the file. Note that this button is also a drop-down list that allows you to remove only the precedent or dependent arrows.

Background Error Checking

Unless this option is disabled, Excel will examine the worksheet for common types of errors as you work. If background error checking is on, a green triangle will appear in the upper left corner of the cell along with a Smart Tag that explains the error and offers a solution. Errors in logic cannot, of course, be detected, but it can identify many other types of errors.

Be aware that in some cases Excel will think that you've made an error when you have not. Don't automatically accept the proposed fix. If this happens repeatedly, you can tell Excel to stop checking for that type of error, or turn off background error checking completely. To change the error checking rules, go to the Formulas area in Options from the File tab.

The Watch Window

When working on a large worksheet, it is common to find yourself changing a value in one location and then scrolling to another to check the result. The Watch Window is a powerful tool that helps speed up formula debugging by letting you watch a distant cell without having to scroll to it. It even works with cells in other worksheets, but only in the same workbook. To activate this tool, click on the Watch Window button in the Formula Auditing group.

FIGURE 3-7
THE WATCH WINDOW

Once the Watch Window is displayed, you can choose one or more cells to watch by clicking the Add Watch button and choosing the cell. In Figure 3-7, we have selected E31. With this window displayed you can scroll to any part of the worksheet, change a cell value, and see what happens to E31. Note that if you close the Watch Window (or even save and close the workbook), the watch cells are not cleared. That allows you to open it again to continue watching the cell.

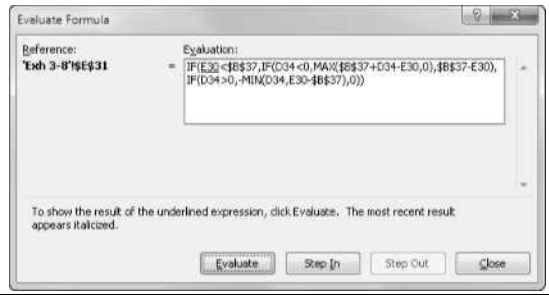
The Evaluate Formula Tool

Finally, perhaps the best feature for formula debugging is the Evaluate Formula tool. This tool lets you step through a formula piece by piece as Excel evaluates it. It works much like the F9 function key, except that it will step through the entire formula one step at a time. To activate this tool, click the Evaluate Formula button.

Figure 3-8 shows the Evaluate Formula dialog box with the formula in E31 ready to be evaluated. Note that E30 is underlined, indicating that it will be evaluated first. Simply click the **E**valuate button and "E30" will be replaced with "1200." Now, B37 will be underlined and ready to be evaluated. You can continue to click the **E**valuate button to work through the entire formula.

An additional feature is the Step **I**n function. For those expressions that themselves are the result of a formula, you can "step in" to the previous formula and evaluate it. For example, D34 is actually the result of the formula =C34+D31−D32. When D34 is underlined, clicking the Step **I**n button will allow you to evaluate this formula and then return to evaluating the rest of the original formula.

FIGURE 3-8
THE EVALUATE FORMULA TOOL



One of the most difficult tasks in the process of building a spreadsheet model is making sure that it works correctly under all conditions. Using the tips and tools discussed here can make the job much simpler. Let's now return to our cash budgeting example.

Calculating Current Investing

If Bithlo Barbecues has cash in excess of the maximum ($40,000 in this case), then the excess cash should be invested in short-term securities. This is the essential idea behind the current investing item. Note that because we have added the Current Investing line, we must adjust our ending cash balance formula to take investing into account. The correct formula, in E33, is: `=SUM(E30:E31)-E32`. That is, our ending cash balance is now going to be the Unadjusted Cash Balance plus Current Borrowing minus Current Investing. (Investing is a cash outflow so it must be subtracted.) Copy this formula to F33:H33.

The current borrowing formula was constructed so that the firm will first sell any existing short-term investments before borrowing. Therefore, if the sum of the unadjusted cash balance and current borrowing is less than the minimum required cash, the firm needs to sell some investments. Otherwise, if the unadjusted cash balance plus current borrowing is greater than the maximum acceptable cash, the firm must invest the excess.

To implement this logic we will again use nested **IF** statements. We also need to use the **AND** function, which allows us to evaluate several conditions instead of just one. This function will return true if, and only if, *all* of the arguments are true. If even one argument is false, then the function will return false. The **AND** statement is defined as follows:

AND(*LOGICAL1*, *LOGICAL2*, …)

In this function, ***LOGICAL1***, *LOGICAL2*, and so on, are up to 255 arguments, each of which can be evaluated as true or false. We will use this function to determine if both of the

following conditions are true: (1) unadjusted cash + current borrowing is less than the minimum cash, and (2) cumulative borrowing (investing) is negative (meaning that the firm has investments).

The formula to calculate the amount of current investing, in E32, is: `=IF(AND(E30+E31<$B$37,D34<0),E30+E31-$B$37,IF(E30+E31>$B$38,E30+E31-$B$38,0))`. Enter this formula and copy it across to F32:H32. Again, this is a complex formula, but it can be broken down into more understandable components:

If Unadjusted Cash + Borrowing < Minimum Cash **AND** Cumulative Borrowing (Investing) < 0 then
  Current Investing = Unadjusted Cash + Borrowing – Minimum Cash
Else
  If Unadjusted Cash + Borrowing > Maximum Cash then
    Current Investing = Unadjusted Cash + Borrowing – Maximum Cash
  Else
    Current Investing = 0
End.

Your cash budget should now resemble that in Exhibit 3-8.

EXHIBIT 3-8
CALCULATING THE CASH BALANCE WITH BORROWING AND INVESTING

1				Bithlo Barbecues				
2				Cash Budget				
3				For the Period June to September 2012				
4			April	May	June	July	August	September
28	Beginning Cash Balance				20,000	15,000	15,000	15,506
29	Collections - Disbursements				(18,800)	(91,492)	105,798	29,350
30	Unadjusted Cash Balance				1,200	(76,492)	120,798	44,856
31	Current Borrowing				13,800	91,492	(105,292)	0
32	Current Investing				0	0	0	4,856
33	**Ending Cash Balance**			**20,000**	**15,000**	**15,000**	**15,506**	**40,000**
34	Cumulative Borrowing (Investing)			0	13,800	105,292	0	(4,856)
35	Cumulative Interest Expense (Inc.)				0	92	794	794
36	Notes:							
37	Minimum Acceptable Cash	15,000						
38	Maximum Acceptable Cash	40,000						

Working Through the Example

In order to understand the complex cash budget, you must work through it line by line. In this section, we will do just that. Follow along in Exhibit 3-8.

June (column E): The unadjusted cash balance in June is projected to be only $1,200. Because this is less than the $15,000 minimum, the firm needs to raise funds. In this

case it has no investments to sell, so it must borrow $13,800 to bring the ending cash balance to $15,000.

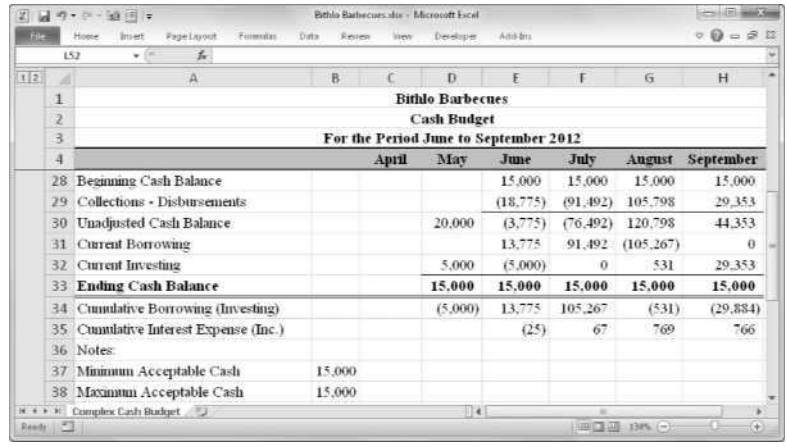
July (column F): The firm is projecting that it will be overdrawn by $76,492. Again, it has no investments to sell and must borrow an additional $91,492. Note that the cumulative borrowing is now $105,292.

August (column G): The firm is projecting an unadjusted cash balance of $120,798, well in excess of the maximum allowable cash. Before investing the excess, however, it needs to pay off the $105,292 of existing short-term debt. In this case, the firm can pay off the entire balance and still remain above the minimum cash requirement. However, after paying down the loans, its cash balance is not high enough to cause investment of excess funds.

September (column H): The firm is projecting that the unadjusted cash balance will be $44,856. In this case, there is no borrowing balance, so the $4,856 in excess of the maximum allowable cash can be invested and the ending cash balance will be $40,000. Note that the Cumulative Borrowing (Investing) in H34 is negative, indicating that the funds represent investments.

In any complex worksheet such as this one, it is important that you work through the calculations by hand to check the results. Never accept the output until you are sure that it is absolutely correct. With this in mind, let's make two changes: First, set the maximum acceptable cash in B38 to `$15,000`. Now, set the unadjusted cash balance for May to $20,000 and copy E31:E33 to D31:D33. Make sure that this portion of your worksheet is the same as that in Exhibit 3-9, and then carefully go over the worksheet.

EXHIBIT 3-9
CASH BALANCE AFTER CHANGING MAXIMUM CASH TO $15,000



	A	B	C	D	E	F	G	H
1	Bithlo Barbecues							
2	Cash Budget							
3	For the Period June to September 2012							
4				April	May	June	July	August	September
28	Beginning Cash Balance					15,000	15,000	15,000	15,000
29	Collections - Disbursements					(18,775)	(91,492)	105,798	29,353
30	Unadjusted Cash Balance				20,000	(3,775)	(76,492)	120,798	44,353
31	Current Borrowing					13,775	91,492	(105,267)	0
32	Current Investing				5,000	(5,000)	0	531	29,353
33	**Ending Cash Balance**				**15,000**	**15,000**	**15,000**	**15,000**	**15,000**
34	Cumulative Borrowing (Investing)				(5,000)	13,775	105,267	(531)	(29,884)
35	Cumulative Interest Expense (Inc.)					(25)	67	769	766
36	Notes:								
37	Minimum Acceptable Cash	15,000							
38	Maximum Acceptable Cash	15,000							

May (column D): The unadjusted cash balance is greater than the minimum cash, so it does not need to borrow. In fact, it has $5,000 more than the maximum allowable cash that can be invested. The ending cash balance is $15,000.
June (column E): The firm is projecting the unadjusted cash balance to be –$3,775, but it does not borrow $18,775 (=$15,000 – [–$3,775]) because it has $5,000 in investments from May that reduce the borrowing need to only $13,775. Current Investing, therefore, is –$5,000.
July (column F): The unadjusted cash balance is projected to be –$76,492 and there are no investments that can be sold. Therefore, the firm must borrow $91,492. The cumulative borrowing is now $105,267.
August (column G): The firm is expected to have a large surplus of funds which can be used to pay off the entire loan balance. Furthermore, it will have $531 in excess of the maximum allowable cash that is available to invest.
September (column H): The unadjusted cash balance is expected to be $44,353 which is $29,353 in excess of the maximum. This amount can be invested.

You are encouraged to experiment by changing values throughout the cash budget to see what happens. In particular, changing the projected sales and/or the payment schedule can be very enlightening. For example, suppose that Bithlo Barbecues' management decides to slow down payments for inventory purchases. Specifically, assume that it decides to pay only 40% in the month after the purchase and 60% two months after the purchase. You should find that this is not as good an idea as it sounds. Table 3-4 shows Cumulative Borrowing (Investing) before and after the change, assuming that the maximum cash is still $15,000. Note that the firm would end up borrowing a little more under this scenario, and the total interest paid would be higher.

TABLE 3-4
CUMULATIVE BORROWING (INVESTING)

Month	Before	After
May	(5,000)	(5,000)
June	13,775	11,575
July	105,267	108,852
August	(531)	12,178
September	(29,984)	(7,791)
Cumulative Interest Expense Through September	766	859

Summary

In this chapter, we have seen that the cash budget is simply a listing of the firm's expected *cash* inflows and outflows over a period of time. Cash budgets are useful in determining the firm's short-term borrowing and investing needs, as well as scheduling transactions. Furthermore, it can be used when forecasting the financial statements. The cash budget is composed of three sections: (1) the worksheet area; (2) a listing of collections and disbursements; and (3) the ending cash balance calculation. We also saw how Excel's Scenario Manager tool can greatly simplify "What if?" analysis and display a table of the results.

One of the most important lessons in this chapter is that complex spreadsheets should be built up from simpler spreadsheets. In other words, start by building a simple version of the worksheet that covers the basics, and then gradually add the complex details. In this chapter, we started with a very simple cash budget, then added borrowing, interest on borrowing, and finally investing and the interest on invested funds. This method will make building the worksheet much easier and it will be less likely to contain errors. If you do find errors, we have covered some of the tools that Excel provides to help you find and fix them quickly. The Watch Window and Evaluate Formula tools are especially helpful in this regard.

TABLE 3-5
FUNCTIONS INTRODUCED IN THIS CHAPTER

Purpose	Function	Page
Calculate a date serial number	**DATE**(***YEAR***, ***MONTH***, ***DAY***)	71
Extract year from a date	**YEAR**(***SERIAL_NUMBER***)	72
Extract month from a date	**MONTH**(***SERIAL_NUMBER***)	72
Extract day from a date	**DAY**(***SERIAL_NUMBER***)	72
Join text strings	**CONCATENATE**(***TEXT1***, *TEXT2*, ...)	72
Convert a number to formatted text	**TEXT**(***VALUE***, ***FORMAT_TEXT***)	72
Return a value based on a logical test	**IF**(***LOGICAL_TEST***, ***VALUE_IF_TRUE***, *VALUE_IF_FALSE*)	80

TABLE 3-5
FUNCTIONS INTRODUCED IN THIS CHAPTER (CONTINUED)

Purpose	Function	Page
Determines the minimum of a list of arguments	**MIN(*NUMBER1,* *NUMBER2*, …)**	81
Determines the maximum of a list of arguments	**MAX(*NUMBER1,* *NUMBER2*, …)**	83
Returns true only if all arguments are true	**AND(*LOGICAL1*, *LOGICAL2*, …)**	94

Problems

1. Lakewood Laser SkinCare's ending cash balance as of January 31, 2012 (the end of its fiscal year 2011) was $10,000. Its expected cash collections and payments for the next six months are given in the following table.

Month	Collections	Payments
February	$16,500	$19,400
March	18,300	20,800
April	22,700	21,600
May	29,100	24,300
June	32,500	26,700
July	36,000	27,200

   a. Calculate the firm's expected ending cash balance for each month.

   b. Assuming that the firm must maintain an ending cash balance of at least $9,000, how much must they borrow during each month?

   c. If the firm must pay 5% annual interest on its short-term borrowing, how does this affect your ending cash balance calculations?

   d. Finally, how would your ending cash balance change if the firm uses any cash in excess of the minimum to pay off its short-term borrowing in each month?

2. Loblaw Manufacturing has asked you to create a cash budget in order to determine its borrowing needs for the June to October period. You have gathered the following information.

Month	Sales	Other Payments
June 2012	$172,000	$80,000
July	142,000	75,000
August	121,000	70,000
September	93,000	50,000
October	76,000	45,000
November	81,000	

April and May sales were $115,000 and $135,000, respectively. The firm collects 35% of its sales during the month, 55% the following month, and 10% two months after the sale. Each month it purchases inventory equal to 60% of the next month's expected sales. The company pays for 40% of its inventory purchases in the same month and 60% in the following month. However, the firm's suppliers give it a 2% discount if it pays during the same month as the purchase. A minimum cash balance of $25,000 must be maintained each month, and the firm pays 6% annually for short-term borrowing from its bank.

   a. Create a cash budget for June to October 2012. The cash budget should account for short-term borrowing and payback of outstanding loans as well as the interest expense. The firm ended May with a $30,000 unadjusted cash balance.

   b. Bob Loblaw, the president, is considering stretching out its inventory payments. He believes that it may be less expensive to borrow from suppliers than from the bank. He has asked you to use the Scenario Manager to see what the total interest cost for this time period would be if the company paid for 0%, 10%, 30%, or 40% of its inventory purchases in the same month. The balance would be paid in the following month. Create a scenario summary and describe whether the results support Bob's beliefs.

3. Camp and Fevurly Financial Planners have forecasted revenues for the first six months of 2012, as shown in the following table.

Month	Revenue	Month	Revenue
November 2011	$48,000	March	30,000
December	45,000	April	38,000
January 2012	25,000	May	40,000
February	27,000	June	45,000

The firm collects 60% of its sales immediately, 39% one month after the sale, and 1% are written off as bad debts two months after the sale. The firm assumes that wages and benefits paid to clerical personnel will be $7,000 per month while commissions to sales associates average 25% of collectable sales. Each of the two partners is paid $5,000 per month or 20% of net sales, whichever is greater. Commissions and partner salaries are paid one month after the revenue is earned. Rent expense for their office space is $3,500 per month, and lease expense for office equipment is $800. Utilities average $250 per month, except in May and June when they average only $150. The ending cash balance in December 2011 was $12,000.

a. Create a cash budget for January to June 2012, and determine the firm's ending cash balance in each month assuming that the partners wish to maintain a minimum cash balance of $10,000.

b. Camp and Fevurly are thinking of obtaining a line of credit from their bank. Based on their expectations for the first six months of the year, what is the minimum amount that would be necessary? Round your answer to the next highest $1,000 and ignore interest charges on short-term debt. (Hint: Look up the **ROUNDUP** function in the online help.)

c. Create three scenarios (best case, base case, and worst case) assuming that revenues are 10% better than expected, exactly as expected, or 10% worse than expected. What is the maximum that the firm would need to borrow to maintain its minimum cash balance in all three cases? Use the Scenario Manager and create a summary of your results. Would this change your answer in part b?

4. You were recently hired to improve the financial condition of Idaho Springs Hardware, a small chain of three hardware stores in Colorado. On your first day the owner, Chuck Vitaska, told you that the biggest problem facing the firm has been periodic unexpected cash shortages that have made it necessary for him to delay wage payments to his employees. Having recently received a degree in finance, you immediately realize that your first priority is to develop a cash budget and to arrange for a short-term borrowing agreement with the firm's bank. After looking at the firm's past financial records, you developed a sales forecast for the remainder of the year, as is presented in the following table.

Month	Sales	Month	Sales
June 2012	$62,000	October	59,000
July	73,000	November	47,000
August	76,000	December	41,000
September	70,000		

In addition to the seasonality of sales, you have observed several other patterns. Individuals account for 40% of the firm's sales, and they pay in cash. The other 60% of sales are to contractors with credit accounts, and they have up to 60 days to pay. As a result, about 20% of sales to contractors are paid one month after the sale, and the other 80% is paid two months after the sale. Each month the firm purchases inventory equal to about 45% of the following month's sales. About 30% of this inventory is paid for in the month of delivery, while the remaining 70% is paid one month later.

Each month the company pays its hourly employees a total of $9,000, including benefits. Its salaried employees are paid $12,000, also including benefits. In the past, the company had to borrow to build its stores and for the initial inventories. This debt has resulted in monthly interest payments of $4,000 and monthly principal payments of $221. On average, maintenance at the stores is expected to cost about $700 per month, except October to December when snow removal costs will add about $200 per month. Sales taxes are 7% of quarterly sales and must be paid in June, September, and December. Other taxes are also paid during those months and are expected to be about 4% of quarterly sales in each of those months. The owner wishes to maintain a cash balance of at least $12,000 to limit the risk of cash shortages. The cash balance at the end of May is expected to be $15,000 (before any borrowing or investing).

a. Create a simple cash budget for Idaho Springs Hardware for June to December. Note that your records indicate that sales in April and May were $51,000 and $57,000, respectively. January 2013 sales are expected to be $36,000. What would be the ending cash balances if the firm does not borrow to maintain its $12,000 minimum?

b. Now assume that the firm can borrow from the bank at a rate of 9% per annum to maintain its liquidity and meet its required minimum cash balance. In addition, if the firm has funds in excess of the minimum, it will use the excess to pay off any previous balance.

c. While negotiating a line of credit, the firm's bank offered to sweep any cash in excess of the minimum into a money market fund that will return an average of 4% per year after expenses. If you accept this offer, how will it affect the firm's ending cash balances and need to borrow in each month? Note that the firm must have paid off all short-term loans before any excess cash can be invested, and invested funds will be used instead of borrowing when needed.

d. After completing the cash budget, you begin to think of ways to further reduce the firm's borrowing needs. One idea that comes to mind is changing the firm's credit policy with contractors because they seem to always pay at the last minute. Three scenarios come to mind: (1) In the best case, contractors are required to pay for 100% of their purchases during the month after the sale. You believe that this would cause a 5% decline in sales. (2) In the base case, everything remains as already outlined. (3) In the worst case, contractors would be required to pay for 100% of their purchases during the month after the sale, and you believe that this would cause a 20% drop in sales. You decide to use the Scenario Manager to evaluate these scenarios. To summarize the impact of the change, you will examine the impact on the firm's maximum borrowing needs and cumulative net interest cost (after accounting for investment earnings). In your opinion, should the firm change its credit policy?

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