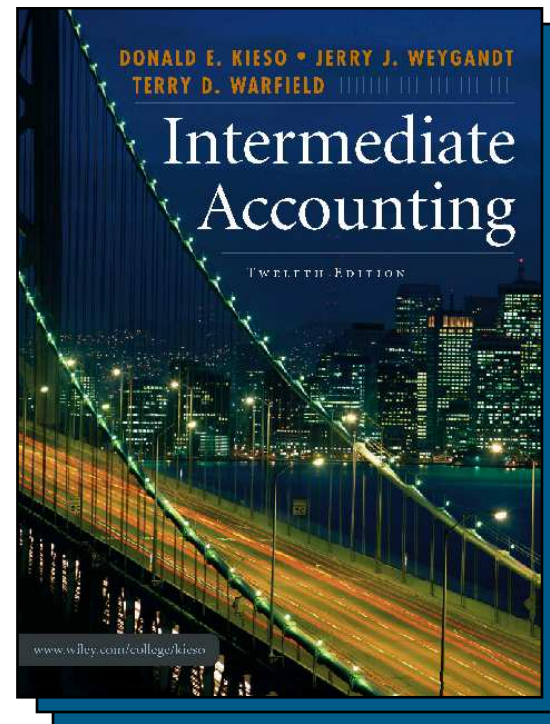


# *Property, Plant, and Equipment: Cost Allocation and Impairment*

## Chapter 11

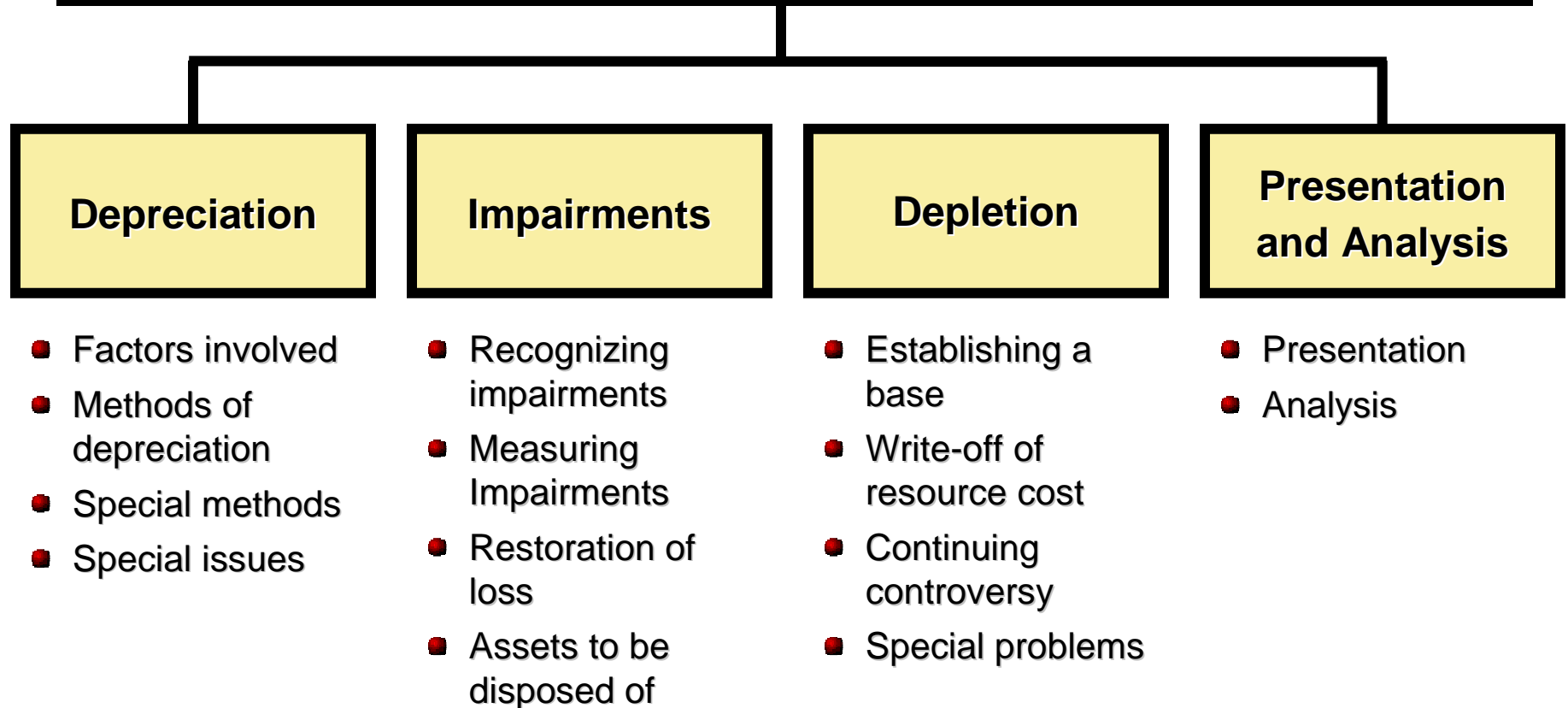
Intermediate Accounting  
12th Edition  
Kieso, Weygandt, and Warfield



## *Learning Objectives*

1. Explain the concept of depreciation.
2. Identify the factors involved in the depreciation process.
3. Compare activity, straight-line, and decreasing-charge methods of depreciation.
4. Explain special depreciation methods.
5. Explain the accounting issues related to asset impairment.
6. Explain the accounting procedures for depletion of natural resources.
7. Explain how to report and analyze property, plant, equipment, and natural resources.

# ***Depreciation, Impairments, and Depletion***



# *Depreciation - Method of Cost Allocation*

**Depreciation** is the accounting process of allocating the cost of **tangible assets to expense** in a systematic and rational manner to those periods expected to benefit from the use of the asset.

Allocating costs of long-term assets:

- Fixed assets = Depreciation expense
- Intangibles = Amortization expense
- Natural resources = Depletion expense

# ***Depreciation - Method of Cost Allocation***

## **Factors Involved in the Depreciation Process**

Three basic questions:

- (1) What depreciable base is to be used?
- (2) What is the asset's useful life?
- (3) What method of cost allocation is best?

# Depreciation - Method of Cost Allocation

## Methods of Depreciation

The profession requires the method employed be "systematic and rational." Examples include:

- (1) Activity method (units of use or production).
- (2) Straight-line method.
- (3) Sum-of-the-years'-digits. } Accelerated methods
- (4) Declining-balance method. }
- (5) Group and composite methods. } Special methods
- (6) Hybrid or combination methods. }

# ***Depreciation - Method of Cost Allocation***

**Exercise (Depreciation Computations—Four Methods)** Robert Parish Corporation purchased a new machine for its assembly process on September 30, 2007. The cost of this machine was \$117,900. The company estimated that the machine would have a salvage value of \$12,900 at the end of its service life. Its life is estimated at 5 years and its working hours are estimated at 1,000 hours. Year-end is December 31.

**Instructions:** Compute the depreciation expense under the following methods.

- (a) Straight-line depreciation.
- (b) Activity method.
- (c) Sum-of-the-years'-digits.
- (d) Double-declining balance.

# Depreciation - Method of Cost Allocation

## Exercise (Straight-line Method)

Year	Depreciable Base		Years		Annual Expense		Partial Year		Current Year Expense	Accum. Deprec.
2007	\$ 105,000	/	5	=	\$ 21,000	x	3/12	=	\$ 5,250	\$ 5,250
2008	105,000	/	5	=	21,000				21,000	26,250
2009	105,000	/	5	=	21,000				21,000	47,250
2010	105,000	/	5	=	21,000				21,000	68,250
2011	105,000	/	5	=	21,000				21,000	89,250
2012	105,000	/	5	=	21,000	x	9/12	=	15,750	105,000
									<u>\$ 105,000</u>	

### Journal entry:

2007	Depreciation expense	5,250	
	Accumultated depreciation		5,250



# Depreciation - Method of Cost Allocation

## Exercise (Activity Method)

(\$105,000 / 1,000 hours = \$105 per hour)

Year	(Given) Hours Used		Rate per Hours		Annual Expense	Partial Year	Current Year Expense	Accum. Deprec.
2007	200	x	\$105	=	\$ 21,000		\$ 21,000	\$ 21,000
2008	150	x	105	=	15,750		15,750	36,750
2009	250	x	105	=	26,250		26,250	63,000
2010	300	x	105	=	31,500		31,500	94,500
2011	100	x	105	=	10,500		10,500	105,000
	<u>1,000</u>						<u>\$ 105,000</u>	

### Journal entry:

2007	Depreciation expense	21,000	
	Accumulated depreciation		21,000

# Depreciation - Method of Cost Allocation

## Exercise (Sum-of-the-years'-digits Method)

Year	Depreciable Base		Years		Annual Expense		Partial Year	Current Year Expense	Accum. Deprec.
2007	\$ 105,000	x	5/15	=	\$ 35,000	x	3/12	\$ 8,750	\$ 8,750
2008	105,000	x	4.75/15	=	33,250			33,250	42,000
2009	105,000	x	3.75/15	=	26,250			26,250	68,250
2010	105,000	x	2.75/15	=	19,250			19,250	87,500
2011	105,000	x	1.75/15	=	12,250			12,250	99,750
2012	105,000	x	.75/15	=	5,250			5,250	105,000
								<u>\$ 105,000</u>	

### Journal entry:

2007	Depreciation expense	8,750	
	Accumulated depreciation		8,750

# Depreciation - Method of Cost Allocation

## Exercise (Double-Declining Balance Method)

Year	Depreciable Base		Rate per Year		Annual Expense		Partial Year		Current Year Expense	Accum. Deprec.
2007	\$ 117,900	x	40%	=	\$ 47,160	x	3/12	=	\$ 11,790	\$ 11,790
2008	106,110	x	40%	=	33,602				33,602	45,392
2009	72,509	x	40%	=	18,127				18,127	63,519
2010	54,381	x	40%	=	9,970				9,970	73,489
2011	44,411	x	40%	=	5,181				5,181	78,670
2012	39,230	x	40%	=	1,962		Plug	→	26,330	105,000
									<u>\$ 105,000</u>	

### Journal entry:

2007	Depreciation expense	11,790	
	Accumulated depreciation		11,790

# *Depreciation - Method of Cost Allocation*

## **Special Depreciation Methods**

The choice of method depends on the nature of the assets involved:

- **Group method** used when the assets are similar in nature and have approximately the same useful lives.
- **Composite approach** used when the assets are dissimilar and have different lives.
- Companies are also free to develop tailor-made depreciation methods, provided the method results in the allocation of an asset's cost in a systematic and rational manner (**Hybrid or Combination Methods**).

# ***Depreciation - Method of Cost Allocation***

## **Special Depreciation Issues**

- (1) How should companies compute depreciation for partial periods?
  - Companies normally compute depreciation on the basis of the nearest full month.
- (2) Does depreciation provide for the replacement of assets?
  - Funds for the replacement of the assets come from the revenues
- (3) How should companies handle revisions in depreciation rates?

# *Depreciation - Method of Cost Allocation*

## **Changes in Depreciation Rate**

- Accounted for in the period of change and future periods (*Change in Estimate*)
- Not handled retrospectively
- Not considered errors or extraordinary items

## *Change in Estimate Example*

Arcadia HS, purchased equipment for \$510,000 which was estimated to have a useful life of 10 years with a salvage value of \$10,000 at the end of that time. Depreciation has been recorded for 7 years on a straight-line basis. In 2005 (year 8), it is determined that the total estimated life should be 15 years with a salvage value of \$5,000 at the end of that time.

### **Questions:**

- What is the journal entry to correct the prior years' depreciation?
- Calculate the depreciation expense for 2005.

**No Entry  
Required**



## Change in Estimate Example

After 7 years

Equipment cost	\$510,000
Salvage value	- 10,000
Depreciable base	<u>500,000</u>
Useful life (original)	<u>10 years</u>
Annual depreciation	<u><u>\$ 50,000</u></u>

First, establish  
NBV at date of  
change in estimate.

$\times 7 \text{ years} = \$350,000$

### Balance Sheet (Dec. 31, 2004)

#### Fixed Assets:

Equipment	\$510,000
Accumulated depreciation	<u>350,000</u>
Net book value (NBV)	<u><u>\$160,000</u></u>



## *Change in Estimate Example*

After 7 years

Net book value	<b>\$160,000</b>
Salvage value (new)	<u>5,000</u>
Depreciable base	155,000
Useful life remaining	<u>8 years</u>
Annual depreciation	<b><u><u>\$ 19,375</u></u></b>

Depreciation  
Expense calculation  
for 2005.

### Journal entry for 2005

Depreciation expense	19,375	
Accumulated depreciation		19,375

# *Impairments*

When the carrying amount of an asset is not recoverable, a company records a write-off referred to as an **impairment**.

## **Events leading to an impairment:**

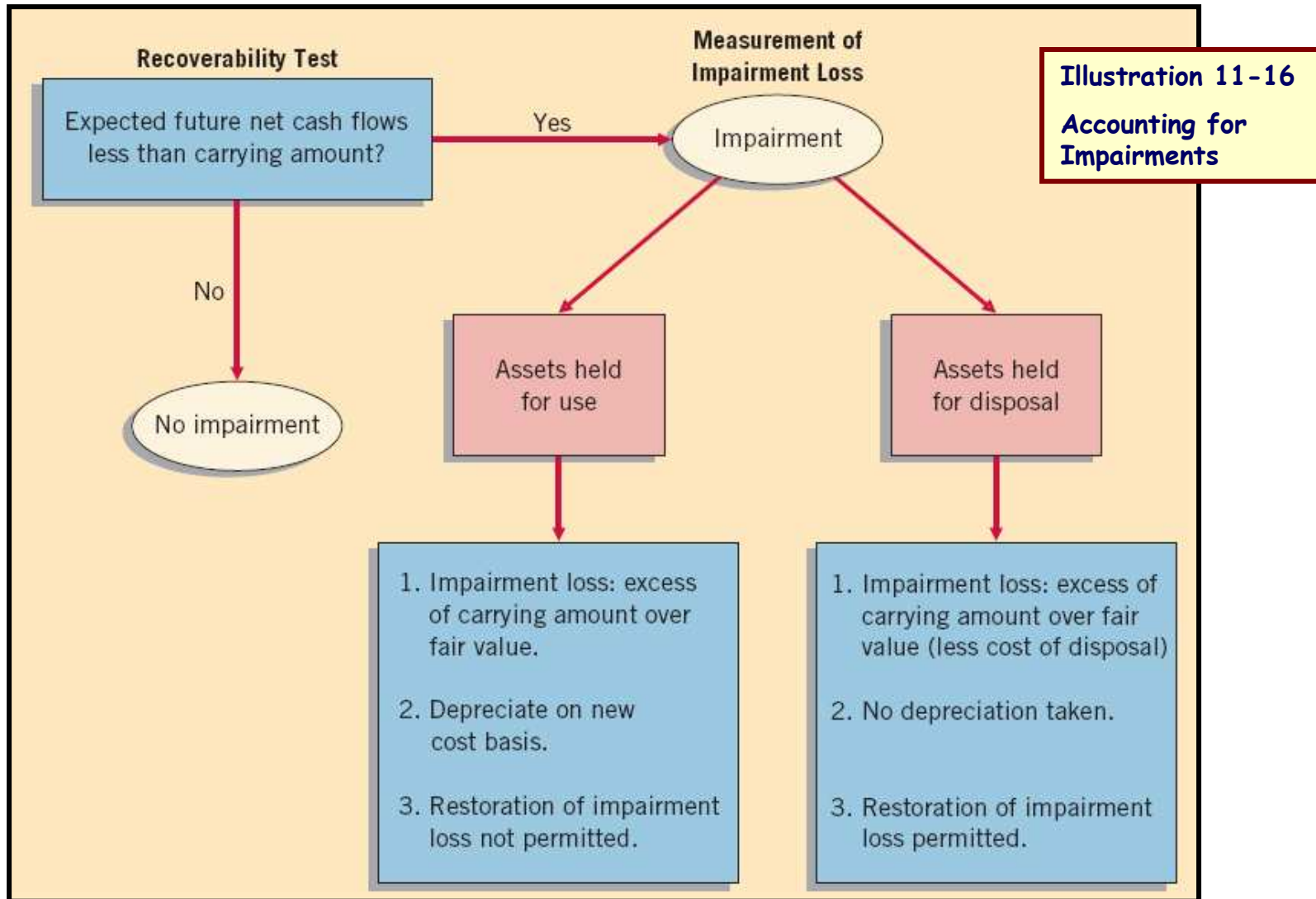
- a. Decrease in the market value of an asset.
- b. Change in the manner in which an asset is used.
- c. Adverse change in legal factors or in the business climate.
- d. An accumulation of costs in excess of the amount originally expected to acquire or construct an asset.
- e. A projection or forecast that demonstrates continuing losses associated with an asset.

# *Impairments*

## **Measuring Impairments**

1. Review events for possible impairment.
2. If the review indicates impairment, apply the recoverability test. If the sum of the expected future net cash flows from the long-lived asset is less than the carrying amount of the asset, an impairment has occurred.
3. Assuming an impairment, the impairment loss is the amount by which the carrying amount of the asset exceeds the fair value of the asset. The fair value is the market value or the present value of expected future net cash flows.

# Impairments



# Impairments

**E11-16 (Impairment)** Presented below is information related to equipment owned by Suarez Company at December 31, 2007. Assume that Suarez will continue to use this asset in the future. As of December 31, 2007, the equipment has a remaining useful life of 4 years.

Cost	\$ 9,000,000
Accumulated depreciation to date	1,000,000
Expected future net cash flows	7,000,000
Fair value	4,800,000

## Instructions:

- (a) Prepare the journal entry (if any) to record the impairment of the asset at December 31, 2007.
- (b) Prepare the journal entry to record depreciation expense for 2008.
- (c) The fair value of the equipment at December 31, 2008, is \$5,100,000. Prepare the journal entry (if any) necessary to record this increase in fair value.

## *Impairments*

(a).	Cost	\$9,000,000
	Accumulated depreciation	1,000,000
	Carrying amount	<hr/> 8,000,000
	Fair value	4,800,000
	Loss on impairment	<hr/> <hr/> \$3,200,000

12/31/07

Loss on impairment	3,200,000	
Accumulated depreciation		3,200,000

## Impairments

(b).	Net carrying amount	\$4,800,000
	Useful life	4 years
	Depreciation per year	<u>\$1,200,000</u>

12/31/08

Depreciation expense	1,200,000	
Accumulated depreciation		1,200,000

(c). Restoration of any impairment loss is not permitted.

# Depletion

**Natural resources**, often called wasting assets, include petroleum, minerals, and timber.

They have two main features:

1. complete removal (consumption) of the asset, and
2. replacement of the asset only by an act of nature.

**Depletion** is the process of allocating the cost of natural resources.



# Depletion

## Establishing a Depletion Base

Computation of the depletion base involves four factors:

- (1) Acquisition cost of the deposit,
- (2) Exploration costs,
- (3) Development costs, and
- (4) Restoration costs.

# Depletion

## Write-off of Resource Cost

Normally, companies compute depletion on a **units-of-production method** (an activity approach). Thus, depletion is a function of the number of units extracted during the period.

Calculation:

$$\frac{\text{Total cost} - \text{Salvage value}}{\text{Total estimated units available}} = \text{Depletion cost per unit}$$
$$\text{Units extracted} \times \text{Cost per unit} = \text{Depletion}$$

# Depletion

**E11-19 (Depletion Computations—Timber)** Stanislaw Timber Company owns 9,000 acres of timberland purchased in 1996 at a cost of \$1,400 per acre. At the time of purchase the land without the timber was valued at \$400 per acre. In 1997, Stanislaw built fire lanes and roads, with a life of 30 years, at a cost of \$84,000. Every year Stanislaw sprays to prevent disease at a cost of \$3,000 per year and spends \$7,000 to maintain the fire lanes and roads. During 1998, Stanislaw selectively logged and sold 700,000 board feet of timber, of the estimated 3,500,000 board feet. In 1999, Stanislaw planted new seedlings to replace the trees cut at a cost of \$100,000.

## Instructions:

Determine the depreciation expense and the cost of timber sold related to depletion for 1998.

# Depletion

## E11-19 (Depletion Computations—Timber)

### Depreciation Expense:

Fire lanes and roads	\$ 84,000
Useful life	30
Depreciation expense per year	<u>\$ 2,800</u>

# Depletion

## E11-19 (Depletion Computations—Timber)

### Depletion:

Cost of timberland per acre	\$ 1,400
Cost of land per acre	(400)
Cost of timber only per acre	<hr/> \$ 1,000
Total acres	9,000
Value of timber	<hr/> \$ 9,000,000
Estimated total board feet	3,500,000
Cost per board foot	<hr/> \$ 2.57
Board feet of timber sold	700,000
Cost of timber sold related to depletion	<hr/> <hr/> \$ 1,800,000

# Depletion

## Continuing Controversy

- Oil and Gas Industry:
- Full cost concept
- Successful efforts concept

## Special Problems in Depletion Accounting

1. Difficulty of estimating recoverable reserves.
2. Problems of discovery value.
3. Tax aspects of natural resources.
4. Accounting for liquidating dividends.

# *Presentation and Analysis*

## **Presentation of Property, Plant, Equipment, and Natural Resources**

Depreciating assets, use Accumulated Depreciation.

Depleting assets may include use of Accumulated Depletion account, or the direct reduction of asset.

---

### **Disclosures**

- Basis of valuation (cost)
- Pledges, liens, and other commitments
- Depreciation expense for the period.
- Balances of major classes of depreciable assets.
- Accumulated depreciation.
- A description of the depreciation methods used.

## *Presentation and Analysis*

**Rate of Return on Assets** measures a firm's success in using assets to generate earnings.

$$\begin{aligned} \text{ROA} &= \frac{\text{Net Income}}{\text{Average Total Assets}} \\ 6.56\% &= \frac{\$56,200}{(\$1,030,400 + 682,400) / 2} \end{aligned}$$



## Presentation and Analysis

The analyst obtains further insight into the behavior of ROA by **disaggregating** it into components of profit margin on sales and asset turnover as follows:

$$\begin{array}{ccccc} \boxed{\text{Rate of Return}} & & & & \boxed{\text{Asset}} \\ \boxed{\text{on Assets}} & = & \boxed{\text{Profit Margin}} & \times & \boxed{\text{Turnover}} \\ & & \boxed{\text{on Sales}} & & \\ \hline \text{Net Income} & = & \text{Net Income} & \times & \text{Sales} \\ \hline \text{Average Total Assets} & = & \text{Sales} & \times & \text{Average Total Assets} \end{array}$$

## Presentation and Analysis

The analyst obtains further insight into the behavior of ROA by **disaggregating** it into components of profit margin on sales and asset turnover as follows:

$$\begin{array}{rcccl} \boxed{\text{Rate of Return}} & & & & \\ \boxed{\text{on Assets}} & = & \boxed{\text{Profit Margin}} & \times & \boxed{\text{Asset}} \\ & & \boxed{\text{on Sales}} & & \boxed{\text{Turnover}} \\ \\ \frac{\$56,200}{(\$1,030,400 + 682,400) / 2} & = & \frac{\$56,200}{\$300,000} & \times & \frac{\$300,000}{(\$1,030,400 + 682,400) / 2} \\ \\ \boxed{6.56\%} & = & \boxed{18.73\%} & \times & \boxed{.3503} \end{array}$$

## Presentation and Analysis

The **profit margin on sales** is a measure of the ability of a firm to generate operating income from a particular level of sales.

$$\begin{array}{ccccc} \boxed{\text{Rate of Return}} & & & & \boxed{\text{Asset}} \\ \boxed{\text{on Assets}} & = & \boxed{\text{Profit Margin}} & \times & \boxed{\text{Turnover}} \\ & & \boxed{\text{on Sales}} & & \\ \hline \text{Net Income} & & \text{Net Income} & & \text{Sales} \\ \hline \text{Average Total Assets} & = & \text{Sales} & \times & \text{Average Total Assets} \\ \\ \boxed{6.56\%} & = & \boxed{18.73\%} & \times & \boxed{.3503} \end{array}$$

## Presentation and Analysis

The **profit margin on sales** is a measure of the ability of a firm to generate operating income from a particular level of sales.

$$\begin{array}{ccccc} \boxed{\text{Rate of Return}} & & & & \boxed{\text{Asset}} \\ \boxed{\text{on Assets}} & = & \boxed{\text{Profit Margin}} & \times & \boxed{\text{Turnover}} \\ & & \boxed{\text{on Sales}} & & \\ \hline \text{Net Income} & & \text{Net Income} & & \text{Sales} \\ \hline \text{Average Total Assets} & = & \text{Sales} & \times & \text{Average Total Assets} \end{array}$$

Differences in the profit margin on sales (from year to year) can be studied by analyzing individual revenues and expenses.

## Presentation and Analysis

The **assets turnover** is a measure of a firm's ability to generate sales from a particular investment in assets.

$$\begin{array}{ccccc} \boxed{\text{Rate of Return}} & & & & \boxed{\text{Asset}} \\ \boxed{\text{on Assets}} & = & \boxed{\text{Profit Margin}} & \times & \boxed{\text{Turnover}} \\ & & \boxed{\text{on Sales}} & & \\ \hline \text{Net Income} & & \text{Net Income} & & \text{Sales} \\ \hline \text{Average Total Assets} & = & \text{Sales} & \times & \text{Average Total Assets} \\ \\ \boxed{6.56\%} & = & \boxed{18.73\%} & \times & \boxed{.3503} \end{array}$$

# *Copyright*

Copyright © 2006 John Wiley & Sons, Inc. All rights reserved. Reproduction or translation of this work beyond that permitted in Section 117 of the 1976 United States Copyright Act without the express written permission of the copyright owner is unlawful. Request for further information should be addressed to the Permissions Department, John Wiley & Sons, Inc. The purchaser may make back-up copies for his/her own use only and not for distribution or resale. The Publisher assumes no responsibility for errors, omissions, or damages, caused by the use of these programs or from the use of the information contained herein.