■ Solutions to Problems

P13-1. LG 2: CCC

Basic

a. OC
$$\begin{aligned} &= \text{Average age of inventories} \\ &\quad + \text{Average collection period} \\ &= 90 \text{ days} + 60 \text{ days} \\ &= 150 \text{ days} \end{aligned}$$

b. CCC
$$\begin{aligned} &= \text{Operating cycle} - \text{Average payment period} \\ &= 150 \text{ days} - 30 \text{ days} \\ &= 120 \text{ days} \end{aligned}$$

c. Resources needed
$$\begin{aligned} &= (\text{total annual outlays} \div 365 \text{ days}) \times \text{CCC} \\ &= [\$30{,}000{,}000 \div 365] \times 120 \\ &= \$9{,}863{,}013.70 \end{aligned}$$

d. Shortening either the AAI or the ACP, lengthening the APP, or a combination of these can reduce the CCC.

P13-2. LG 2: Changing CCC

Intermediate

a.   AAI   = 365 days ÷ 8 times inventory = 46 days

OC   = AAl + ACP

= 46 days + 60 days

= 106 days

CCC   = OC − APP

= 106 days − 35 days = 71 days

b.   Daily cash operating expenditure = total outlays ÷ 365 days

= \$3,500,000 ÷ 365

= \$9,589

Resources needed   = daily expenditure × CCC

= \$9,589 × 71

= \$680,819

c.   Additional profit   = (daily expenditure × reduction in CC)

× financing rate

= (\$9,589 × 20) × 0.14

= \$26,849

P13-3. LG 2: Multiple changes in CCC

Intermediate

a.   AAI   = 365 ÷ 6 times inventory = 61 days

OC   = AAI + ACP

= 61 days + 45 days

= 106 days

CCC   = OC − APP

= 106 days − 30 days

= 76 days

Daily financing   = \$3,000,000 ÷ 365

= \$8,219

Resources needed = Daily financing × CCC

= \$8,219 × 76

= \$624,644

b.   OC   = 56 days + 35 days

= 91 days

CCC   = 91 days − 40 days

= 51 days

Resources needed = \$8,219 × 51

= \$419,169

c. Additional profit = (daily expenditure × reduction in CCC)

$$\times \text{ financing rate}$$
$$= (\$8{,}219 \times 26) \times 0.13$$
$$= \$27{,}780$$

d. Reject the proposed techniques because costs ($35,000) exceed savings ($27,780).

P13-4. LG 2: Aggressive versus conservative seasonal funding strategy

Intermediate

a.

Month	Total Funds Requirements	Permanent Requirements	Seasonal Requirements
January	$ 2,000,000	$2,000,000	$ 0
February	2,000,000	2,000,000	0
March	2,000,000	2,000,000	0
April	4,000,000	2,000,000	2,000,000
May	6,000,000	2,000,000	4,000,000
June	9,000,000	2,000,000	7,000,000
July	12,000,000	2,000,000	10,000,000
August	14,000,000	2,000,000	12,000,000
September	9,000,000	2,000,000	7,000,000
October	5,000,000	2,000,000	3,000,000
November	4,000,000	2,000,000	2,000,000
December	3,000,000	2,000,000	1,000,000

Average permanent requirement = $2,000,000

Average seasonal requirement   = $48,000,000 ÷ 12
$$= \$4{,}000{,}000$$

b. (1) Under an aggressive strategy, the firm would borrow from $1,000,000 to $12,000,000 according to the seasonal requirement schedule shown in part **a** at the prevailing short-term rate. The firm would borrow $2,000,000, or the permanent portion of its requirements, at the prevailing long-term rate.

(2) Under a conservative strategy, the firm would borrow at the peak need level of $14,000,000 at the prevailing long-term rate.

c. Aggressive   = ($2,000,000 × 0.17) + ($4,000,000 × 0.12)
$$= \$340{,}000 + \$480{,}000$$
$$= \$820{,}000$$

Conservative = ($14,000,000 × 0.17)
$$= \$2{,}380{,}000$$

d. In this case, the large difference in financing costs makes the aggressive strategy more attractive. Possibly the higher returns warrant higher risks. In general, since the conservative strategy requires the firm to pay interest on unneeded funds, its cost is higher. Thus, the aggressive strategy is more profitable but also more risky.

P13-5. LG 3: EOQ analysis

Intermediate

a.   (1) $EOQ = \sqrt{\dfrac{(2 \times S \times O)}{C}} = \sqrt{\dfrac{(2 \times 1,200,000 \times \$25)}{\$0.54}} = 10,541$

    (2) $EOQ = \sqrt{\dfrac{(2 \times 1,200,000 \times 0)}{\$0.54}} = 0$

    (3) $EOQ = \sqrt{\dfrac{(2 \times 1,200,000 \times \$25)}{\$0.00}} = \infty$

    EOQ approaches infinity. This suggests the firm should carry the large inventory to minimize ordering costs.

b.   The EOQ model is most useful when both carrying costs and ordering costs are present. As shown in Part (a), when either of these costs are absent the solution to the model is not realistic. With zero ordering costs the firm is shown to never place an order. (Assuming the minimum order size is one, Tiger Corporation would place 2.3 orders per minute.) When carrying costs are zero the firm would order only when inventory is zero and order as much as possible (infinity).

P13-6. LG 3: EOQ, reorder point, and safety stock

Intermediate

a. $EOQ = \sqrt{\dfrac{(2 \times S \times O)}{C}} = \sqrt{\dfrac{(2 \times 800 \times \$50)}{2}} = 200$ units

b.   Average level of inventory $= \dfrac{200 \text{ units}}{2} + \dfrac{800 \text{ units} \times 10 \text{ days}}{365}$

    $= 121.92$ units

c.   Reorder point $= \dfrac{(800 \text{ units} \times 10 \text{ days})}{365 \text{ days}} + \dfrac{(800 \text{ units} \times 5 \text{ days})}{365 \text{ days}}$

    $= 32.88$ units

d.
Change	**Do Not Change**
(2) carrying costs	(1) ordering costs
(3) total inventory cost	(5) EOQ
(4) reorder point	

P13-7. LG 3: Marginal costs

Challenge

Jimmy Johnson
Marginal Cost Analysis
Purchase of V-8 SUV vs. V-6 SUV

	V-6	V-8
MSRP	$30,260	44,320
Engine (liters)	3.7	5.7
Ownership period in years	5	5
Depreciation over 5 years	17,337	25,531
Financing over 5 years.*	5,171	7,573
Insurance over 5 years	7,546	8,081
Taxes and fees over 5 years	2,179	2,937
Maintenance/repairs over 5 years	5,600	5,600
[a] Total "true" cost for each vehicle over the 5-year period	$37,833	$49,722
Average miles per gallon	19	14
Miles driven per year	15,000	15,000
Cost per gallon of gasoline over the 5-year ownership period	3.15	3.15
[b] Total fuel cost for each vehicle over 5-year ownership period	$12,434	$16,875

If Jimmy decides to buy the V-8, he will have to pay $11,889 more than the cost of the smaller V-6 SUV over the 5 year period. Additionally, Jimmy will spend $4,441 more on fuel for the V-8 SUV. The total marginal costs over the 5-year period, associated with purchasing the V-8 over the V-6, are $16,330.	Marginal cost	$11,889
	[c] Marginal fuel cost	4,441
	[d] Total marginal costs	$16,330

*Accumulated Finance Charges	V-6	V-8
Cost of SUV	$30,260.00	$ 44,320
Assumed annual discount rate	5.50%	5.5%
Term of the loan (years)	5	5
PV inters factor of the annuity (PVIFA)	4.2703	4.2703
Annual payback to be made over five years	7,086.2	$10,378.7
Total interest and principals paid back over 5 years	35,431	$ 51,893
Less: Cost of the SUV	30,280	$ 44,320
Accumulated finance charges over the entire 5 year period	$ 5,171	$ 7,573

e. The true marginal cost of $16,330 is greater than the simple difference between the costs of the two vehicles.

P13-8. LG 4: Accounts receivable changes without bad debts

Intermediate

a.   Current units $= \$360,000,000 \div \$60 = 6,000,000$ units
     Increase $= 6,000,000 \times 20\% = 1,200,000$ new units
     Additional profit contribution $= (\$60 - \$55) \times 1,200,000$ units
                                       $= \$6,000,000$

b.   Average investment in accounts receivable $= \dfrac{\text{total variable cost of annual sales}}{\text{turnover of A/R}}$

     Turnover, present plan $= \dfrac{365}{60} = 6.08$

     Turnover, proposed plan $= \dfrac{365}{(60 \times 1.2)} = \dfrac{365}{72} = 5.07$

     Marginal investment in AR:
     Average investment, proposed plan:
     $\dfrac{(7,200,000 \text{ units*} \times \$55)}{5.07}$ $= \$78,106,509$

     Average investment, present plan:
     $\dfrac{(6,000,000 \text{ units} \times \$55)}{6.08}$ $= \underline{\;\;54,276,316}$

     Marginal investment in AR $= \underline{\underline{\$23,830,193}}$

     *Total units, proposed plan = existing sales of 6,000,000 units + 1,200,000 additional units.

c.   Cost of marginal investment in accounts receivable:

Marginal investment in AR	$23,830,193
Required return	$\times\,0.14$
Cost of marginal investment in AR	$\underline{\underline{\$\;\;3,336,227}}$

d.   The additional profitability of $6,000,000 exceeds the additional costs of $3,336,227.
     However, one would need estimates of bad debt expenses, clerical costs, and some
     information about the uncertainty of the sales forecast prior to adoption of the policy.

P13-9. LG 4: Accounts receivable changes and bad debts

Challenge

a.   Bad debts

Proposed plan (60,000 × $20 × 0.04)	$48,000
Present plan (50,000 × $20 × 0.02)	$\underline{\;\;20,000}$

b.   Cost of marginal bad debts $\underline{\underline{\$28,000}}$

c.   No, since the cost of marginal bad debts exceeds the savings of $3,500.

d.   Additional profit contribution from sales:

10,000 additional units × ($20 − $15)	$50,000
Cost of marginal bad debts (from Part (b))	(28,000)
Savings	$\underline{\;\;3,500}$
Net benefit from implementing proposed plan	$\underline{\underline{\$25,500}}$

This policy change is recommended because the increase in sales and the savings of $3,500 exceed the increased bad debt expense.

e.   When the additional sales are ignored, the proposed policy is rejected. However, when all the benefits are included, the profitability from new sales and savings outweigh the increased cost of bad debts. Therefore, the policy is recommended.

P13-10. LG 4: Relaxation of credit standards

Challenge

Additional profit contribution from sales = 1,000 additional units × ($40 − $31) $9,000
Cost of marginal investment in AR:

$$\text{Average investment, proposed plan} = \frac{11,000 \text{ units} \times \$31}{\frac{365}{60}}$$ $56,055

$$\text{Average investment, present plan} = \frac{10,000 \text{ units} \times \$31}{\frac{365}{45}}$$ 38,219

Marginal investment in AR $17,836
Required return on investment   × 0.25
  Cost of marginal investment in AR   (4,459)
Cost of marginal bad debts:
  Bad debts, proposed plan (0.03 × $40 × 11,000 units) $13,200
  Bad debts, present plan (0.01 × $40 × 10,000 units)   4,000
Cost of marginal bad debts   (9,200)
  Net loss from implementing proposed plan   ($4,659)

The credit standards should not be relaxed since the proposed plan results in a loss.

P13-11. LG 5: Initiating a cash discount

Challenge

Additional profit contribution from sales = 2,000 additional units × ($45 − $36) $18,000
Cost of marginal investment in AR:

$$\text{Average investment, proposed plan} = \frac{42,000 \text{ units} \times \$36}{\frac{365}{30}}$$ $124,274

$$\text{Average investment, present plan} = \frac{40,000 \text{ units} \times \$36}{\frac{365}{60}}$$ 236,713

Reduced investment in AR $112,439
Required return on investment   × 0.25
  Cost of marginal investment in AR   28,110
  Cost of cash discount = (0.02 × 0.70 × $45 × 42,000 units)   (26,460)
Net profit from implementing proposed plan $ 19,650
Since the net effect would be a gain of $19,650, the project should be accepted.

P13-12. LG 5: Shortening the credit period

Challenge

Reduction in profit contribution from sales = 2,000 units × ($56 − $45)   ($22,000)
Cost of marginal investment in AR:

$$\text{Average investment, proposed plan} = \frac{10{,}000 \text{ units} \times \$45}{\dfrac{365}{36}} \qquad \$44{,}384$$

$$\text{Average investment, present plan} = \frac{12{,}000 \text{ units} \times \$45}{\dfrac{365}{45}} \qquad \underline{66{,}576}$$

Marginal investment in AR $22,192
Required return on investment   × 0.25
   Benefit from reduced
   Marginal investment in AR $ 5,548
Cost of marginal bad debts:
   Bad debts, proposed plan (0.01 × $56 × 10,000 units) $ 5,600
   Bad debts, present plan (0.015 × $56 × 12,000 units)   10,080
   Reduction in bad debts   4,480
Net loss from implementing proposed plan   ($11,972)
This proposal is not recommended.

P13-13. LG 5: Lengthening the credit period

Challenge

Preliminary calculations:

$$\text{Contribution margin} = \frac{(\$450{,}000 - \$345{,}000)}{\$450{,}000} = 0.23333$$

$$\begin{aligned}
\text{Variable cost percentage} &= 1 - \text{contribution margin}\\
&= 1 - 0.233\\
&= 0.767
\end{aligned}$$

a.   Additional profit contribution from sales:
($510,000 − $450,000) × 0.23333 contribution margin $14,000

b.   Cost of marginal investment in AR:

$$\text{Average investment, proposed plan} = \frac{\$510{,}000 \times 0.767}{\dfrac{365}{60}} \qquad \$64{,}302$$

$$\text{Average investment, present plan} = \frac{\$450{,}000 \times 0.767}{\dfrac{365}{30}} \qquad \underline{28{,}368}$$

Marginal investment in AR   ($35,934)
Required return on investment   × 0.20
Cost of marginal investment in AR   ($ 7,187)

c. Cost of marginal bad debts:

Bad debts, proposed plan (0.015 × $510,000)	$7,650	
Bad debts, present plan (0.01 × $450,000)	4,500	
Cost of marginal bad debts		(3,150)

d. Net benefit from implementing proposed plan $3,663

The net benefit of lengthening the credit period is a surplus of $3,663; therefore the proposal is recommended.

P13-14. LG 6: Float

Basic

a. Collection float   = 2.5 + 1.5 + 3.0 = 7 days

b. Opportunity cost = $65,000 × 3.0 × 0.11 = $21,450

The firm should accept the proposal because the savings ($21,450) exceed the costs ($16,500).

P13-15. LG 6: Lockbox system

Basic

a. Cash made available = $3,240,000 ÷ 365

= ($8,877/day) × 3 days = $26,631

b. Net benefit   = $26,631 × 0.15   = $3,995

The $9,000 cost exceeds $3,995 benefit; therefore, the firm should not accept the lockbox system.

P13-16. LG 6: Zero-balance account

Basic

Current average balance in disbursement account	$420,000
Opportunity cost (12%)	× 0.12
Current opportunity cost	$ 50,400
Zero-balance account	
Compensating balance	$300,000
Opportunity cost (12%)	× 0.12
Opportunity cost	$ 36,000
+ Monthly fee ($1,000 × 12)	12,000
Total cost	$ 48,000

The opportunity cost of the zero-balance account proposal ($48,000) is less than the current account opportunity cost ($50,400). Therefore, accept the zero-balance proposal.

P13-17. LG 6: Management of cash balance

a. Alexis should transfer her current savings account balances into a liquid marketable security

Current savings balance	$15,000

b.

Yield on marketable security @ 4.75%	$712.50
Interest on savings account balance @ 2.0%	($300.00)
Increase in annual interest earnings	$412.50

c. Alexis should transfer monthly the $500 from her checking account to the liquid marketable security

Monthly transfer	$500.00
Yield on marketable security @ 4.75%	$ 23.75
Interest on savings balance @ 2.00%	($ 10.00)
Increase in annual earnings on monthly transfers	$ 13.75

d. Rather than paying bills so quickly, Alexis should pay bills on their due date

Average monthly bills	$ 2,000
Total annual bills ($2,000 × 12)	$24,000
Daily purchases (24,000 ÷365 days)	$ 65.75
Additional funds invested ($65.75 × 9)	$591.78
Marketable security yield	4.75%
Annual savings from slowing down payments ($591.78 × 0.0475)	$ 28.11

Summary	
Increase from investing current balances	$412.50
Increase from investing monthly surpluses	13.75
Savings from slowing down payments	28.11
Increase in Alexis' annual earnings	$454.36

P13-18. Ethics problem

Intermediate

Management should point out that what it is doing shows integrity, as it is honest, just, and fair. The ethics reasoning portrayed in the ethics focus box could be used.

■ Case

Assessing Roche Publishing Company's Cash Management Efficiency

Chapter 13's case involves the evaluation of a furniture manufacturer's cash management by its treasurer. The student must calculate the OC, CCC, and resources needed and compare them to industry standards. The cost of the firm's current operating inefficiencies is determined and the case also looks at the decision to relax its credit standards. Finally, all the variables are consolidated and a recommendation made.

1. **Roche Publishing:**

   OC   = AAI
                           + ACP
                           = 120 days + 60 days
                           = 180 days

   CCC   = OC − APP
                           = 180 days − 25 days
                           = 155 days

   Resources needed $= \dfrac{\text{Total annual outlays}}{365 \text{ days}} \times \text{CCC}$

                           $= \dfrac{\$12,000,000}{365} \times 155 = \$5,095,890$

2. **Industry**

   Industry OC   = 85 days + 42 days
                           = 127 days

   Industry CCC   = 127 days − 40 days
                           = 87 days

   Industry resources needed $= \dfrac{\$12,000,000}{365} \times 87 = \$2,860,274$

3. Roche Publishing resources needed $5,095,890
   Less: Industry resources needed   2,860,274
                                                 $2,235,616

   Cost of inefficiency: $2,235,616 × 0.12 = $268,274

4. To determine the net profit or loss from the change in credit standards we must evaluate the three factors that are impacted:

   a.   Changes in sales volume
   b.   Investment in accounts receivable
   c.   Bad-debt expenses

   Changes in sales volume:

   Total contribution margin of annual sales:

   Under present plan = ($13,750,000 × 0.20)   = $2,750,000
   Under proposed plan = ($15,000,000 × 0.20) = $3,000,000
   Increase in contribution margin = $250,000 ($3,000,000 − $2,750,000).
   Investment in accounts receivable:

   Turnover of accounts receivable:

   $\text{Under present plan} = \dfrac{365}{\text{ACP}} = \dfrac{365}{60} = 6.08$

   $\text{Under proposed plan} = \dfrac{365}{\text{ACP}} = \dfrac{365}{42} = 8.69$

Average investment in accounts receivable:

$$\text{Under present plan} \; = \; \frac{(\$13,750,000 \times 0.80)}{6.08} = \frac{\$11,000,000}{6.08} = \$1,809,211$$

$$\text{Under proposed plan} \; = \; \frac{(\$15,000,000 \times 0.80)}{8.69} = \frac{\$12,000,000}{8.69} = \$1,380,898$$

Cost of marginal investment in accounts receivable:

Average investment under proposed plan	$1,380,898
− Average investment under present plan	1,809,211
Marginal investment in accounts receivable	−428,313
× Required return on investment	0.12
Cost of marginal investment in AR	−$51,398

Cost of marginal bad debts:

Bad debt would remain unchanged as specified in the case.

Net profits from implementation of new plan:

Additional profit contribution from sales:		
($1,250,000 × 0.20)		250,000
Cost of marginal investment in AR:		
Average investment under proposed plan	1,380,898	
Average investment under present plan	1,809,211	
Marginal investment in AR	−428,313	
Cost of marginal investment in AR		
(0.12 × 428,313)		−51,398
		$198,602

5. Total cost incurred

Cost of 40-day payment period	$ 53,000	
Cost of 85-day inventory period	150,000	
Incremental cost of accounts receivable	51,398	$254,398
Savings from plan implementation		
Payment period extension[a]	$ 59,178	
Inventory period reduction[b]	138,082	
Additional profit contribution on sales[c]	250,000	447,260
Annual savings		$192,862

[a](40 − 25) × $12,000,000/365) 0.12 = $59,178

[b](120-85) × $12,000,000/365) 0.12 = $138,082

[c]$1,250,000 × 0.20   = $250,000

6. Roche Publishing should incur the cost to correct its cash management inefficiencies and should also soften the credit standards to increase net, before-tax cash flow by $192,862.

■ Spreadsheet Exercise

The answer to Chapter 13's Eboy Corporation accounts receivable management spreadsheet problem is located in the Instructor's Resource Center at *www.prenhall.com/irc*.

■ A Note on Web Exercises

A series of chapter-relevant assignments requiring Internet access can be found at the book's Companion Website at *http://www.prenhall.com/gitman*. In the course of completing the assignments students access information about a firm, its industry, and the macro economy, and conduct analyses consistent with those found in each respective chapter.