Chapter 14
Working Capital and Current Assets Management

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Course Title: Managerial Finance

Working Capital Fundamentals

Short-term financial management:
Management of current assets and current liabilities.

Current assets:
cash, marketable securities, accounts receivable and inventory.

Current liabilities:
(notes payable, accruals, and accounts payable)

Working capital:
Current assets which represent the portion of investment that circulates from one form to another in the ordinary conduct of business.

Net Working Capital

Net working Capital:

The difference between the firm's current assets and its current liabilities, this can be positive or negative.

If current assets > current liabilities ——→ positive net working capital

If current Liabilities > current Assets ——→ negative net working capital

The greater the margin by which a firm's current assets cover its liabilities, the better able it will be to pay its bills as they come due.

The goal of short-term financial management is:

To manage both current assets and current liabilities to achieve a balance between profitability and risk that contributes positively to the firm's value.

Trade-off between Profitability and Risk.

Profitability

The relationship between revenues and costs generated by using the firm's assets—both current and fixed—in productive activities.

Risk (of insolvency)

The probability that a firm will be unable to pay its bills as they come due.

Technically Insolvent

Describes a firm that is unable to pay its bills as they come due.

Effects of changing ratios on profits and risk

Ratio	Change in ratio	Effect on profit	Effect on risk
$\frac{\text{Current assets}}{\text{Total assets}}$	Increase	Decrease	Decrease
	Decrease	Increase	Increase
$\frac{\text{Current liabilities}}{\text{Total assets}}$	Increase	Increase	Increase
	Decrease	Decrease	Decrease

Cash Conversion Cycle

Cash Conversion Cycle (CCC):

- It is the amount of time a firm's resources are tied up, calculated by subtracting the average payment period from the operating cycle.
- It is the length of time required for a company to convert cash invested in its operations to cash received as a result of its operations.

The cash conversion cycle has three main components:

1. ***Average Age of Inventory AAI.***
2. ***Average Collection Period ACP.***
3. ***Average Payment Period APP.***

Operating Cycle (OC):
It is the time measured by number of days from the beginning of the production process to the collection of cash from the sale of the finished product.

$$CCC = AAI + ACP - APP$$

$$OC = AAI + ACP$$

$$CCC = OC - APP$$

$CCC = AAI + ACP - APP$

Average Age of Inventory (AAI):

It is the average number of days it takes for a firm to sell a product it is currently holding as inventory to consumers.

$$\text{Inventory Turnover} = \frac{\text{Cost of Goods Sold}}{\text{Average Inventory}}$$

$$\text{Average Age of Inventory} = \frac{\text{365 days}}{\text{Inventory turnover}}$$

Average Collection Period (ACP):

It is the average amount of time needed to collect accounts receivable, measured in days.

$$\text{Average Sales Per Day} = \frac{\text{Annual Sales}}{\text{365}}$$

$$\text{Average Collection Period} = \frac{\text{Accounts Receivable}}{\text{Average Sales Per Day}}$$

$CCC = AAI + ACP - APP$

Average Payment Period (APP):

It is the average amount of time needed to pay accounts payable, measured in days.

$$\text{Average Purchases Per Day} = \frac{\text{Annual Purchases}}{365}$$

$$\text{Average Payment Period} = \frac{\text{Accounts Payable}}{\text{Average Purchases Per day}}$$

Example 1 : Calculate the Operating Cycle (OC) and calculate Cash Conversion Cycle (CCC) using the following data:

- Annual credit sales = $360,000
- Cost of goods sold = $100,000
- Annual credit purchases = $252,000
- Accounts Receivable = $14,000
- Average Inventory = $10,000
- Accounts Payable = $7,000
- Assume the year has 360 days.

Solving the example:

1) Calculating AAI:

$$\text{Inventory Turnover} = \frac{\text{Cost of Goods Sold}}{\text{Average Inventory}}$$

$$\text{Inventory Turnover} = \frac{\$\ 100{,}000}{\$\ 10{,}000} = 10 \text{ times}$$

$$\text{Average Age of Inventory} = \frac{360 \text{ days}}{\text{Inventory turnover}}$$

$$\text{Average Age of Inventory} = \frac{360 \text{ days}}{10 \text{ times}} = \boxed{36 \text{ days} = \text{AAI}}$$

2) Calculating ACP:

$$\text{Average Sales Per Day} = \frac{\text{Annual Sales}}{360}$$

$$\text{Average Sales Per Day} = \frac{\$\ 360{,}000}{360} = \$\ 1{,}000$$

$$\text{Average Collection Period} = \frac{\text{Accounts Receivable}}{\text{Average Sales Per Day}}$$

$$\text{Average Collection Period} = \frac{\$\ 14{,}000}{\$\ 1{,}000} = \boxed{14 \text{ days} = \text{ACP}}$$

3) Calculating APP:

$$\text{Average Purchases Per Day} = \frac{\text{Annual Credit Purchases}}{360}$$

$$\text{Average Purchases Per Day} = \frac{\$\ 252{,}000}{360} = \$\ 700$$

$$\text{Average Payment Period} = \frac{\text{Accounts Payable}}{\text{Average Purchases Per day}}$$

$$\text{Average Payment Period} = \frac{\$\ 7{,}000}{\$\ 700} = \boxed{10 \text{ days} = \text{APP}}$$

4) Calculating OC:

$$OC = AAI + ACP$$

$$OC = 36\ days + 14\ days$$

$$OC = 50\ days$$

5) Calculating CCC:

$$CCC = AAI + ACP - APP$$

$$CCC = OC - APP$$

$$CCC = 50\ days - 10\ days$$

$$CCC = 40\ days$$

Calculating $ resources invested or tied up in the cash conversion cycle

Inventory	=	**Cost of goods sold**	×	$\frac{\text{AAI}}{365}$	=	**$ Inventory**
+ **Accounts receivable**	=	**Sales**	×	$\frac{\text{ACP}}{365}$	=	+ **$ A/R**
- **Accounts payable**	=	**Purchases**	×	$\frac{\text{APP}}{365}$	=	- **$ A/P**
Total Resources Invested in the cash conversion cycle					=	**$$$**

To reduce the amount of resources tied up in the CCC:

1. **Reduce AAI.**
2. **Reduce ACP.**
3. **Increase APP.**

Reducing the Amount of Resources tied up in the CCC

1) **Reducing AAI:** reduces resources invested in inventory.

$$\textit{Reduced inventory resources} = \textit{cost of goods sold} \times \frac{\textit{days reduced of AAI}}{365}$$

2) **Reducing ACP:** reduces resources invested in accounts receivable.

$$\textit{Reduced A/R resources} = \textit{sales} \times \frac{\textit{days reduced of ACP}}{365}$$

3) **Increasing APP:** increases resources invested in accounts payable.

$$\textit{Increased A/P resources} = \textit{purchases} \times \frac{\textit{days increased of APP}}{365}$$

- Example 2:

Resources Invested in the Cash Conversion Cycle

MAX Company has annual sales of $10 million, cost of goods sold of 75% of sales, and purchases that are 65% of cost of goods sold. MAX has an average age of inventory (AAI) of 60 days, an average collection period (ACP) of 40 days, and an average payment period (APP) of 35 days. (Assume the year has 365 days)

1. Calculate the CCC.
2. Calculate cash resources invested or tied up to the cash conversion cycle.
3. How will a5-day reduction in ACP affect the resources invested in the CCC?

1) Calculating CCC:

$$CCC = AAI + ACP - APP$$

$$CCC = 60 + 40 - 35$$

$$CCC = 65 \text{ days}$$

2) Calculating resources invested or tied up in the cash conversion cycle:

Inventory	=	**Cost of goods sold** ×	$\frac{\text{AAI}}{365}$	= **$ Inventory**
+ **Accounts receivable**	=	**Sales** ×	$\frac{\text{ACP}}{365}$	= + **$ A/R**
- **Accounts payable**	=	**Purchases** ×	$\frac{\text{APP}}{365}$	= - **$ A/P**
Total Resources Invested in the cash conversion cycle				= **$$$**

Inventory =	**(10,000,000 × .75)** × $\frac{60}{365}$	= **$ 1,232,877**
+ **Accounts receivable** =	**10,000,000** × $\frac{40}{365}$	= + **$ 1,095,890**
- **Accounts payable** =	**(10,000,000 × .75 × .65)** × $\frac{35}{365}$	= - **$ 467,466**
Total Resources Invested in the cash conversion cycle		= **$ 1,861,301**

3) Effects of a 5 day reduction in ACP on the resources invested in the CCC :

- This will reduce resources invested in accounts receivable and will reduce resources invested in the CCC.

$$\textit{Reduced A/R resources} = \textit{sales} \times \frac{\textit{days reduced of ACP}}{365}$$

$$\textit{Reduced A/R resources} = 10{,}000{,}000 \times \frac{5 \text{ days}}{365}$$

$$\textit{Reduced A/R resources} = \$\ 136{,}986$$

New amount of resources in CCC after 5-day reduction in ACP is:

$$= \textit{Total resources invested in CCC} - \textit{resources reduced from A/R}$$

$$= \$\ 1{,}861{,}301 - \$\ 136{,}986 = \$\ 1{,}724{,}315$$

Strategies for Managing the CCC

1. Turn over inventory as quickly as possible without stock outs that result in lost sales.
2. Collect accounts receivable as quickly as possible without losing sales from high-pressure collection techniques.
3. Manage, mail, processing, and clearing time to reduce them when collecting from customers and to increase them when paying to suppliers.
4. Pay accounts payable as slowly as possible without damaging the firm's credit rating.

Managing the first component of the CCC
Inventory Management:

- The objective of managing inventory is to Turn over inventory as quickly as possible without stock outs that result in lost sales.
- Classification of inventories:
  1. **Raw materials**: items purchased for use in the manufacturing of a finished product.
  2. **Work-in-progress**: all items that are currently in production but are not finished.
  3. **Finished goods**: all items that have been produced and finished but not yet sold.

Differing Views About Inventory

- The different departments within the firm (finance, production, marketing, etc.) often have different views about what is an "appropriate" level of inventory.

❑ **Financial managers:**

- Do not have direct control over inventory, instead they provide input to the inventory management process.
- They would like to keep inventory levels low to ensure that funds are not being unwisely invested in excess resources.

❑ **Marketing managers:**

- They would like to keep finished goods inventory levels high to ensure orders could be quickly filled, eliminating the need for backorders due to stock outs.

❑ **Manufacturing managers:**

- They would like to keep raw materials levels high to avoid production delays and to make larger, more economical production runs that will result in finished goods of acceptable quality at a lower unit cost.

❑ **Purchasing managers :**

- They are concerned with raw material inventory only, and would like to purchase large quantities of raw material than actually needed to get quantity discounts with favorable prices.

Techniques for Managing Inventory

1) The ABC Inventory System:

- It is an inventory management technique that divides inventory into three groups - A, B, and C, in descending order of importance and level of monitoring, on the basis of the dollar amount invested in each.
- A typical system would contain:
  1. Group A would consist of 20% of the items worth 80% of the total dollar value.
  2. Group B would consist of the next largest investment.
  3. Group C would consist of the largest amount but lowest price items.
- Control of the A items would be intensive because of the high dollar investment involved. A group items are tracked on a perpetual inventory system that allows daily verification of each item's inventory level.
- B group items are frequently controlled through periodic, perhaps weekly, checking of their levels.
- Control of the C items would be low because of the low dollar investment involved. C group items are monitored with unsophisticated techniques, such as the two-bin method.

2) The two-bin inventory method:

- It is an unsophisticated inventory monitoring technique that is typically applied to C group items and involves reordering inventory when one of two bins is empty.

- With the **two-bin method, the item is stored in two bins. As an item** is needed, inventory is removed from the first bin. When that bin is empty, an order is placed to refill the first bin while inventory is drawn from the second bin. The second bin is used until empty, and so on.

- The large dollar investment in A and B group items suggests the need for a better method of inventory management than the ABC system. The EOQ model, discussed next, is an appropriate model for the management of A and B group items.

Economic Order Quantity (EOQ) Model

Economic order quantity (EOQ) model

Inventory management technique for determining an item's optimal order size, which is the size that minimizes the total of its order costs and carrying costs.

Order costs

The fixed clerical costs of placing and receiving an inventory order.

Carrying costs

The variable costs per unit of holding an item in inventory for a specific period of time.

Total cost of inventory

The sum of order costs and carrying costs of inventory.

$$EOQ = \sqrt{\frac{(2 \times S \times O)}{C}}$$

EOQ minimizes the total cost of both order costs and carrying costs.

$$Q = EOQ = \sqrt{\frac{(2 \times S \times O)}{C}}$$

To minimizes the total cost of both order costs and carrying costs, we use EOQ to substitute for Q in the provided total cost, order cost and carrying cost equations.

$$Order\ \ Cost = O \times (S \div Q)$$

$$Carrying\ \ Cost = C \times (Q \div 2)$$

$$Total\ \ Cost = Order\ cos\ t + Carrying\ \ Cost$$

$$Total\ \ Cost = [\ O \times (S \div Q)\ ] + [\ C \times (Q \div 2)\ ]$$

$S =$ *usage in units per period*

$O =$ *order cos t per orde r*

$C =$ *carrying cost per u nit per pe riod*

$Q =$ *order qua ntity in u nits*

Carrying costs (Variable costs) include:

- Storage costs
- Insurance costs
- Deterioration costs
- Obsolescence costs
- Opportunity costs

Order costs (Fixed costs) include:

- Cost of writing a purchase order.
- Cost of processing resulting paperwork
- Cost of receiving an order.
- Cost of checking order against invoice.

If the size of the order increase the result will be:

- a decrease in order costs.
- an increase in carrying costs.

Example 3 :

Assume that RLB, Inc., a manufacturer of electronic test equipment, uses 1,600 units of an item annually. Its order cost is $50 per order, and the carrying cost is $1 per unit per year.

1) Calculate EOQ.

2) Calculate minimum total cost.

Solution: 1) Calculating EOQ

$$Q = EOQ = \sqrt{\frac{(2 \times S \times O)}{C}}$$

$$Q = EOQ = \sqrt{\frac{(2 \times 1{,}600 \times \$50)}{\$1}} = 400 \text{ unit} = Q \text{ that minimize total cost}$$

Solution: 2) Calculating minimum total cost:

$$Order\ \ Cost\ = \mathrm{O} \times (\mathrm{S} \div \mathrm{Q})$$

Ordering Costs = $50 x (1600 / 400) = $50 x 4 = $200

$$Carrying\ \ Cost\ = \mathrm{C} \times (\mathrm{Q} \div 2)$$

Carrying Costs = $1 x (400 / 2) = $1 x 200 = $200

$$Total\ \ Cost\ =\ Order\ cos\ \ t\ +\ Carrying\ \ \ Cost$$

Total Costs = $200 + $200 = $400

The Reorder Point and Safty stock:

- Once a company has calculated its EOQ, it must determine **when** it should place its orders.
- **The reorder point:** is the point at which the firm must reorder inventory.
- **Lead Time:** is the time measured by number of days that the firm needs to place and receive an order.
- **The safety stock:** is extra inventory that is held to prevent stock outs of important items.
- If we assume that inventory is used at a constant rate throughout the year (no seasonality), the reorder point can be determined by using the following equation:

Reorder point = (lead time in days x daily usage) + Safety stock

Daily usage = Annual usage / Work or operating days per year

- **Example 4 :**

If a company requires 10 days to place and receive an order, and the annual usage is 1,600 units per year. The company operates 360 days per year. Calculate the reorder point.

Daily usage = Annual usage / operating days per year

Daily usage = 1,600 / 360 = 4.44 units/day

Reorder point = (lead time in days x daily usage) + Safety stock

Reorder point = (10 x 4.44) + 0 = 44.44 or ~ 45 units

Thus, when inventory level reaches 45 units, the company should place an order for 400 units. However, if the company wishes to maintain a safety stock to protect against stock outs, they should order before inventory level reaches 45 units.

- **Example 5 : A company has the following data:**
- Usage in units per year = 10,000 unit.
- Order cost per order = $100
- Carrying cost per unit per year = $2
- Lead time = 5 days.
- Safety stock = 10 units.
- The company operates 250 days per year.

1. Calculate the Economic Order Quantity (EOQ)
2. Calculate the Economic Reorder Point

1) $$Q = EOQ = \sqrt{\frac{(2 \times S \times O)}{C}} = \sqrt{\frac{(2 \times 10{,}000 \times \$100)}{\$2}} = 1{,}000 \text{ unit}$$

2) Daily usage = Annual usage / Work or operating days per year

Daily usage = 10,000 / 250 = 40 unit

Reorder point = (lead time in days x daily usage) + Safety stock

Reorder point = (5 x 40) + 10 = 210 units.

- The firm's goal for inventory is to turn it over as quickly as possible without stock outs.
- Inventory turnover is best calculated by dividing cost of goods sold by average inventory.
- The importance of EOQ model is the following:

1. It determines the optimal order size and minimizes total costs.
2. It determines indirectly, through the assumption of constant usage, the average inventory.
3. Thus the EOQ model determines the firm's optimal inventory turnover rate, given the firm's specific costs of inventory.

Managing the second component of the CCC

Accounts Receivable Management:

- The second component of the cash conversion cycle is the average collection period (ACP).
- **Average collection period:** is the average length of time from a sale on credit until the payment becomes usable funds to the firm.
- The collection period consists of two parts:
  1. The time period from the sale until the customer mails payment: this involves managing the credit available to the firm customers.
  2. The time from when the payment is mailed until the firm collects funds in its bank account: this involves collecting and processing payments.

- The objective for managing accounts receivable is to collect accounts receivable as quickly as possible without losing sales from high-pressure collection techniques.
- Accomplishing this goal includes three topics:
  (1) credit selection and standards.
  (2) credit terms.
  (3) credit monitoring.

(1) credit selection and standards.

- Credit selection process:

1. involves application of techniques for determining which customers should receive credit.
2. involves evaluating the customer's creditworthiness and comparing it to the firm's **credit standards.**

- **Credit Standards:** they are the firm's minimum requirements for extending credit to a customer.

The Five Cs of Credit:

Five C's of credit:

The five key dimensions—character, capacity, capital, collateral, and conditions— used by credit analysts to provide a framework for in-depth credit analysis.

- Because of the time and expense involved, this credit selection method is used for large-dollar credit requests.
- Analysis via the five C's of credit does not yield a specific accept/reject decision, so its use requires an analyst experienced in reviewing and granting credit requests.

1. **Character:** The applicant's record of meeting past obligations.
2. **Capacity:** The applicant's ability to repay the requested credit.
3. **Capital:** The applicant's debt relative to equity.
4. **Collateral:** The applicant amount of assets available for use in securing the credit.
5. **Conditions:** Current general and industry-specific economic conditions

Credit Scoring:

credit scoring :

A credit selection method commonly used with high volume/ small dollar credit requests; relies on a credit score determined by applying statistically derived weights to a credit applicant's scores on key financial and credit characteristics.

- Simply stated, the procedure results in a score that measures the applicant's overall credit strength, and the score is used to make the accept/reject decision for granting the applicant credit.

- The purpose of credit scoring is to make a relatively informed credit decision quickly and inexpensively, recognizing that the cost of a single bad scoring decision is small.

Example on credit scoring:

Credit Scoring of a customer by Haller's Stores

Financial and credit characteristics	Score (0 to 100) (1)		Predetermined weight (2)		Weighted score [(1) x (2)] (3)
Credit references	80		.15		12.00
Home ownership	100		.15		15.00
Income range	70		.25		17.50
Payment history	75		.25		18.75
Years at address	90		.10		9.00
Years on job	80		.10		8.00
		Total	1.00	Credit score	80.25

Accounts Receivable Management
Changing the Credit Standards

- The firm sometimes will make changing its credit standards to improve its returns and generate greater value for its owners.

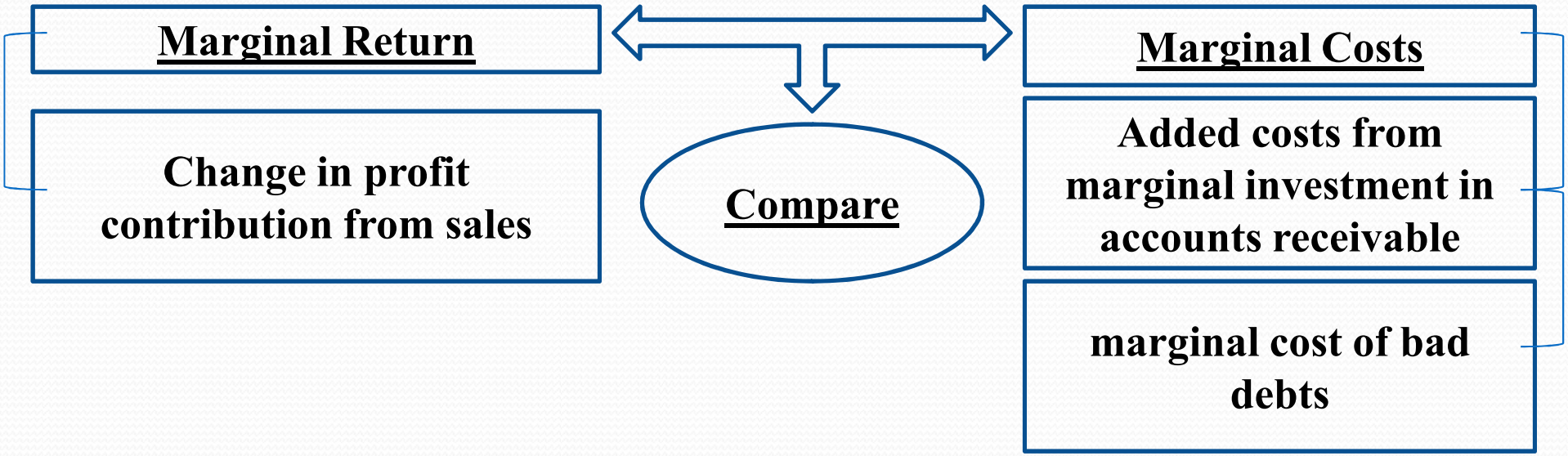
Effects of Relaxation of Credit Standards

Variable	Direction of change	Effect on profits
Sales volume	Increase	Positive
Investment in accounts receivable	Increase	Negative
Bad-debt expenses	Increase	Negative

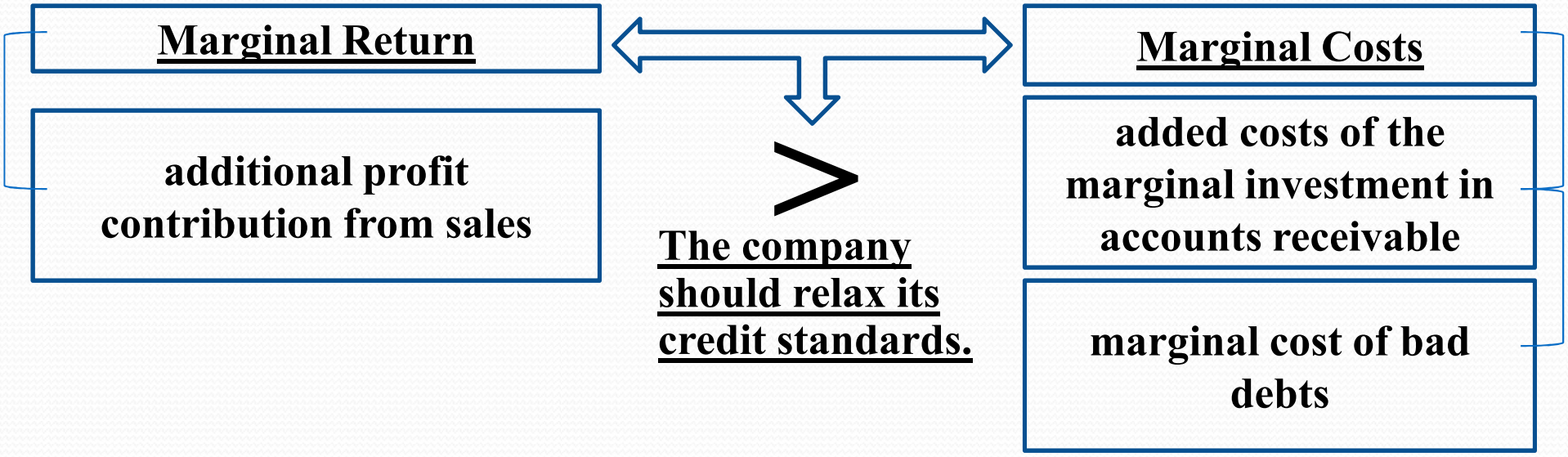
- If credit standards were tightened (shortening of credit standards), the opposite effects would be expected.

Effects of a Relaxation of Credit Standards

- The company needs to determine whether to relax its credit standards or not based on the effect of this relaxation.
- The firm must compare between the marginal return and marginal cost for credit relaxation.



- **Decision rule:**
- **Relaxing the credit standards:**
  - If additional profit contribution from sales > marginal costs, then credit standards should be relaxed.
- **Shortening the credit standards:**
  - If the reduction in profit contribution from sales < marginal costs savings, then credit standards should be shortened.



First : Calculating Marginal Return:

Additional profit contribution from sales

= change in sales units × unit contribution margin

(sales units with relaxation – sales units without relaxation)

(Price per unit – Variable cost per unit)

Second : Calculating Marginal Costs :

(1) Calculating costs of marginal investment in accounts receivable:

$$Average\ \ Investment\ \ in\ \ Accounts\ \ Receivable\ \ =\ \ \frac{Total\ Vari\ able\ Cost}{Account\ Re\ ceivable\ T\ urnover}$$

$$Total\ Vari\ able\ Cost\ \ =\ \ Variable\ \ cost\ per\ u\ nit\ \times\ annual\ sa\ les\ volume\ \ in\ units$$

$$Accounts\ R\ \ eceivable\ \ \ Turnover\ \ \ =\ \ \frac{365}{Average\ Co\ \ \ llection\ P\ \ eriod\ (ACP\ \ )}$$

Average investment in accounts receivable with relaxation
− Average investment in accounts receivable without relaxation
= Marginal investment in accounts receivable
× Required return on investment (opportunity cost rate)
= Cost of marginal investment in accounts receivable

(2) Calculating costs of marginal bad debt :

Cost of bad debt with relaxation (Under proposed plan)
− Cost of bad debt without relaxation (Under present plan)
= Costs of marginal bad debt

$$Cost\ of\ Bad\ Debt = \%\ of\ bad\ debt \times annual\ \ dollar\ sales$$

Third : Calculating Net Profit or Loss From the Implementation of the Proposed Plan (with credit relaxation):

Relaxing of credit standards

Change (addition) in profit contribution from sales
− Costs of marginal investment in accounts receivable
− Costs of marginal bad debt
= Net profit or loss from making credit relaxation (proposed plan)

Shortening of credit standards

Change (reduction) in profit contribution from sales
+ Cost savings from marginal investment in accounts receivable
+ Cost savings from marginal bad debt
= Net profit or loss from making credit relaxation (proposed plan)

Example 6 : making a decision to provide credit relaxation or not.

A firm is currently selling a product for $10 per unit. Sales (all on credit) for last year were 60,000 units. The variable cost per unit is $6. The firm's total fixed costs are $120,000. The firm is currently considering a *relaxation of credit standards that is* expected to result in the following:

1. a 5% increase in unit sales to 63,000 units.
2. an increase in the average collection period from 30 days (the current level) to 45 days.
3. an increase in bad-debt expenses from 1% of sales (the current level) to 2%.
4. The firm determines that its cost of tying up funds in receivables is 15% before taxes.

Additional profit contribution from sales		
[3,000 units × ($10 − $6)]		$12,000
Cost of marginal investment in A/R[a]		
Average investment under proposed plan: $\frac{\$6 \times 63{,}000}{8.1} = \frac{\$378{,}000}{8.1}$	$46,667	
− Average investment under present plan: $\frac{\$6 \times 60{,}000}{12.2} = \frac{\$360{,}000}{12.2}$	29,508	
Marginal investment in A/R	$17,159	
Cost of marginal investment in A/R (0.15 × $17,159)		($ 2,574)
Cost of marginal bad debts		
Bad debts under proposed plan (0.02 × $10 × 63,000)	$12,600	
− Bad debts under present plan (0.01 × $10 × 60,000)	6,000	
Cost of marginal bad debts		($ 6,600)
Net profit from implementation of proposed plan		$ 2,826

[a]The denominators 8.1 and 12.2 in the calculation of the average investment in accounts receivable under the proposed and present plans are the accounts receivable turnovers for each of these plans (365 ÷ 45 = 8.1 and 365 ÷ 30 = 12.2).

Example 7 :

A firm is considering making a relaxation of credit standards, using the following information:

With credit relaxation (proposed plan)		**Without credit relaxation (present policy)**	
ACP	60 days	ACP	40 days
Annual units' sales	100,000 unit	Annual units' sales	80,000 unit
Price per unit	$30 per unit	Price per unit	$30 per unit
Variable cost per unit	$21 per unit	Variable cost per unit	$21 per unit
Bad debt expenses	10%	Bad debt expenses	5%
• Opportunity Cost (Required Rate of Return) is 10%			
• Assume the year has 360 days.			

1.Calculate the change in Profit contribution from sales:

$$= \text{change in sales units} \times \text{unit contribution margin}$$

$$= (100{,}000 - 80{,}000) \times (30 - 21) = 20{,}000 \times 9 = \$\,180{,}000 \text{ addition}$$

2. Calculate Marginal Investment in Accounts Receivable (A/R):

A/R <u>With</u> credit relaxation (proposed plan)	A/R <u>Without</u> credit relaxation (present policy)
$= \dfrac{\text{Total Variable Cost}}{\text{Account Receivable Turnover}}$	$= \dfrac{\text{Total Variable Cost}}{\text{Account Receivable Turnover}}$
$= \dfrac{21 \times 100{,}000}{360 \ / \ 60} = \dfrac{2{,}100{,}000}{6} = \$\,350{,}000$	$= \dfrac{21 \times 80{,}000}{360 \ / \ 40} = \dfrac{1{,}680{,}000}{9} = \$\,186{,}666.7 \cong \$\,186{,}667$
Marginal Investment in Accounts Receivable = $ 350,000 - $ 186,667 = $ 163,333 addition	

3. Calculate (Opportunity cost) or Cost of Marginal Investment in Accounts Receivable:

$$\text{Marginal investment in accounts receivable} \times \text{Opportunity cost} = \$\,163{,}333 \times .10 = \$\,16{,}333.3$$
$$\cong \$\,16{,}333 \quad \text{addition}$$

4. Calculate Cost of Marginal Bad Debt:

Bad Debt With credit relaxation(proposed plan)	Bad Debt Without credit relaxation (present policy)
$Cost\ of\ Bad\ Debt = \%\ of\ bad\ debt \times annual\ \ dollar\ sales$ $Cost\ of\ Ba\ \ d\ Debt\ \ = .1 \times \$30 \times 100{,}000$ $Cost\ of\ Ba\ \ d\ Debt\ \ = \$\ 300{,}000$	$Cost\ of\ Bad\ Debt = \%\ of\ bad\ debt \times annual\ \ dollar\ sales$ $Cost\ of\ Ba\ \ d\ Debt\ \ = .05 \times \$30 \times 80{,}000$ $Cost\ of\ Ba\ \ d\ Debt\ \ = \$\ 120{,}000$
Cost of Marginal Bad Debt = $ 300,000 - $ 120,000 = $ 180,000 addition	

5. Do you advice the company to make credit relaxation? Yes or No / Why?

	Additional profit contribution from sales	$ 180,000
-	Costs of marginal investment in accounts receivable	(16,333)
-	Costs of marginal bad debt	(180,000)
=	Net profit or loss from making credit relaxation (proposed plan)	$ (16,333)

No, credit standards should not be relaxed because the additional profit contribution from sales < marginal costs, which results in net loss.

P14 –12: Shortening the credit period

A firm is contemplating *shortening its credit period* from 40 to 30 days and believes that, as a result of this change, its average collection period will decline from 45 to 36 days.

Bad-debt expenses are expected to decrease from 1.5% to 1% of sales. The firm is currently selling 12,000 units but believes that as a result of the proposed change, sales will decline to 10,000 units.

The sale price per unit is $56, and the variable cost per unit is $45. The firm has a required return on equal-risk investments of 25%.

Evaluate this decision, and make a recommendation to the firm.
(*Note: Assume a 360-day year.)*

1.Calculate the change in Profit contribution from sales:

= change in sales units × unit contribution margin

= [10,000 – 12,000] × [56 – 45] = - 2,000 × 11 = ($ 22,000) reduction

2. Calculate Marginal Investment in Accounts Receivable (A/R):

A/R With credit shortening (proposed plan)	A/R Without credit shortening (present policy)
$= \frac{\text{Total Variable Cost}}{\text{Account Receivable Turnover}}$	$= \frac{\text{Total Variable Cost}}{\text{Account Receivable Turnover}}$
$= \frac{\$45 \times 10{,}000 \text{ unit}}{360 / 36} = \frac{\$ 450{,}000}{10} = \$ 45{,}000$	$= \frac{\$45 \times 12{,}000 \text{ unit}}{360 / 45} = \frac{\$540{,}000}{8} = \$ 67{,}500$
Marginal Investment in Accounts Receivable = $ 45,000 - $ 67,500 = ($ 22,500) savings	

3. Calculate (Opportunity cost) or Return on Marginal Investment in Accounts Receivable:

= Benefits from reduced marginal investment in accounts receivable × Required return

= ($ 22,500) × .25 = ($ 5,625) savings

4. Calculate Cost of Marginal Bad Debt:

Bad Debt With credit shortening (proposed plan)	Bad Debt Without credit shortening (present policy)
$Cost\ of\ Bad\ Debt = \%\ of\ bad\ debt \times annual\ \ dollar\ sales$ $Cost\ of\ Bad\ Debt = .01 \times \$56 \times 10{,}000\ units$ $Cost\ of\ Bad\ Debt = \$\ 5{,}600$	$Cost\ of\ Bad\ Debt = \%\ of\ bad\ debt \times annual\ \ dollar\ sales$ $Cost\ of\ Bad\ Debt = .015 \times \$56 \times 12{,}000$ $Cost\ of\ Bad\ Debt = \$\ 10{,}080$
Cost of Marginal Bad Debt = $ 5,600 - $ 10,080 = ($ 4,480) savings	

5. Do you advice the company to make credit shortening? Yes or No / Why?

	Reduction in profit contribution from sales	($ 22,000)
+	Benefits or savings from reduced marginal investment in accounts receivable	5,625
+	Savings in costs of marginal bad debt	4,480
=	Net profit or loss from making credit shortening (proposed plan)	($ 11,895)

No, credit shortening should not be done, because the reduction in profit contribution from sales < savings in marginal costs, which results in net loss.

Credit Terms

Credit Terms

The terms of sale for customers who have been extended credit by the firm.

- Terms of *net 30 mean the customer has 30 days from the beginning* of the credit period (typically *end of month or date of invoice) to pay the full* invoice amount.

Cash Discount

A percentage deduction from the purchase price; available to the credit customer who pays its account within a specified time.

- For example, terms of *2/10 net 30 mean the customer can take a 2 percent discount from the invoice amount if* the payment is made within 10 days of the beginning of the credit period or can pay the full amount of the invoice within 30 days.

- A firm's business strongly influences its regular credit terms. For example, a firm selling perishable items will have very short credit terms because its items have little long-term collateral value; a firm in a seasonal business may tailor its terms to fit the industry cycles.

- A firm wants its regular credit terms to conform to its industry's standards. If its terms are more restrictive than its competitors', it will lose business; if its terms are less restrictive than its competitors', it will attract poor-quality customers that probably could not pay under the standard industry terms.

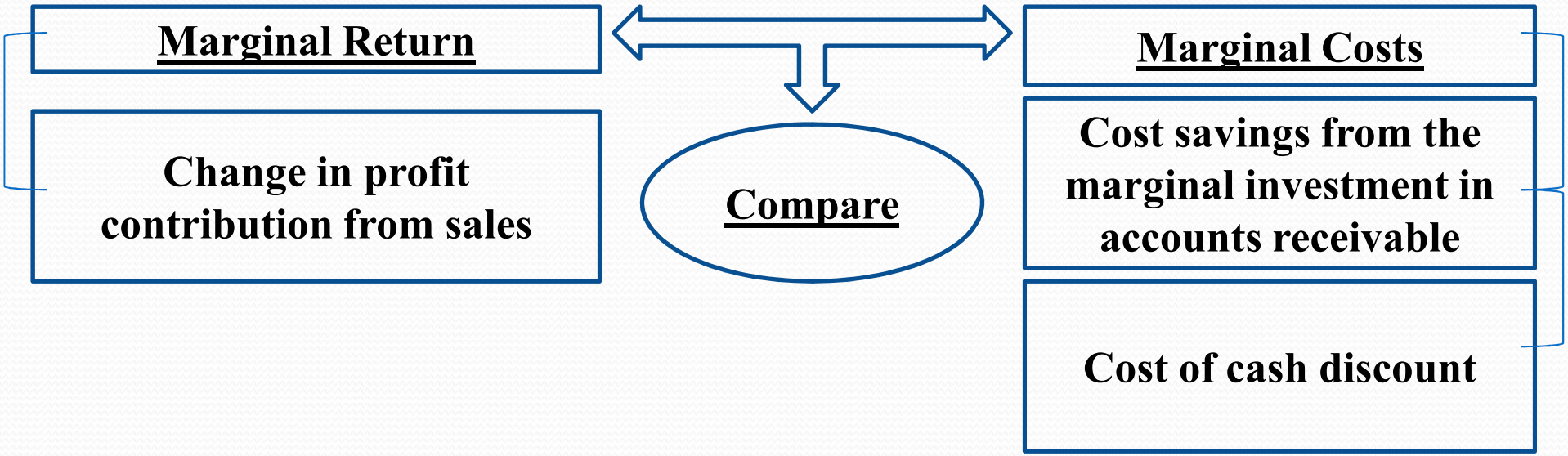
- The bottom line is that a firm should compete on the basis of quality and price of its product and service offerings, not its credit terms. Accordingly, the firm's regular credit terms should match the industry standards, but individual customer terms should reflect the riskiness of the customer.

Characteristics of providing a cash discount:

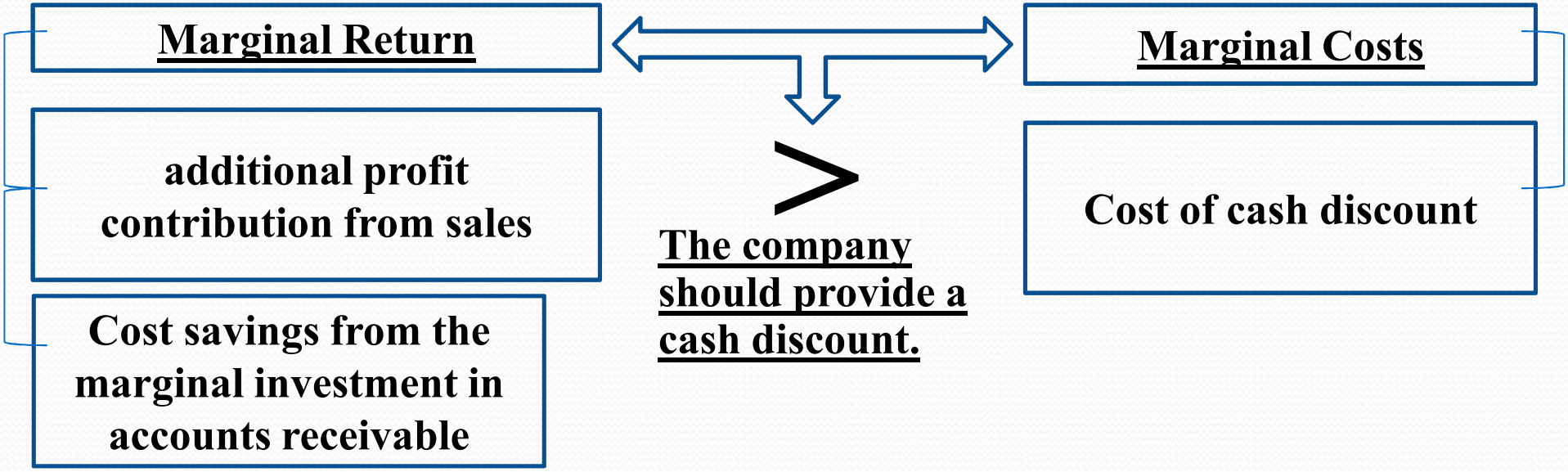
1. Including a cash discount in the credit terms is a popular way to speed up collections of accounts receivable without putting pressure on customers.
2. The cash discount provides an incentive for customers to pay sooner.
3. By speeding collections, the discount decreases the firm's investment in accounts receivable, but it also decreases the per-unit profit. Additionally, initiating a cash discount should reduce bad debts because customers will pay sooner, and it should increase sales volume because customers who take the discount pay a lower price for the product.
4. Accordingly, firms that consider offering a cash discount must perform a benefit–cost analysis to determine whether extending a cash discount is profitable.

Effects of a providing a cash discount

- The company needs to determine whether to provide a cash discount or not based on the effect of this discount.
- The firm must compare between the marginal return and marginal cost for cash discount.



- **Decision rule:**
- **Providing Cash discount to customers:**
  - If additional profit contribution from sales and cost savings from account receivable > cost of cash discount, then cash discount should be provided.
  - If additional profit contribution from sales and cost savings from account receivable < cost of cash discount, then cash discount should not be provided.



First : Calculating Marginal Return:

Additional profit contribution from sales

= change in sales units × unit contribution margin

(sales units with cash discount – sales units without cash discount)

(Price per unit – Variable cost per unit)

Second : Calculating Marginal Costs :

(1) Calculating cost savings from reduced investments in accounts receivable:

$$Average\ \ Investment\ \ in\ Accounts\ \ Receivable\ \ =\ \ \frac{Total\ Vari\ able\ Cost}{Account\ Re\ ceivable\ T\ urnover}$$

$$Total\ Vari\ able\ Cost\ \ =\ \ Variable\ \ cost\ per\ u\ nit\ \times\ annual\ sa\ les\ volume\ \ in\ units$$

$$Accounts\ R\ eceivable\ \ Turnover\ \ =\ \ \frac{365}{Average\ Co\ llection\ P\ eriod\ (ACP\ )}$$

Average investment in accounts receivable with cash discount
− Average investment in accounts receivable without cash discount
= Reduction in accounts receivable investment
× Required return on investment (opportunity cost rate)
= Cost savings from reduced investments in accounts receivable

(2) Calculating the cost of cash discount:

$$\begin{aligned} Cost\ of\ Cash\ Discount\ = & \ \%\ of\ cash\ discount \\ & \times\ \%\ customers\ \ who\ take\ cash\ discount \\ & \times\ sales\ \ in\ units\ \ with\ \ cash\ \ discount \\ & \times\ \ price\ \ per\ \ unit \end{aligned}$$

Third : Calculating Net Profit or Loss From the Implementation of the Proposed Plan (with cash discount):

Additional profit contribution from sales
\+ Cost savings from reduced investments in accounts receivable
\- Cost of cash discount
= Net profit or loss from providing cash discount (proposed plan)

Example 8 : making a decision to provide cash discount or not

1. A company has annual sales of $10 million and is considering initiating *a cash discount* by changing its credit terms from net 30 to *2/10 net 30*.
2. The firm has an average collection period ACP of 40 days and expects this change to result in an average collection period ACP of 25 days.
3. The company has current annual usage of 1,100 units at a variable cost of $2,300 per unit and sells for $3,000 on terms of net 30.
4. The company estimates that the discount will increase sales of the finished product by 50 units (from 1,100 to 1,150 units) per year.
5. The company estimates that 80% of its customers will take the 2% discount
6. The company estimates that the cash discount will not alter its bad debt percentage.
7. Opportunity cost of funds invested in accounts receivable is 14%.

Should the company offer the proposed cash discount?

Additional profit contribution from sales [50 units × ($3,000 − $2,300)]		$35,000
Cost of marginal investment in A/R[a]		
Average investment presently (without discount): $\frac{\$2,300 \times 1,100 \text{ units}}{9.1} = \frac{\$2,530,000}{9.1}$	$278,022	
− Average investment with proposed cash discount:[b] $\frac{\$2,300 \times 1,150 \text{ units}}{14.6} = \frac{\$2,645,000}{14.6}$	181,164	
Reduction in accounts receivable investment	$ 96,858	
Cost savings from reduced investment in accounts receivable (0.14 × $96,858)[c]		$13,560
Cost of cash discount (0.02 × 0.80 × 1,150 × $3,000)		($55,200)
Net profit from initiation of proposed cash discount		($ 6,640)

No the company should not offer the cash discount because this will provide net loss.

[a]In analyzing the investment in accounts receivable, we use the variable cost of the product sold ($1,500 raw materials cost + $800 production cost = $2,300 per unit variable cost) instead of the sale price, because the variable cost is a better indicator of the firm's investment.

[b]The average investment in accounts receivable with the proposed cash discount is estimated to be tied up for an average of 25 days instead of the 40 days under the original terms.

opportunity cost of funds is 14%.

- **P14 –11: Initiating a cash discount**

1. A company currently makes all sales on credit and offers no cash discount.
2. The firm is considering offering a 2% cash discount for payment within 15 days.
3. The firm's current average collection period is 60 days, sales are 40,000 units, selling price is $45 per unit, and variable cost per unit is $36.
4. The firm expects that the change in credit terms will result in an increase in sales to 42,000 units, that 70% of the sales will take the discount, and that the average collection period will fall to 30 days. If the firm's required rate of return on equal-risk investments is 25%,
5. should the proposed discount be offered?
   (*Note: Assume a 360-day year.)*

1.Calculate the change in Profit contribution from sales:

$$= \text{change in sales units} \times \text{unit contribution margin}$$

$$= (42{,}000 - 40{,}000) \times (45 - 36) = 2{,}000 \times 9 = \$\ 18{,}000 \text{ addition}$$

2. Calculate Marginal Investment in Accounts Receivable (A/R):

A/R <u>With</u> cash discount (proposed plan)	A/R <u>Without</u> cash discount (present policy)
$= \dfrac{\text{Total Variable Cost}}{\text{Account Receivable Turnover}}$ $= \dfrac{\$36 \times 42{,}000 \text{ unit}}{360 / 30} = \dfrac{\$1{,}512{,}000}{12} = \$\ 126{,}000$	$= \dfrac{\text{Total Variable Cost}}{\text{Account Receivable Turnover}}$ $= \dfrac{\$\ 36 \times 40{,}000}{360 / 60} = \dfrac{1{,}440{,}000}{6} = \$\ 240{,}000$
Marginal Investment in Accounts Receivable = $ 126,000 - $ 240,000 = ($ 114,000) reduction	

3. Calculate (Opportunity cost) or Return on Marginal Investment in Accounts Receivable:

$$= \text{Marginal investment in accounts receivable} \times \text{Opportunity cost (Required return)}$$

$$= (\$114{,}000) \times .25 = (\$\ 28{,}500) \text{ savings}$$

4. Calculate Cost of cash discount:

Cost of cash discount (proposed plan)	
Cost of Cash Discount = *% of cash discount*	= .02
× *% customers who take cash discount*	× .7
× *sales in units with cash discount*	× $45
× *price per unit*	× 42,000 u nits
Cost of cash discount (proposed plan) = $26,460	

5. Do you advice the company to provide a cash discount? Yes or No / Why?

	Additional profit contribution from sales	$ 18,000
+	Cost savings from reduced investment in accounts receivable	28,500
-	Cost of cash discount	(26,460)
=	Net profit or loss from making credit relaxation (proposed plan)	$ 20,040

Yes, cash discount should be provided because the additional profit contribution from sales and savings from accounts receivable > marginal costs of cash discount, which results in net profit.

Cash Discount Period

It is the number of days after the beginning of the credit period during which the cash discount is available.

- The financial manager can change the cash discount period, but the net effect of changes in this period is difficult to analyze because of the nature of the forces involved.

- The following changes would be expected to occur:

(1) Sales would increase, positively affecting profit.
(2) Bad-debt expenses would decrease, positively affecting profit.
(3) The profit per unit would decrease as a result of more people taking the discount, negatively affecting profit.
(4) The investment in account receivable will decrease because of non–discount takers now paying earlier. However, the investment in accounts receivable will increase for two reasons:
    1. Discount takers will still get the discount but will pay later.
    2. New customers will be attracted by the new policy which will result in new accounts receivable.

Credit Monitoring

It is the ongoing review of a firm's accounts receivable to determine whether customers are paying according to the stated credit terms.

- Slow payments are costly to a firm because they lengthen the average collection period and thus increase the firm's investment in accounts receivable.
- Two frequently used techniques for credit monitoring are:
  1. Average collection period ACP.
  2. Aging of accounts receivable.

(1) ACP *average collection period:*

It is the average number of days that credit sales are outstanding.

- The average collection period has two components:
  1. the time from sale until the customer places the payment in the mail.
  2. the time to receive, process, and collect the payment once it has been mailed by the customer.

$$\textbf{Average Collection Period} = \frac{\textbf{Accounts Receivable}}{\textbf{Average Sales Per Day}}$$

(2) Aging of Accounts Receivable

Aging schedule:

It is a credit-monitoring technique that breaks down accounts receivable into groups on the basis of their time of origin; The breakdown is typically made on a month-by-month basis, going back 3 or 4 months, it indicates the percentages of the total accounts receivable balance that have been outstanding for specified periods of time.

Example 10 :

The accounts receivable balance of a firm on December 31, 2012, was $200,000. The firm extends net 30-day credit terms to its customers. The firm had the following aging schedule.

Age of account	Balance outstanding	Percentage of total balance outstanding
0–30 days	$ 80,000	40%
31–60 days	36,000	18
61–90 days	52,000	26
91–120 days	26,000	13
Over 120 days	6,000	3
Totals at 12/31/12	$200,000	100%

- Reviewing the aging schedule, we see that 40% of the accounts are current (age 30 days) and the remaining 60% are overdue (age 30 days). Eighteen percent of the balance outstanding is 1–30 days overdue, 26% is 31–60 days overdue, 13% is 61–90 days overdue, and 3% is more than 90 days overdue.

- There is a high percentage of the balance outstanding that is 31–60 days overdue (ages of 61–90 days). Clearly, a problem must have occurred 61–90 days ago.

- Investigation may find that:

1. The problem can be attributed to the hiring of a new credit manager.
2. The problem can be attributed to the acceptance of a new account that made a large credit purchase but has not yet paid for it.
3. The problem can be attributed to the ineffective collection policy.

- When this problem is found in the aging schedule, the analyst should determine, evaluate, and remedy its cause.

Credit Monitoring: Collection Policy

- The firm's **collection policy** is its procedures for collecting a firm's accounts receivable when they are due.
- The effectiveness of this policy can be partly evaluated by evaluating at the level of bad expenses.
- As seen in the previous examples, this level depends not only on collection policy but also on the firm's credit policy.

Collection Policy

Table 14.4 Popular Collection Techniques

Technique[a]	Brief description
Letters	After a certain number of days, the firm sends a polite letter reminding the customer of the overdue account. If the account is not paid within a certain period after this letter has been sent, a second, more demanding letter is sent.
Telephone calls	If letters prove unsuccessful, a telephone call may be made to the customer to request immediate payment. If the customer has a reasonable excuse, arrangements may be made to extend the payment period. A call from the seller's attorney may be used.
Personal visits	This technique is much more common at the consumer credit level, but it may also be effectively employed by industrial suppliers. Sending a local salesperson or a collection person to confront the customer can be very effective. Payment may be made on the spot.
Collection agencies	A firm can turn uncollectible accounts over to a collection agency or an attorney for collection. The fees for this service are typically quite high; the firm may receive less than 50 cents on the dollar from accounts collected in this way.
Legal action	Legal action is the most stringent step, an alternative to the use of a collection agency. Not only is direct legal action expensive, but it may force the debtor into bankruptcy without guaranteeing the ultimate receipt of the overdue amount.

[a]The techniques are listed in the order in which they are typically followed in the collection process.

Management of Receipts & Disbursements: Float

- **Collection float** is the delay between the time when a payer deducts a payment from its checking account ledger and the time when the payee actually receives the funds in spendable form.
- **Disbursement float** is the delay between the time when a payer deducts a payment from its checking account ledger and the time when the funds are actually withdrawn from the account.
- Both the collection and disbursement float have three separate components.

Management of Receipts & Disbursements: Float

- **Mail float** is the delay between the time when a payer places payment in the mail and the time when it is received by the payee.
- **Processing float** is the delay between the receipt of a check by the payee and the deposit of it in the firm's account.
- **Clearing float** is the delay between the deposit of a check by the payee and the actual availability of the funds which results from the time required for a check to clear in the banking system.

Management of Receipts & Disbursements: Speeding Up Collections

- Lockboxes
  - A **lockbox system** is a collection procedure in which payers send their payments to a nearby post office box that is emptied by the firm's bank several times a day.
  - It is different from and superior to concentration banking in that the firm's bank actually services the lockbox which reduces the processing float.
  - A lockbox system reduces the collection float by shortening the processing float as well as the mail and clearing float.

Management of Receipts & Disbursements: Slowing Down Payments

- Controlled Disbursing
  - **Controlled Disbursing** involves the strategic use of mailing points and bank accounts to lengthen the mail float and clearing float respectively.
  - This approach should be used carefully, however, because longer payment periods may strain supplier relations.

Management of Receipts & Disbursements: Cash Concentration

- Direct Sends and Other Techniques
  - **Wire transfers** is a telecommunications bookkeeping device that removes funds from the payer's bank and deposits them into the payees bank—thereby reducing collections float.
  - **Automated clearinghouse (ACH) debits** are pre-authorized electronic withdrawals from the payer's account that are transferred to the payee's account via a settlement among banks by the automated clearinghouse.
  - ACHs clear in one day, thereby reducing mail, processing, and clearing float.

Management of Receipts & Disbursements: Zero-Balance Accounts

- **Zero-balance accounts (ZBAs)** are disbursement accounts that always have an end-of-day balance of zero.
- The purpose is to eliminate non-earning cash balances in corporate checking accounts.
- A ZBA works well as a disbursement account under a cash concentration system.

Investing in Marketable Securities

Table 14.5 Features and Recent Yields on Popular Marketable Securities [a] (cont.)

Security	Issuer	Description	Initial maturity	Risk and return	Yield on July 23, 2007[b]
Government Issues					
Treasury bills	U.S. Treasury	Issued weekly at auction; sold at a discount; strong secondary market	4, 13, and 26 weeks	Lowest, virtually risk-free	4.97%
Treasury notes	U.S. Treasury	Stated interest rate; interest paid semiannually; strong secondary market	1 to 10 years	Low, but slightly higher than U.S. Treasury bills	5.03%
Federal agency issues	Agencies of federal goverment	Not an obligation of U.S. Treasury; strong secondary market	9 months to 30 years	Slightly higher than U.S. Treasury issues	5.17%[c]

Investing in Marketable Securities (cont.)

Table 14.5 Features and Recent Yields on Popular Marketable Securities [a] (cont.)

Nongovernment Issues					
Negotiable certificates of deposit (CDs)	Commercial banks	Represent specific cash deposits in commercial banks; amounts and maturities tailored to investor needs; large denominations; good secondary market	1 month to 3 years	Higher than U.S. Treasury issues and comparable to commercial paper	4.95%
Commercial paper	Corporation with a high credit standing	Unsecured note of issuer; large denominations	3 to 270 days	Higher than U.S. Treasury issues and comparable to negotiable CDs	5.23%
Banker's acceptances	Banks	Results from a bank guarantee of a business transaction; sold at discount from maturity value	30 to 180 days	About the same as negotiable CDs and commercial paper but higher than U.S. Treasury issues	5.31%
Eurodollar deposits	Foreign banks	Deposits of currency not native to the country in which the bank is located; large denominations; active secondary market	1 day to 3 years	High, due to less regulation of despository banks and some foreign exchange risk	5.36%

Investing in Marketable Securities (cont.)

Table 14.5 Features and Recent Yields on Popular Marketable Securities [a]

Money market mutual funds	Professional portfolio management companies	Professionally managed portfolios of marketable securities; provide instant liquidity	None—depends on wishes of investor	Vary, but generally higher than U.S. Treasury issues and comparable to negotiable CDs and commercial paper	4.98%[d]
Repurchase agreements	Bank or security dealer	Bank or security dealer sells specific securities to firm and agrees to repurchase them at a specific price and time	Customized to purchaser's needs	Generally slightly below that associated with the outright purchase of the security	5.13%

[a]The prime rate of interest at this time was 8.25%.
[b]Yields obtained for 3-month maturities of each security.
[c]Federal National Mortgage Association (Fannie Mae) issue with 3 months to maturity is used here.
[d]Fidelity Cash Reserves Fund with an average maturity of 51 days is used here in the absence of any average-yield data.
Source: *Wall Street Journal*, July 24, 2007, p. C6.