

Chapter 17

Working Capital Management

Learning Objectives

After reading this chapter, students should be able to:

- ◆ Explain how different amounts of current assets and current liabilities affect firms' profitability and thus their stock prices.
- ◆ Discuss how the cash conversion cycle is determined, how the cash budget is constructed, and how each is used in working capital management.
- ◆ Explain how companies decide on the proper amount of each current asset—cash, marketable securities, accounts receivable, and inventory.
- ◆ Discuss how companies set their credit policies, and explain the effect of credit policy on sales and profits.
- ◆ Describe how the costs of trade credit, bank loans, and commercial paper are determined, and how that information impacts decisions for financing working capital.
- ◆ Explain how companies use security to lower their costs of short-term credit.

Lecture Suggestions

We have never found working capital an interesting topic to students; hence it is, to us, a somewhat more difficult subject to teach than most. Perhaps that's because it comes near the end of the course, when everyone is tired. More likely, though, the problem is that working capital management is really more a matter of operating efficiently than thinking conceptually correctly—i.e., it is more practice than theory—and theory lends itself better to classroom teaching than practice. Still, working capital management is important, and it is something that students are likely to be involved with after they graduate.

Since we have only one chapter on working capital, we try to cover the entire chapter. However, the chapter is modular, so it is easy to omit sections if time pressures require. What we cover, and the way we cover it, can be seen by scanning the slides and Integrated Case solution for Chapter 17, which appears at the end of this chapter's solutions. For other suggestions about the lecture, please see the "Lecture Suggestions" in Chapter 2, where we describe how we conduct our classes.

DAYS ON CHAPTER: 2 OF 56 DAYS (50-minute periods)

Answers to End-of-Chapter Questions

- 17-1** The DuPont equation is: $ROE = \text{Profit margin on sales} \times \text{Total assets turnover} \times \text{Leverage factor}$. A relaxed current assets investment policy means that relatively large amounts of cash, marketable securities, and inventories are carried, and a liberal credit policy results in a high level of receivables. This policy minimizes operating problems, thus the impact on sales is minimized; however, it results in a low assets turnover because assets are increased. Therefore, ROE is reduced.
- 17-2** The cash conversion cycle is the length of time funds are tied up in working capital, or the length of time between paying for working capital and collecting cash from the sale of the working capital. Holding other things constant, if you reduce the CCC you are reducing the amount of funds tied up. These funds have a cost; therefore, a reduction in funds will lower the firm's costs and thus raise its profitability. Here we have made an assumption that you can reduce working capital without harming sales.
- 17-3** When most of us use the term cash, we mean currency (paper money and coins) plus bank demand deposits. However, when corporate treasurers use the term, they often mean currency and demand deposits plus very safe, highly liquid marketable securities that can be sold quickly at a predictable price and thus be converted to bank deposits. Therefore, cash as reported on the balance sheet generally includes short-term securities, which are also called "cash equivalents."
- 17-4** Firms need to forecast their cash flows. If they will need additional cash, they should line up funds well in advance, while if they will generate surplus cash, they should plan for its productive use. The primary forecasting tool is the cash budget.
- Cash budgets can be of any length, but firms typically develop a monthly cash budget for the coming year and a daily cash budget at the start of each month. The monthly budget is good for long-range planning, while the daily budget gives a more precise picture of the actual cash flows. If cash inflows and outflows do not occur uniformly during each month, then the actual funds needed might be quite different from the indicated monthly amounts.
- The monthly cash budget specifically identifies the amount of cash the firm would have on hand at the end of each month if it neither borrowed nor invested. The treasurer would show the cash budget to the bankers when negotiating for a line of credit. Lenders would want to know how much the firm expects to need, when the funds will be needed, and when the loan will be repaid. The lenders would question the treasurer about the budget, and they would want to know how the forecasts would be affected if sales were higher or lower than were projected, how changes when customers pay would affect the forecasts, and the like. The central issues of the questioning are these: How accurate is the forecast likely to be, and what would be the effects of significant errors.
- 17-5** The four key factors in a firm's credit policy are: (1) credit period, the length of time buyers are given to pay for their purchases; (2) discounts, price reductions given for early payment; (3) credit standards, the required financial strength of acceptable credit customers; and (4) collection policy, procedures used to collect past due accounts. A relaxed credit policy would call for a longer credit period, higher discounts, somewhat lower credit standards, and a looser collection policy—all to increase sales. All of these have costs, and the firm must analyze whether the benefits (increased sales) exceed the costs (higher discounts, increased collection costs, and increased bad debts); therefore, increase profits. Obviously, a restrictive policy would be just the opposite, a shorter credit period, smaller discounts, more restrictive credit standards and

collection policies. However, this could reduce sales, although bad debt losses would be smaller. The firm's analysis is the same, however, to determine whether the benefits (lower discounts, costs, and bad debts) exceed the costs (possibly lower sales); therefore, to increase profits.

- 17-6** The maturity matching, or "self-liquidating," approach calls for matching asset and liability maturities. All of the fixed assets plus the permanent current assets are financed with long-term capital, but temporary current assets are financed with short-term debt. A more aggressive financing approach would involve financing some of its permanent assets with short-term debt. The reason for adopting the aggressive policy is to take advantage of the fact that the yield curve is generally upward sloping; hence short-term interest rates are generally lower than long-term rates. A more conservative financing approach would involve financing all permanent current assets as well as some of its seasonal needs with long-term capital. In this situation, the firm uses a small amount of short-term credit to meet its peak requirements, but it also meets a part of its seasonal needs by storing liquidity in the form of marketable securities. This is a very safe, conservative financing policy.

The aggressive approach is the riskiest of all three approaches because if the firm encountered temporary financial problems, the lender might not renew its loan. However, because the yield curve is normally upward sloping, short-term interest rates are lower than long-term rates, thus would lead to higher profits. The conservative approach is the least risky but it is also the least profitable of the three approaches. The maturity matching approach is between these two approaches in both risk and profitability. Optimistic and/or aggressive managers will probably lean more toward short-term credit to gain an interest cost advantage, while more conservative managers will lean toward long-term financing to avoid potential renewal problems.

- 17-7** Trade credit is the debt arising from credit sales and recorded as an account receivable by the seller and as an account payable by the buyer. Free trade credit is the credit received during the discount period, while the costly trade credit is the credit taken in excess of free trade credit, whose cost is equal to the discount lost. With credit terms of 2/10, net 30 and the firm pays on the 30th day, then some of the trade credit would be free and some would be costly. With an accounts payable balance of \$300,000, then the free trade credit would be \$100,000 and the costly trade credit would be \$200,000. The free trade credit represents the 10 days of purchases that would qualify for the discount, while the costly trade credit represents the additional 20 days of purchases that do not qualify for the discount.

- 17-8** The prime rate is the published interest rate charged by commercial banks to large, strong borrowers. The commercial paper rate is the interest rate charged on unsecured, short-term promissory notes of large firms, usually issued in denominations of \$100,000 or more. The commercial paper rate would be somewhat below the prime rate. The simple interest rate is the rate charged on a bank loan that is paid monthly, and the principal is payable on demand. The simple interest rate is higher than both the commercial paper rate and the prime rate. Add-on interest is interest that is calculated and added to funds received to determine the face amount of an installment loan. Add-on interest would be higher than simple interest. From lowest to highest cost, these rates would fall in this order: commercial paper rate, prime rate, simple interest rate, and add-on interest rate.

If the stated rate on each of the bank loans was 6%, their effective rates would not be equal. The effective rate on the simple interest loan would be 6%, but the effective rate on the installment loan would be more than twice this amount. (An estimate of the add-on rate would be $2 \times 6\% = 12\%$.)

- 17-9** Accruals are continually recurring short-term liabilities, especially accrued wages and accrued taxes. Accruals arise automatically, or spontaneously, from a firm's operations, hence they are spontaneous funds. For example, if sales grow by 50%, then accrued wages and taxes should also grow by about 50%. Accruals are "free" in the sense that no interest is paid on them. However, firms cannot generally control their amounts because the timing of wage payments is set by industry custom and tax payments are set by law. Thus, firms use all the accruals they can, but they have little control over their levels.

17-10	<u>A/R</u>	<u>Sales</u>	<u>Profit</u>
a. The firm restricts its credit standards.	<u>-</u>	<u>-</u>	<u>0</u>
b. The terms of trade are changed from 2/10, net 30, to 3/10, net 30.	<u>0</u>	<u>+</u>	<u>0</u>
c. The terms are changed from 2/10 net 30, to 3/10, net 40.	<u>0</u>	<u>+</u>	<u>0</u>
d. The credit manager gets tough with past-due accounts.	<u>-</u>	<u>-</u>	<u>0</u>

Explanations:

- When a firm "restricts" its credit standards, it sells on credit more selectively. It will likely sell less and certainly will make fewer credit sales. Profit may be affected in either direction.
- The larger cash discount will probably induce more sales, but they will likely be from customers who pay bills quickly. Further, some of the current customers who do not take the 2% discount may be induced to start paying earlier. The effect of this would be to reduce accounts receivable, so accounts receivable and profits could go either way.
- A less stringent credit policy in terms of the credit period should stimulate sales. The accounts receivable could go up or down depending upon whether customers take the new higher discount or delay payments for the 10 additional days, and depending upon the amount of new sales generated.
- If the credit manager gets tough with past due accounts, sales will decline, as will accounts receivable.

Solutions to End-of-Chapter Problems

- 17-1** 1. Sales = \$15,000,000; Inventory = \$2,000,000; A/R = \$3,000,000; A/P = \$1,000,000; COGS = 0.8(Sales); Interest on bank loan = 8%; CCC = ?

CCC = Inventory conversion period + Average collection period – Payables deferral period.

$$\begin{aligned}\text{Inventory conversion period} &= \frac{\text{Inventory}}{\text{Cost of goods sold per day}} \\ &= \frac{\$2,000,000}{[(0.8)(\$15,000,000)]/365} \\ &= \frac{\$2,000,000}{\$32,876.7123} \\ &= 60.83 \text{ days.}\end{aligned}$$

$$\begin{aligned}\text{Average collection period} &= \frac{\text{Receivables}}{\text{Sales}/365} \\ &= \frac{\$3,000,000}{\$15,000,000/365} \\ &= 73 \text{ days.}\end{aligned}$$

$$\begin{aligned}\text{Payables deferral period} &= \frac{\text{Payables}}{\text{Cost of goods sold}/365} \\ &= \frac{\$1,000,000}{\$32,876.7123} \\ &= 30.42 \text{ days.}\end{aligned}$$

$$\text{CCC} = 60.83 + 73 - 30.42 = 103.41 \text{ days.}$$

2. Lower inventories and receivables by 10% each and increase payables by 10%. Sales and COGS remain the same.

$$\text{Inventory} = \$2,000,000 \times 0.9 = \$1,800,000.$$

$$\text{A/R} = \$3,000,000 \times 0.9 = \$2,700,000.$$

$$\text{A/P} = \$1,000,000 \times 1.1 = \$1,100,000.$$

Calculate new CCC:

$$\begin{aligned}\text{Inventory conversion period} &= \frac{\$1,800,000}{\$32,876.7123} \\ &= 54.75 \text{ days.}\end{aligned}$$

$$\begin{aligned}\text{Average collection period} &= \frac{\$2,700,000}{\$15,000,000/365} \\ &= 65.70 \text{ days.}\end{aligned}$$

$$\begin{aligned}\text{Payables deferral period} &= \frac{\$1,100,000}{\$32,876.7123} \\ &= 33.46 \text{ days.}\end{aligned}$$

$$\text{New CCC} = 54.75 + 65.70 - 33.46 = 86.99 \text{ days} \approx 87 \text{ days.}$$

3. Cash freed up:

$$\Delta \text{ Inventory} = (60.83 - 54.75) \times \$32,876.7123 = \$199,890.41.$$

$$\Delta \text{ Receivables} = (73 - 65.70) \times \$41,095.8904 = \$300,000.$$

$$\Delta \text{ Payables} = (30.42 - 33.46) \times \$32,876.7123 = -\$99,945.21.$$

$$\text{Cash freed up} = \$199,890.41 + \$300,000 - (-\$99,945.21) = \$599,835.62 \approx \$600,000.$$

4. Impact on pretax profits: $\$600,000 \times 0.08 = \$48,000$ increase in pretax profits.

17-2 Sales = \$10,000,000; A/R = \$2,000,000; DSO = ?

$$\begin{aligned}\text{DSO} &= \frac{\text{Receivables}}{\text{Sales}/365} \\ &= \frac{\$2,000,000}{\$10,000,000/365} \\ &= 73 \text{ days.}\end{aligned}$$

If all customers paid on time (assuming that it makes no sense for customers to pay earlier than 30 days), then the firm's DSO = 30 days. If customers paid on time, the firm's A/R = $30 \times \$10,000,000/365 = \$821,917.81$.

$$\text{Cash freed up} = \$2,000,000 - \$821,917.81 = \$1,178,082.19.$$

17-3 Purchases = \$8,000,000; terms = 3/5 net 60; currently pays on Day 5 and takes discounts.

Forgoes discounts; additional credit = ?

$$\$8,000,000/365 \times 55 \text{ days} = \$1,205,479.45.$$

$$\text{Nominal cost of trade credit} = \frac{3}{97} \times \frac{365}{55} = 3.09\% \times 6.6364 = 20.52\%.$$

$$\text{Effective cost of trade credit} = (1 + 3/97)^{365/55} - 1 = 1.2240 - 1 = 22.40\%.$$

Bank loan: 10%, interest paid monthly

$$\text{EAR} = (1 + 0.10/12)^{12} - 1 = 1.1047 - 1 = 10.47\%.$$

Because the effective cost of the bank loan is less than half the effective cost of the trade credit, the bank loan should be used.

17-4 a.
$$\begin{aligned} \text{Cash conversion cycle} &= \text{Inventory conversion period} + \text{Receivables collection period} - \text{Payables deferral period} \\ &= 75 + 38 - 30 = 83 \text{ days.} \end{aligned}$$

b. Average sales per day = $\$3,421,875/365 = \$9,375$.

Investment in receivables = $\$9,375 \times 38 = \$356,250$.

c. Step 1: Calculate inventory balance from inventory conversion period:

$$75 = \frac{\text{Inventory}}{0.75 \times \frac{\$3,421,875}{365}}$$

$$75 = \frac{\text{Inventory}}{\$7,031.25}$$

$$\text{Inventory} = \$527,343.75.$$

Step 2: Calculate inventory turnover ratio:

$$\begin{aligned} \text{Inventory turnover} &= \frac{\$3,421,875}{\$527,343.75} \\ &= 6.49\times. \end{aligned}$$

17-5 a. $0.4(10) + 0.6(40) = 28 \text{ days.}$

b. $\$912,500/365 = \$2,500 \text{ sales per day.}$

$\$2,500(28) = \$70,000 = \text{Average receivables.}$

c. Customers who take discount: Free trade credit.

Customers who do not take the discount and pay on Day 30:

1. Nominal cost: $3/97 \times 365/20 = 56.44\%$.

2. Effective cost: $(1 + 3/97)^{365/20} - 1 = 1.7435 - 1 = 0.7435 = 74.35\%$.

d. Customers who do not take the discount and pay on Day 40:

1. Nominal cost: $3/97 \times 365/30 = 37.63\%$.

2. Effective cost: $(1 + 3/97)^{365/30} - 1 = 0.4486 = 44.86\%$.

e. $0.4(10) + 0.6(30) = 22 \text{ days.}$ $\$912,500/365 = \$2,500 \text{ sales per day.}$

$\$2,500(22) = \$55,000 = \text{Average receivables.}$

Sales may also decline as a result of the tighter credit. This would further reduce receivables. Also, some customers may now take discounts further reducing receivables.

- 17-6** a. Cash conversion cycle = $22 + 40 - 30 = 32$ days.
- b. Working capital financing = $1,500 \times 32 \times \$6 = \$288,000$.
- c. If the payables deferral period was increased by 5 days, then its cash conversion cycle would decrease by 5 days, so its working capital financing needs would decrease by
 Decrease in working capital financing = $1,500 \times 5 \times \$6 = \$45,000$.
- d. Cash conversion cycle = $20 + 40 - 30 = 30$ days.
 Working capital financing = $1,800 \times 30 \times \$7 = \$378,000$.

- 17-7** a. Calculate inventory:

$$\begin{aligned}\text{Inventory turnover ratio} &= \text{Sales/Inventory} \\ 6 &= \$150,000/\text{Inventory} \\ \text{Inventory} &= \$25,000.\end{aligned}$$

Calculate inventory conversion period:

$$\begin{aligned}\text{Inventory conversion period} &= \frac{\text{Inventory}}{\text{Cost of goods sold per day}} \\ &= \frac{\$25,000}{0.8 \times \frac{\$150,000}{365}} \\ &= 76.04 \text{ days}.\end{aligned}$$

Receivables collection period = DSO = 36.5 days.

$$\begin{aligned}\text{Cash conversion cycle} &= \text{Inventory conversion period} + \text{Receivables collection period} - \text{Payables deferral period} \\ &= 76.04 + 36.5 - 40 = 72.54 \text{ days}.\end{aligned}$$

- b. Total assets = Inventory + Receivables + Fixed assets
 $= \$150,000/6 + [(\$150,000/365) \times 36.5] + \$35,000$
 $= \$25,000 + \$15,000 + \$35,000 = \$75,000$.

$$\begin{aligned}\text{Total assets turnover} &= \text{Sales/Total assets} \\ &= \$150,000/\$75,000 = 2.0\times.\end{aligned}$$

$$\begin{aligned}\text{ROA} &= \text{Profit margin} \times \text{Total assets turnover} \\ &= 0.06 \times 2.0 = 0.12 = 12\%.\end{aligned}$$

- c. $9 = \frac{\$150,000}{\text{Inventory}}$
 Inventory = \$16,667.

$$\begin{aligned}\text{Inventory conversion period} &= \frac{\$16,667}{\$328.7671} \\ &= 50.69 \text{ days}.\end{aligned}$$

Cash conversion cycle = $50.69 + 36.5 - 40 = 47.19$ days.

Total assets = Inventory + Receivables + Fixed assets
 $= \$16,667 + \$15,000 + \$35,000 = \$66,667$.

Total assets turnover = $\$150,000 / \$66,667 = 2.25\times$.

ROA = $\$9,000 / \$66,667 = 13.50\%$.

- 17-8 a.** Return on equity may be computed as follows:

	<u>Restricted</u>	<u>Moderate</u>	<u>Relaxed</u>
Current assets			
(% of sales \times Sales)	\$ 900,000	\$1,000,000	\$1,200,000
Fixed assets	<u>1,000,000</u>	<u>1,000,000</u>	<u>1,000,000</u>
Total assets	<u>\$1,900,000</u>	<u>\$2,000,000</u>	<u>\$2,200,000</u>
Debt (60% of assets)	\$1,140,000	\$1,200,000	\$1,320,000
Equity	<u>760,000</u>	<u>800,000</u>	<u>880,000</u>
Total liab./equity	<u>\$1,900,000</u>	<u>\$2,000,000</u>	<u>\$2,200,000</u>
EBIT (12% \times \$2 million)	\$ 240,000	\$ 240,000	\$ 240,000
Interest (8%)	<u>91,200</u>	<u>96,000</u>	<u>105,600</u>
Earnings before taxes	\$ 148,800	\$ 144,000	\$ 134,400
Taxes (40%)	<u>59,520</u>	<u>57,600</u>	<u>53,760</u>
Net income	<u>\$ 89,280</u>	<u>\$ 86,400</u>	<u>\$ 80,640</u>
Return on equity	11.75%	10.80%	9.16%

- b.** No, this assumption would probably not be valid in a real world situation. A firm's current asset policies, particularly with regard to accounts receivable, such as discounts, collection period, and collection policy, may have a significant effect on sales. The exact nature of this function may be difficult to quantify, however, and determining an "optimal" current asset level may not be possible in actuality.
- c.** As the answers to Part a indicate, the restricted policy leads to a higher expected return. However, as the current asset level is decreased, presumably some of this reduction comes from accounts receivable. This can be accomplished only through higher discounts, a shorter collection period, and/or tougher collection policies. As outlined above, this would in turn have some effect on sales, possibly lowering profits. More restrictive receivable policies might involve some additional costs (collection, and so forth) but would also probably reduce bad debt expenses. Lower current assets would also imply lower liquid assets; thus, the firm's ability to handle contingencies would be impaired. Higher risk of inadequate liquidity would increase the firm's risk of insolvency and thus increase its chance of failing to meet fixed charges. Also, lower inventories might mean lost sales and/or expensive production stoppages. Attempting to attach numerical values to these potential losses and probabilities would be extremely difficult.

- 17-9 a.** Presently, HGC has 5 days of collection float; under the lockbox system, this would drop to 2 days.

$$\begin{aligned} \$1,400,000 \times 5 \text{ days} &= \$7,000,000 \\ \$1,400,000 \times 2 \text{ days} &= \underline{2,800,000} \\ &\underline{\$4,200,000} \end{aligned}$$

HGC can reduce its cash balances by the \$4,200,000 reduction in negative float. This would be a one-time cash flow, unless the firm grows. Then cash flow would increase by the differential growth in collections.

- b.** $0.10(\$4,200,000) = \$420,000$ = the value of the lockbox system on an annual basis.
c. $\$420,000/12 = \$35,000$ = maximum monthly charge HGC can pay for the lockbox system.

17-10 a.

	May	June	July	August	September	October	November	December	January
<i>Collections and purchases worksheet</i>									
Sales (gross)	\$180,000	\$180,000	\$360,000	\$540,000	\$720,000	\$360,000	\$360,000	\$90,000	\$180,000
<i>Collections</i>									
During month of sale	18,000	18,000	36,000	54,000	72,000	36,000	36,000	9,000	
During 1st month after sale		135,000	135,000	270,000	405,000	540,000	270,000	270,000	
During 2nd month after sale			27,000	27,000	54,000	81,000	108,000	54,000	
Total collections			<u>\$198,000</u>	<u>\$351,000</u>	<u>\$531,000</u>	<u>\$657,000</u>	<u>\$414,000</u>	<u>\$333,000</u>	
<i>Purchases</i>									
Labor and raw materials	\$90,000	\$90,000	\$126,000	\$882,000	\$306,000	\$234,000	\$162,000	\$90,000	
Payments for labor and raw materials		<u>\$90,000</u>	<u>\$90,000</u>	<u>\$126,000</u>	<u>\$882,000</u>	<u>\$306,000</u>	<u>\$234,000</u>	<u>\$162,000</u>	
<i>Cash gain or loss for month</i>									
Collections			<u>\$198,000</u>	<u>\$351,000</u>	<u>\$531,000</u>	<u>\$657,000</u>	<u>\$414,000</u>	<u>\$333,000</u>	
Payments for labor and raw materials			<u>90,000</u>	<u>126,000</u>	<u>882,000</u>	<u>306,000</u>	<u>234,000</u>	<u>162,000</u>	
General and administrative salaries			<u>27,000</u>	<u>27,000</u>	<u>27,000</u>	<u>27,000</u>	<u>27,000</u>	<u>27,000</u>	
Lease payments			<u>9,000</u>	<u>9,000</u>	<u>9,000</u>	<u>9,000</u>	<u>9,000</u>	<u>9,000</u>	
Miscellaneous expenses			<u>2,700</u>	<u>2,700</u>	<u>2,700</u>	<u>2,700</u>	<u>2,700</u>	<u>2,700</u>	
Income tax payments					<u>63,000</u>			<u>63,000</u>	
Design studio payment						<u>180,000</u>			
Total payments			<u>\$128,700</u>	<u>\$164,700</u>	<u>\$983,700</u>	<u>\$524,700</u>	<u>\$272,700</u>	<u>\$263,700</u>	
Net cash gain (loss) during month			<u>\$69,300</u>	<u>\$186,300</u>	<u>(\$452,700)</u>	<u>\$132,300</u>	<u>\$141,300</u>	<u>\$69,300</u>	
<i>Loan requirement or cash surplus</i>									
Cash at start of month			<u>\$132,000</u>	<u>\$201,300</u>	<u>\$387,600</u>	<u>(\$65,100)</u>	<u>\$67,200</u>	<u>\$208,500</u>	
Cumulative cash			<u>\$201,300</u>	<u>\$387,600</u>	<u>(\$65,100)</u>	<u>\$67,200</u>	<u>\$208,500</u>	<u>\$277,800</u>	
Target cash balance			<u>\$90,000</u>	<u>\$90,000</u>	<u>\$90,000</u>	<u>\$90,000</u>	<u>\$90,000</u>	<u>\$90,000</u>	
Cumulative surplus cash or loans outstanding to maintain \$90,000 target cash balance			<u>\$111,300</u>	<u>\$297,600</u>	<u>(\$155,100)</u>	<u>(\$22,800)</u>	<u>\$118,500</u>	<u>\$187,800</u>	

- b.** The cash budget indicates that Helen will have surplus funds available during July, August, November, and December. During September the company will need to borrow \$155,100. The cash surplus that accrues during October will enable Helen to reduce the loan balance outstanding to \$22,800 by the end of October.
- c.** In a situation such as this, where inflows and outflows are not synchronized during the month, it may not be possible to use a cash budget centered on the end of the month. The cash budget should be set up to show the cash positions of the firm on the 5th of each month. In this way the company could establish its maximum cash requirement and use these maximum figures to estimate its required line of credit.

The table below shows the status of the cash account on selected dates within the month of July. It shows how the inflows accumulate steadily throughout the month and how the requirement of paying all the outflows on the 5th of the month requires that the firm obtain external financing. By July 14, however, the firm reaches the point where the inflows

have offset the outflows, and by July 30 we see that the monthly totals agree with the cash budget developed earlier in Part a.

	<u>7/2/12</u>	<u>7/4/12</u>	<u>7/5/12</u>	<u>7/6/12</u>	<u>7/14/12</u>	<u>7/30/12</u>
Opening balance	\$132,000	132,000	132,000	\$132,000	\$132,000	\$132,000
Cumulative inflows (1/30 × receipts × no. of days)	<u>13,200</u>	<u>26,400</u>	<u>33,000</u>	<u>39,600</u>	<u>92,400</u>	<u>198,000</u>
Total cash available	\$145,200	\$158,400	\$165,000	\$171,600	\$224,400	\$330,000
Outflow	<u>0</u>	<u>0</u>	<u>128,700</u>	<u>128,700</u>	<u>128,700</u>	<u>128,700</u>
Net cash position	\$145,200	\$158,400	\$ 36,300	\$ 42,900	\$ 95,700	\$201,300
Target cash balance	<u>90,000</u>	<u>90,000</u>	<u>90,000</u>	<u>90,000</u>	<u>90,000</u>	<u>90,000</u>
Cash above minimum needs (borrowing needs)	<u>\$ 55,200</u>	<u>\$ 68,400</u>	<u>(\$ 53,700)</u>	<u>(\$ 47,100)</u>	<u>\$ 5,700</u>	<u>\$111,300</u>

- d. The months preceding peak sales would show a decreased current ratio and an increased debt ratio due to additional short-term bank loans. In the following months as receipts are collected from sales, the current ratio would increase and the debt ratio would decline. Abnormal changes in these ratios would affect the firm's ability to obtain bank credit.

Comprehensive/Spreadsheet Problem

Note to Instructors:

The partial solution for Part a of this problem is provided at the back of the text; however, the solutions to Parts b through d are not. Instructors can access the *Excel* file on the textbook's website or the Instructor's Resource CD.

17-11 See Problem 17-10 Parts a through d on the preceding two pages.

The "Sales adjustment factor" can be used to cause sales to vary from the base levels. Similarly, we can change the percentage of late-paying customers. Here is the relevant data table:

Change in Sales	Maximum Loan Required						
	% Collections in 2nd month						
\$155,100	0%	15%	30%	45%	60%	75%	90%
-100%	\$ 2,296,200	\$ 2,296,200	\$ 2,296,200	\$ 2,296,200	\$ 2,296,200	\$ 2,296,200	\$ 2,296,200
-75%	\$ 1,668,450	\$ 1,675,200	\$ 1,681,950	\$ 1,688,700	\$ 1,695,450	\$ 1,702,200	\$ 1,708,950
-50%	\$ 1,040,700	\$ 1,054,200	\$ 1,067,700	\$ 1,081,200	\$ 1,094,700	\$ 1,108,200	\$ 1,121,700
-25%	\$ 412,950	\$ 457,050	\$ 517,800	\$ 578,550	\$ 639,300	\$ 700,050	\$ 760,800
0%	\$ 101,100	\$ 155,100	\$ 209,100	\$ 263,100	\$ 317,100	\$ 371,100	\$ 427,800
25%	\$ 0	\$ 0	\$ 0	\$ 20,100	\$ 87,600	\$ 155,100	\$ 222,600
50%	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 20,100
75%	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0
100%	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0

You can see from the table that, from the base case (collections = 15%, change in sales = 0), an increase in late payers increases the loan requirement, as does a decline in sales.

Integrated Case

17-12

Ski Equipment Inc.

Managing Current Assets

Dan Barnes, financial manager of Ski Equipment Inc. (SKI), is excited, but apprehensive. The company's founder recently sold his 51% controlling block of stock to Kent Koren, who is a big fan of EVA (Economic Value Added). EVA is found by taking the after-tax operating profit and subtracting the dollar cost of all the capital the firm uses:

$$\begin{aligned}\text{EVA} &= \text{EBIT}(1 - T) - \text{Annual dollar cost of capital} \\ &= \text{EBIT}(1 - T) - (\text{WACC} \times \text{Capital employed}).\end{aligned}$$

If EVA is positive, the firm is creating value. On the other hand, if EVA is negative, the firm is not covering its cost of capital and stockholders' value is being eroded. Koren rewards managers handsomely if they create value, but those whose operations produce negative EVAs are soon looking for work. Koren frequently points out that if a company can generate its current level of sales with fewer assets, it will need less capital. That would, other things held constant, lower capital costs and increase EVA.

Shortly after he took control of SKI, Koren met with SKI's senior executives to tell them of his plans for the company. First, he presented some EVA data that convinced everyone that SKI had not been creating value in recent years. He then stated, in no uncertain terms, that this situation must change. He noted that SKI's designs of skis, boots, and clothing are acclaimed throughout the industry but that something is seriously amiss elsewhere in the company. Costs are too high, prices are too low, or the company employs too much capital; and he expects SKI's managers to correct the problem.

Barnes has long believed that SKI's working capital situation should be studied—the company may have the optimal amounts of cash, securities,

receivables, and inventories; but it may also have too much or too little of these items. In the past, the production manager resisted Barnes's efforts to question his holdings of raw materials inventories, the marketing manager resisted questions about finished goods, the sales staff resisted questions about credit policy (which affects accounts receivable), and the treasurer did not want to talk about her cash and securities balances. Koren's speech made it clear that such resistance would no longer be tolerated.

Barnes also knows that decisions about working capital cannot be made in a vacuum. For example, if inventories could be lowered without adversely affecting operations, less capital would be required, the dollar cost of capital would decline, and EVA would increase. However, lower raw materials inventories might lead to production slowdowns and higher costs, while lower finished goods inventories might lead to the loss of profitable sales. So before inventories are changed, it will be necessary to study operating as well as financial effects. The situation is the same with regard to cash and receivables.

- | | |
|-----------|---|
| A. | Barnes plans to use the ratios in Table IC 17.1 as the starting point for discussions with SKI's operating executives. He wants everyone to think about the pros and cons of changing each type of current asset and the way changes would interact to affect profits and EVA. Based on the data in Table IC 17.1, does SKI seem to be following a relaxed, moderate, or restricted current assets investment policy? |
|-----------|---|

Table IC 17.1. Selected Ratios: SKI and Industry Average

	<u>SKI</u>	<u>Industry</u>
Current	1.75	2.25
Debt/assets	58.76%	50.00%
Turnover of cash and securities	16.67	22.22
Days sales outstanding (365-day basis)	45.63	32.00
Inventory turnover	4.82	7.00
Fixed assets turnover	11.35	12.00
Total assets turnover	2.08	3.00
Profit margin	2.07%	3.50%
Return on equity (ROE)	10.45%	21.00%

Answer: [Show S17-1 through S17-4 here.] A company with a relaxed current assets investment policy would carry relatively large amounts of current assets relative to its sales. It would be guarding against running out of stock or of running short of cash, or losing sales because of a restrictive credit policy. We can see that SKI has relatively low cash and inventory turnover ratios. For example, Sales/Inventories = 4.82 versus 7.0 for an average firm in its industry. Thus, SKI is carrying a lot of inventory per dollar of sales, which would meet the definition of a relaxed policy. Similarly, SKI's DSO is relatively high. Since DSO is calculated as receivables/sales per day, a high DSO indicates a large amount of receivables per dollar of sales. Thus, SKI seems to have a relaxed current assets investment policy, and a lot of current assets.

B. How can we distinguish between a relaxed but rational current assets investment policy and a situation where a firm has a large amount of current assets simply because it is inefficient? Does SKI's current assets investment policy seem appropriate? Explain.

Answer: [Show S17-5 here.] SKI may choose to hold large amounts of inventory to avoid the costs of "running short," and to cater to

customers who expect to receive their equipment in a short period of time. SKI may also choose to hold high amounts of receivables to maintain good relationships with its customers. However, if SKI is holding large stocks of inventory and receivables to better serve customers, it should be able to offset the costs of carrying that working capital with high prices or higher sales, and its ROE should be no lower than that of firms with other working capital policies.

It is clear from the data in Table IC 17.1 that SKI is not as profitable as the average firm in its industry. This suggests that it simply has excessive working capital, and that it should take steps to reduce its working capital.

C. SKI tries to match the maturity of its assets and liabilities. Describe how SKI could adopt a more aggressive or a more conservative financing policy.

Answer: [Show S17-6 through S17-8 here.] With an aggressive financing policy, some of SKI's permanent assets would be financed with short-term debt. Of course, there are different degrees of aggressiveness. A highly aggressive policy would be one where all current assets, both permanent and temporary, and part of fixed assets would be financed with short-term credit. This would subject SKI to the dangers of loan renewal and rising interest rates. However, short-term interest rates are generally lower than long-term rates, and some firms are willing to sacrifice safety for the chance of higher profits.

With a conservative financing policy, long-term capital is used to finance all the permanent assets and also to meet some of the seasonal needs. In this situation, the firm uses a small amount of short-term credit to meet its peak requirements, but it also meets a part of its

seasonal needs by storing liquidity in the form of marketable securities. This is a very safe, conservative financing policy.

D. Assume that SKI's payables deferral period is 30 days. Now calculate the firm's cash conversion cycle estimating the inventory conversion period as $365/\text{Inventory turnover}$.

Answer: [Show S17-9 and S17-10 here.] A firm's cash conversion cycle is calculated as:

$$\begin{array}{ccccccc} \text{Inventory} & & \text{Receivables} & & \text{Payables} & & \text{Cash} \\ \text{conversion} & + & \text{collection} & - & \text{deferral} & = & \text{conversion} \\ \text{period} & & \text{period} & & \text{period} & & \text{cycle} \end{array}$$

From Table IC 17.1, SKI's inventory turnover is given as 4.82 so we can estimate its inventory conversion period as:

$$\frac{365}{\text{Inventory turnover}} = \frac{365}{4.82} 75.73 \approx 76 \text{ days.}$$

SKI's receivables collection period is equal to its DSO. From Table IC 16.1, its DSO is given as 45.63 days, or approximately 46 days.

We are given in the problem that its payables deferral period is 30 days, so now we have all the individual components to calculate SKI's cash conversion cycle.

$$76 \text{ days} + 46 \text{ days} - 30 \text{ days} = 92 \text{ days.}$$

Thus, SKI's cash conversion cycle is approximately 92 days. Note that the inventory conversion period would normally be calculated based on its cost of goods sold, so the number of days in the cash conversion cycle would be larger than calculated above.

E. What might SKI do to reduce its cash and securities without harming operations?

Answer: [Show S17-11 here.] To the extent that “cash and securities” consist of low-yielding securities, they could be sold and the cash generated could be used to reduce debt, to repurchase stock, or to invest in operating assets.

In an attempt to better understand SKI's cash position, Barnes developed a cash budget. Data for the first 2 months of the year are shown in Table IC 17.2. (Note that Barnes's preliminary cash budget does not account for interest income or interest expense.) He has the figures for the other months, but they are not shown in Table IC 17.2.

Table IC 17.2. SKI's Cash Budget for January and February

	<u>Nov</u>	<u>Dec</u>	<u>Jan</u>	<u>Feb</u>	<u>Mar</u>	<u>Apr</u>
I. Collections and Purchases Worksheet						
(1) Sales (gross)	\$71,218	\$68,212.00	\$65,213.00	\$52,475.00	\$42,909	\$30,524
Collections						
(2) During month of sale						
(0.2)(0.98)(month's sales)			12,781.75	10,285.10		
(3) During first month after sale						
(0.7)(previous month's sales)			47,748.40	45,649.10		
(4) During second month after sale						
(0.1)(sales 2 months ago)			<u>7,121.80</u>	<u>6,821.20</u>		
(5) Total collections (Lines 2 + 3 + 4)			<u>\$67,651.95</u>	<u>\$62,755.40</u>		
Purchases						
(6) (0.85)(forecasted sales						
2 months from now)		\$44,603.75	\$36,472.65	\$25,945.40		
(7) Payments (1-month lag)			44,603.75	36,472.65		
II. Cash Gain or Loss for Month						
(8) Collections (from Section I)			\$67,651.95	\$62,755.40		
(9) Payments for purchases (from Section I)			44,603.75	36,472.65		
(10) Wages and salaries			6,690.56	5,470.90		
(11) Rent			2,500.00	2,500.00		
(12) Taxes						
(13) Total payments			<u>\$53,794.31</u>	<u>\$44,443.55</u>		
(14) Net cash gain (loss) during month						
(Line 8 – Line 13)			<u>\$13,857.64</u>	<u>\$18,311.85</u>		
III. Cash Surplus or Loan Requirement						
(15) Cash at beginning of month						
if no borrowing is done			<u>\$ 3,000.00</u>	<u>\$16,857.64</u>		
(16) Cumulative cash [cash at start + gain						
or – loss = (Line 14 + Line 15)]			\$16,857.64	\$35,169.49		
(17) Target cash balance			<u>1,500.00</u>	<u>1,500.00</u>		
(18) Cumulative surplus cash or loans outstanding						
to maintain \$1,500 target cash balance						
(Line 16 – Line 17)			<u>\$15,357.64</u>	<u>\$33,669.49</u>		

F. In his preliminary cash budget, Barnes has assumed that all sales are collected and, thus, that SKI has no bad debts. Is this realistic? If not, how would bad debts be dealt with in a cash budgeting sense? (Hint: Bad debts affect collections but not purchases.)

Answer: [Show S17-12 through S17-15 here.] It is not realistic to assume zero bad debts. When credit is granted, bad debts should be expected. Collections in each month would be lowered by the percentage of bad debts. Payments would be unchanged, so the result would be that loan balances would be larger and cash surplus balances would be smaller by the difference in the collection amounts.

G. Barnes's cash budget for the entire year, although not given here, is based heavily on his forecast for monthly sales. Sales are expected to be extremely low between May and September but then increase dramatically in the fall and winter. November is typically the firm's best month, when SKI ships equipment to retailers for the holiday season. Interestingly, Barnes's forecasted cash budget indicates that the company's cash holdings will exceed the targeted cash balance every month except for October and November, when shipments will be high but collections will not be coming in until later. Based on the ratios in Table IC 17.1, does it appear that SKI's target cash balance is appropriate? In addition to possibly lowering the target cash balance, what actions might SKI take to better improve its cash management policies and how might that affect its EVA?

Answer: [Show S17-16 and S17-17 here.] The company's turnover of cash and securities (presented in Table IC 17.1) and its projected cash budget (presented in Table IC 17.2) suggest that the company is

holding too much cash. SKI could improve its EVA by either investing the cash in productive assets, or returning the cash to shareholders. If SKI uses the cash for profitable investments, its costs will remain the same, but its operating income will rise, thereby increasing EVA. On the other hand, if the company chooses to return the cash to its shareholders, for example, by increasing the dividend or repurchasing shares of common stock, the company's revenues would remain the same, but its overall cost of capital would fall, thereby increasing EVA.

H.	Is there any reason to think that SKI may be holding too much inventory? If so, how would that affect EVA and ROE?
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Answer: [Show S17-18 and S17-19 here.] As pointed out in Part a, SKI's inventory turnover (4.82) is considerably lower than the average firm's turnover (7.00). This indicates that the firm is carrying a large amount of inventory per dollar of sales.

By holding more inventory per dollar of sales than is necessary, the firm is increasing its costs, which reduces its ROE. In addition, this additional working capital must be financed, so EVA is lowered too.

I.	If the company reduces its inventory without adversely affecting sales, what effect should this have on the company's cash position (1) in the short run and (2) in the long run? Explain in terms of the cash budget and the balance sheet.
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Answer: [Show S17-20 here.] Reducing inventory purchases will increase the company's cash holdings in the short run, thus reducing the amount of financing or the target cash balance needed. In the long run, the company is likely to reduce its cash holdings in order to increase its

EVA. SKI can use the “excess cash” to make investments in more productive assets such as plant and equipment. Alternatively, the firm can distribute the “excess cash” to its shareholders through higher dividends or repurchasing its shares.

J. Barnes knows that SKI sells on the same credit terms as other firms in the industry. Use the ratios presented in Table IC 17.1 to explain whether SKI’s customers pay more or less promptly than those of its competitors. If there are differences, does that suggest that SKI should restrict or relax its credit policy? What four variables make up a firm’s credit policy, and in what direction should each be changed by SKI?

Answer: [Show S17-21 and S17-22 here.] SKI’s DSO is 45.63 days as compared with 32 days for the average firm in its industry. This suggests that SKI’s customers are paying less promptly than those of its competitors. Because the firm’s DSO is higher than the industry average, the firm should restrict its credit policy in an attempt to lower its DSO.

The four variables that make up a firm’s credit policy are (1) discount amount and period, (2) credit period, (3) credit standards, and (4) collection policy. Cash discounts generally produce two benefits: (1) they attract new customers who view discounts as a price reduction, thus sales would increase, and (2) they cause a reduction in the days sales outstanding (DSO) because some established customers will pay more promptly to take advantage of the discount, thus the level of receivables held would decline. Discounts might encourage customers now paying late to pay more promptly. Of course, these benefits are offset to some degree by the dollar cost of the discounts. The effect on bad debt expense is

indeterminate. If the firm restricted its credit policy it is unclear what the firm would do with its cash discount policy. The firm could decrease the discount period and keep discounts unchanged.

Credit period is the length of time allowed all “qualified” customers to pay for their purchases. The shorter a firm’s credit period, the lower the firm’s days sales outstanding, and the lower the level of receivables held. A shorter credit period might also tend to decrease sales, especially when a competitor’s credit period is longer than the firm’s own credit period. The effect of the credit period on bad debt expense is indeterminate.

In order to qualify for credit in the first place, customers must meet the firm’s credit standards. These dictate the minimum acceptable financial position required of customers to receive credit. Also, a firm may impose differing credit limits depending on the customer’s financial strength. Tight credit standards would tend to decrease sales (fewer customers would qualify for credit), decrease the level of receivables held, and would cause a decrease in the amount of bad debt expenses. The level of receivables held would be decreased due to the lower level of sales and also the probability that customers now qualifying for credit would take less time to pay. Bad debt expenses should decrease due to raising customers’ minimum acceptable financial positions.

Finally, collection policy refers to the procedures that the firm follows to collect past-due accounts. These can range from a simple letter or phone call to turning the account over to a collection agency. A restrictive collection policy would decrease the level of receivables held, as customers would decrease the length of time they took to pay their bills. A restrictive collection policy would also cause a decrease in the amount of bad debt losses the firm incurred.

A restrictive credit policy would tend to decrease sales, decrease the level of receivables held, and decrease the amount of bad debt expenses.

K. Does SKI face any risks if it restricts its credit policy? Explain.

Answer: [Show S17-23 here.] A restrictive credit policy may discourage sales. Some customers may choose to go elsewhere if they are pressured to pay their bills sooner.

L. If the company reduces its DSO without seriously affecting sales, what effect will this have on its cash position (1) in the short run and (2) in the long run? Answer in terms of the cash budget and the balance sheet. What effect should this have on EVA in the long run?

Answer: [Show S17-24 here.] If customers pay their bills sooner, this will increase the company's cash position in the short run, which would decrease the amount of financing or the target cash balance needed. Over time, the company would hopefully invest this cash in more productive assets, or pay it out to shareholders. Both of these actions would increase EVA.

M. Assume that SKI buys on terms of 1/10, net 30, but that it can get away with paying on the 40th day if it chooses not to take discounts. Also assume that it purchases \$3 million of components per year, net of discounts. How much free trade credit can the company get, how much costly trade credit can it get, and what is the percentage cost of the costly credit? Should SKI take discounts? Why or why not?

Answer: [Show S17-25 through S17-30 here.] If SKI's net purchases are \$3,000,000 annually, then with a 1% discount, its gross purchases

are $\$3,000,000/0.99 = \$3,030,303$. Net daily purchases from this supplier are $\$3,000,000/365 = \$8,219.178$.

If the discount is taken, then SKI must pay this supplier at the end of Day 10 for purchases made on Day 1, on Day 11 for purchases made on Day 2, and so on. Thus, in a steady state, SKI will on average have 10 days' worth of purchases in payables, so,

$$\text{Payables} = 10(\$8,219.178) = \$82,192.$$

If the discount is not taken, then SKI will wait 40 days before paying, so

$$\text{Payables} = 40(\$8,219.178) = \$328,767.$$

Therefore:

Trade credit if discounts are not taken: $\$328,767 = \text{Total trade credit}$

Trade credit if discounts are taken: $-82,192$ = Free trade credit

Difference: $\$246,575$ = Costly trade credit

To obtain $\$246,575$ of costly trade credit, SKI must give up $0.01(\$3,030,303) = \$30,303$ in lost discounts annually. Since the forgone discounts pay for $\$246,575$ of credit, the nominal annual interest rate is 12.29%:

$$\frac{\$30,303}{\$246,575} = 0.1229 = 12.29\%.$$

Here is a formula that can be used to find the nominal annual interest rate of costly trade credit:

$$\text{Nominal cost of trade credit} = \frac{\text{Discount \%}}{100 - \text{Discount \%}} \times \frac{365 \text{ Days}}{\text{Days credit outstanding} - \text{Discount period}}$$

In this situation,

$$\frac{1}{99} \times \frac{365}{40 - 10} = 0.0101 \times 12.1667 = 0.1229 = 12.29\%.$$

Note (1) that the formula gives the same nominal annual interest rate as was calculated earlier, (2) that the first term is the periodic cost of the credit (SKI spends \$1 to get the use of \$99), and (3) that the second term is the number of “savings periods” per year (SKI delays payment for $40 - 10 = 30$ days), and there are $365/30 = 12.1667$ 30-day periods in a year. Therefore, we could calculate the exact effective annual interest rate as: effective rate = $(1.0101)^{12.1667} - 1 = 13.01\%$.

If SKI can obtain financing from its bank (or from other sources) at an interest rate less than 13.01%, it should borrow the funds and take discounts.

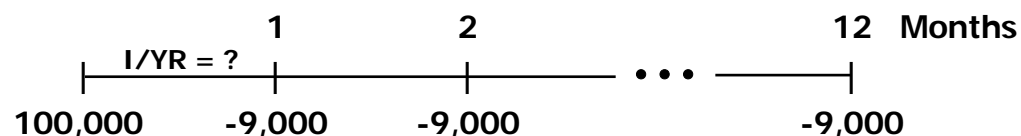
N. Suppose SKI decided to raise an additional \$100,000 as a 1-year loan from its bank, for which it was quoted a rate of 8%. What is the effective annual cost rate assuming simple interest and add-on interest on a 12-month installment loan?

Answer: [Show S17-31 through S17-34 here.] For a simple interest loan, the effective annual cost is the same as the simple interest rate, which is 8%. The effective annual cost for an add-on interest, 12-month installment loan would be calculated as follows:

Total amount to be repaid = $\$100,000 \times 1.08 = \$108,000$.

Monthly payments = $\$108,000/12 = \$9,000$.

Time Line:



With a financial calculator, enter $N = 12$, $PV = 100000$, $PMT = -9000$, $FV = 0$, and then press $I/YR = 1.2043\%$. However, this is a monthly rate, the $EAR_{\text{Add-on}}$ would be calculated as:

$$\begin{aligned} &= (1 + 0.012043)^{12} - 1 \\ &= 1.1545 - 1 \\ &= 0.1545 = 15.45\%. \end{aligned}$$