

Cash Cycle / Cash Conversion Period

Problem 1:

Income Statement Data		Balance Sheet Data		
	Year Ending, First Quarter 1999		End of First Quarter 1998	End of First Quarter 1999
Sales	\$3,968	Inventory	\$470	\$468
Cost of goods sold	3,518	Accounts receivable	471	481
		Accounts payable	304	303

- a) Suppose that each year the company spends total cash for overall operations at \$5,475 billion. How much minimum cash does the company need to have?

Sol:

Inv. Days = 49 days
 A/R Days = 45 days
 A/P Days = 32 days
 Cash Cycle = 62 days
 Daily Cash = 15.00 billion
Min. Cash Required = 930.00 billion

- b) Suppose United States manufacturers are able to reduce inventory levels to a year average value of \$250 billion and average accounts receivable to \$300 billion. By how many days will this reduce the cash conversion cycle?

Sol: Cash conversion cycle reduces by $(62-22) = 40$ days.

Inv. Days = 26 days
 A/R Days = 28 days
 A/P Days = 32 days
 Cash Cycle = 22 days
 Daily Cash = 15.00 billion
 Min. Cash Required = 330.00 billion

- c) Suppose that with the same level of inventories, accounts receivable, and accounts payable, United States manufacturers can increase production and sales by 10 percent. What will be the effect on the cash conversion cycle?

Sol: Cash cycle would be lowered by approximately $= [62/1.10] = 57$ days.

Problem 2:

MAX Company, a producer of paper dinnerware, has annual sales \$10 million and a cost of goods sold of 75% of sales. MAX has an average age of inventory of 60 days, an average collection period 40 days, and an average payment period of 35 days.

Find - Cash that MAX needs to use in cash conversion cycle

Sol: From that we have:

$$\begin{array}{rcl} \text{Sale} & = & 10 \\ \text{COGS} & = & 7.5 \end{array}$$

$$\begin{array}{rcl} (1) \text{ Cash investment in inventory} & & 1.23288 \\ (2) \text{ Cash investment in A/R} & & 1.09589 \\ (3) \text{ Cash investment in A/P} & & 0.71918 \end{array}$$

$$\text{Cash required to support cash conversion cycle} = (1) + (2) - (3) = 1.60959 \text{ Million}$$

- If MAX could reduce average collection period by 5 days

Sol: From this case, it turns out that:

$$\begin{array}{rcl} \text{Sale} & = & 10 \\ \text{COGS} & = & 7.5 \end{array}$$

$$\begin{array}{rcl} (1) \text{ Cash investment in inventory} & & 1.23288 \\ (2) \text{ Cash investment in A/R} & & 0.95890 \\ (3) \text{ Cash investment in A/P} & & 0.71918 \end{array}$$

$$\text{Cash required to support cash conversion cycle} = (1) + (2) - (3) = 1.47260 \text{ Million}$$

Problem 3:

The Zocco Corporation has an inventory conversion period of 60 days, an average collection period of 38 days, and a payables deferral period of 30 days. Assume that cost of goods sold is 75% of sales.

a) What is the length of the firm's cash conversion cycle?

$$\begin{aligned} \text{Sol: } \text{Cash conversion cycle} &= \text{Inv. Days} + \text{A/R days} - \text{A/P days} \\ &= 60 + 38 - 30 \text{ days} = 68 \text{ days} \end{aligned}$$

b) If Zocco's annual sales are \$3,421,875 and all sales are on credit, what is the firm's investment in accounts receivable?

$$\begin{aligned} \text{Sol: } \text{The firm's investment in A/R} &= (\text{A/R days}) \times (\text{Sales} / 365) \\ &= (38 \text{ days}) \times (\$3,421,875 / 365) \\ &= \$356,250 \end{aligned}$$

Sol: Inventory turnover = $365 / \text{Inventory days}$
= $365 / 60$
= 6.0833 times

Garrett Industries turns over its inventory 6 times each year; it has an average collection period of 45 days and an average payment period of 30 days. The firm's annual operating-cycle investment is \$3 million. Assume a 360-day year.

a) Calculate firm's operating cycle, cash conversion cycle, its daily cash operating expenditure, and the amount of resources needed to support its cash conversion cycle.

Sol:

Operating cycle	= 60 + 45 days = 105 days
Cash conversion cycle	= 60 + 45 – 30 days = 75 days
Daily cash	= 3 million / 105 days = 28,571.4286
Minimum cash required	= 28,571.4286 x 75 days = 2,142,857.1429

b) Find the firm's cash conversion cycle and resource investment requirement if it makes the following changes simultaneously.

(2) Shortens the average age of inventory by 5 days.

(3) Speeds the collection of accounts receivable by an average 10 days.

(4) Extends the average payment period by 10 days.

Sol:

Cash conversion cycle = 55 + 35 – 40 days = 50 days

Minimum cash required = 28,571.4286 x 50 days = 1,666,666.6667

c) Discuss possible management that might be able to reduce the cash conversion cycle.

Sol:

From cash cycle = Inventory days + A/R days – A/P days, the possible ways to reduce the cash cycle is to: (1) Shorten inventory days, (2) Speed up collection days or A/R days, and (3) Delay payment period or A/P days.

Problem 5:

Costs of Alternative Sources of Short-term Financing. On March 1, 20X1, National Corporation purchased \$100,000 worth of inventory on credit with terms of 1/20, net/60. In the past, National has always followed the policy of making payment 1 month (30 days) after the goods are purchased.

A new member of National's staff has indicated that the company she had previously worked for never passed up its cash discounts, and she wonders if that is not a sound policy. She has also pointed out to National that if it does not take advantage of the cash discount, it should wait the entire 60-day period to pay the full bill rather than paying within 30 days.

If National were to take advantage of the discount and pay the bill on March 20 rather than on March 30, the firm would have to borrow the necessary funds for the 10 extra days. National's borrowing terms with a local bank are estimated to be at **8.5** percent (annual rate), with a 15 percent compensating balance for the term of the loan. Most members of National's staff feel that it makes little sense to take out an **8.5** percent loan with a compensating balance of 15 percent in order to save 1 percent on its \$100,000 by paying the account 10 days earlier than it had planned.

Sol:

- (a) The cost of not paying by the twentieth day is \$1,000. The company pays on the thirtieth day; thus, it is paying \$1,000 to borrow \$99,000 for 10 days. The annual interest cost is:

$$\frac{\$1,000}{\$99,000} \times \frac{360}{10} = 36.36\%$$

It would be necessary to borrow \$116,471 from the bank to satisfy the 15 percent compensating balance and pay \$99,000 to the suppliers ($\$99,000 \div 0.85$). The interest charges for the 10-day period would be $\$116,471 \times 0.085 \times 10/360 = \275.00 . The interest rate on the \$99,000 would be:

$$\frac{\$275}{\$99,000} \times \frac{360}{10} = 10.00\%$$

It is to National's advantage to borrow from the bank in order to earn the discount.

- (b) Waiting 40 days past the discount date to pay the bill changes the annual interest cost of the discount to 9.09 percent.

$$\frac{\$1,000}{\$99,000} \times \frac{360}{40} = 9.09\%$$

The interest charges at the bank would be $\$116,471 \times 0.085 \times 40/360 = \$1,100$.

The interest rate on the \$99,000 would be:

$$\frac{\$1,100}{\$99,000} \times \frac{360}{40} = 10.00\%$$

It is not in National's best interest to borrow from the bank in this case.

- (c) The reason the borrowing alternative is no longer desirable in (b) is the change in the number of days that the borrowing covers. The \$1,000 discount is a fixed charge for the 40-day period; it is unchanged by the number of days that lapse between the twentieth day and the day of payment. However, the interest charges vary with the number of days. Changing the borrowing period from 10 to 40 days increases the interest charges from \$275 to \$1,100.

Cost of Bank Loan

Problem 6:

Suppose that Dynamic Mattress needs to raise \$20 million for 6 months. Bank A quotes a simple interest rate of 7 percent but requires the firm to maintain an interest-free compensating balance of 20 percent. Bank B quotes a simple interest rate of 8 percent but does not require any compensating balances. Bank C quotes a discount interest rate of 7.5 percent and also does not require compensating balances. What is the effective (or compound) annual interest rate on each of these loans?

Sol:

Bank A: The interest paid on the \$20 million loan over the 6-month period will be \$20 million $\times .07/2 = \$0.7$ million. With a 20 percent compensating balance, \$16 million is available to the firm. The effective annual interest rate is

$$\begin{aligned} \text{Effective annual rate on a} \\ \text{loan with compensating balances} &= \left(1 + \frac{\text{actual interest paid}}{\text{borrowed funds available}} \right)^m - 1 \\ &= \left(1 + \frac{\$0.7 \text{ million}}{\$16 \text{ million}} \right)^2 - 1 = .0894, \text{ or } 8.94\% \end{aligned}$$

Bank B: The compound annual interest rate on the simple loan is

$$\begin{aligned} \text{Effective annual rate} &= \left(1 + \frac{\text{quoted interest rate}}{m} \right)^m - 1 \\ &= \left(1 + \frac{.08}{2} \right)^2 - 1 = 1.04^2 - 1 = .0816, \text{ or } 8.16\% \end{aligned}$$

Bank C: The compound annual interest rate is

$$\begin{aligned}\text{Effective annual rate on a discount loan} &= \left(\frac{1}{1 - \frac{\text{annual interest rate}}{m}} \right)^m - 1 \\ &= \left(\frac{1}{1 - \frac{.075}{2}} \right)^2 - 1 = \left(\frac{1}{.9625} \right)^2 - 1 = .0794, \text{ or } 7.94\%\end{aligned}$$

Problem 7:

Jackie Corp. turns over its inventory 9 times during the year, and its days sales outstanding was 36 days. Under regular payment policy, the company payables deferral period is 40 days. Jackie's daily operating cash is around \$64,000. Assume a 360-day year.

- a) Calculate firm's cash conversion period and the amount of resources or minimum cash needed to support its cash conversion cycle.

Sol: Cash conversion period = Inv. Days + A/R days – A/P days
 = (360/9) + 36 – 40 days
 = **36 days**
 Cash require = 36 days x (64,000)
 = **\$2,304,000**

- b) Jackie normally buys inventory on account with credit term of 2/15, net 40. If the company decides to take cash discount, what effect will this have on the cash cycle and the minimum cash required?

Sol: Cash conversion period = 40 + 36 – 15
 = 61 days
 Cash require = 61 days x (64,000)
 = **3,904,000**

- c) If Jackie decides to take 2 percent cash discount, it has to make short-term bank loan at 15 percent cost and 25 percent compensating balance. How much does it need to pay to suppliers and apply for total loan with commercial bank?

Sol: Taking 2 percent discount requires the company to pay 98 percent of its total purchasing value. Regarding short-term loan, the company should finance additional fund to support an increase in minimum cash required (=1,600,000) used to support the cash conversion period. Thus, total loan must be $(1,600,000/(1-25\%)) = 2,133,333.33$.

- d) Will it be better for Jackie to take 2 percent discount when short-term bank loan costs 15%? Please calculate and compare the opportunity cost rate of foregoing cash discount and the actual interest rate to make decision.

$$\begin{aligned}\text{Sol: Effective loan cost} &= \left(1 + \frac{15\%}{360 / 25}\right)^{\frac{360}{25}} - 1 = \mathbf{16.09\%} \\ \text{Opportunity cost} &= \frac{2}{98} \times \frac{360}{(40 - 15)} = \mathbf{29.39\%}\end{aligned}$$