Chapter 10:
Determining How Costs Behave

Horngren 13e

Types of Cost Behavior Patterns

Summary of Variable and Fixed Cost Behavior		

Total Variable Cost Example

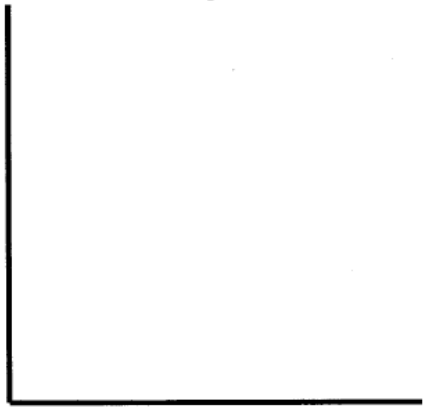
Your total long distance telephone bill is based on how many minutes you talk.

Variable Cost Per Unit Example

The cost per minute talked is
For example, 10 cents per minute.

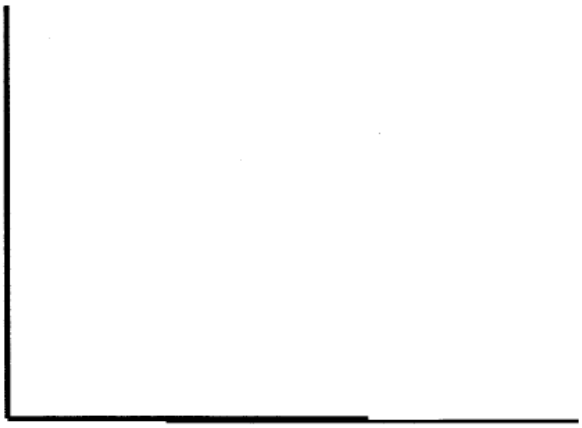
Total Fixed Cost Example

Your monthly basic telephone bill is probably and does not change when you make more local calls.



Fixed Cost Per Unit Example

The fixed cost per local call decreases as more local calls are made.



EXAMPLES OF COSTS THAT ARE NORMALLY

VARIABLE WITH RESPECT TO OUTPUT VOLUME

Merchandising company

Costs of goods (merchandise) sold

Manufacturing company

	Variable elements of MOH:
Direct materials	Indirect materials
	Lubricants
Direct labor*	Supplies
	Power

Both merchandising and manufacturing companies

Variable elements of selling and administrative costs:

Commissions

Shipping costs

TYPES OF FIXED COSTS

- Committed fixed costs relate to investment in plant, equipment, and basic administrative structure. It is difficult to reduce these fixed costs in the short-term. Examples include:
  - Equipment depreciation.
  - Real estate taxes.
  - Salaries of key operating personnel.
- Discretionary fixed costs arise from annual decisions by management to spend in certain areas. These costs can often be reduced in the short-term. Examples include:
  - Advertising.
  - Research.
  - Public relations.
  - Management development programs.

TREND TOWARD FIXED COSTS

The trend is toward greater fixed costs relative to variable costs. The reasons for this trend are:

- Increased automation of business processes.
- Shift from laborers paid by the hour to salaried knowledge workers.

Learning Objective 1: Explain the two assumptions frequently used in cost-behavior estimation . . . cost functions are linear and have a single cost driver

Learning Objective 2: Describe linear cost functions. . . graph of cost function is a straight line and three common ways in which they behave. . . variable, fixed, and mixed

Learning Objective 3: Understand various methods of cost estimation. . . for example, the regression analysis method determines the line that best fits past data

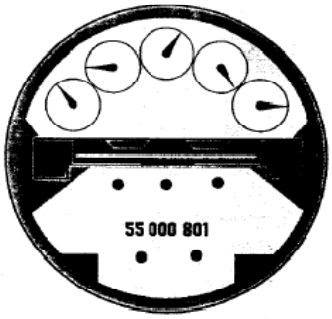
Learning Objective 4: Outline six steps in estimating a cost function using quantitative analysis . . . the end result (step 6) is to evaluate the cost driver of the estimated cost function

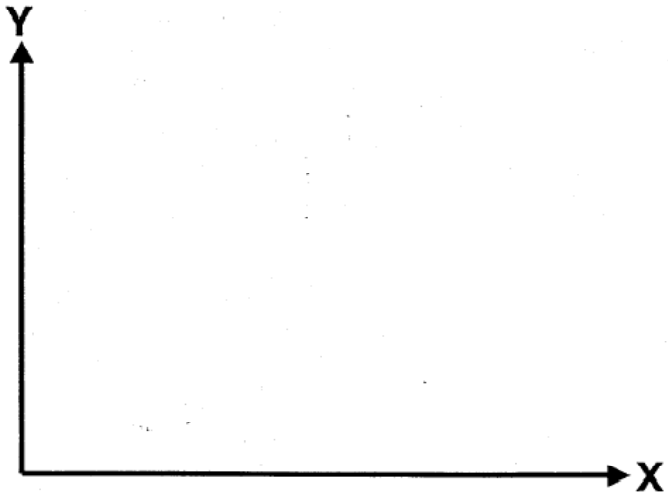
Mixed Costs

A mixed cost has both fixed and variable components.

Consider the following electric utility example.

Mixed Costs





Learning Objective 4: Outline six steps in estimating a cost function using quantitative analysis . . . the end result (step 6) is to evaluate the cost driver of the estimated cost function

Step 1: Choose the dependent variable
Step 2: Identify the independent variable, or cost driver.
Step 3: Collect data on the dependent variable and the cost driver.
Step 4: Plot the data.
Step 5: Estimate the cost function.
Step 6: Evaluate the cost driver of the estimated cost function.

The total mixed cost line can be expressed as an equation:

Where: Y =

a =

b =

X =

The Linear Cost Function

$$y = a + bX$$

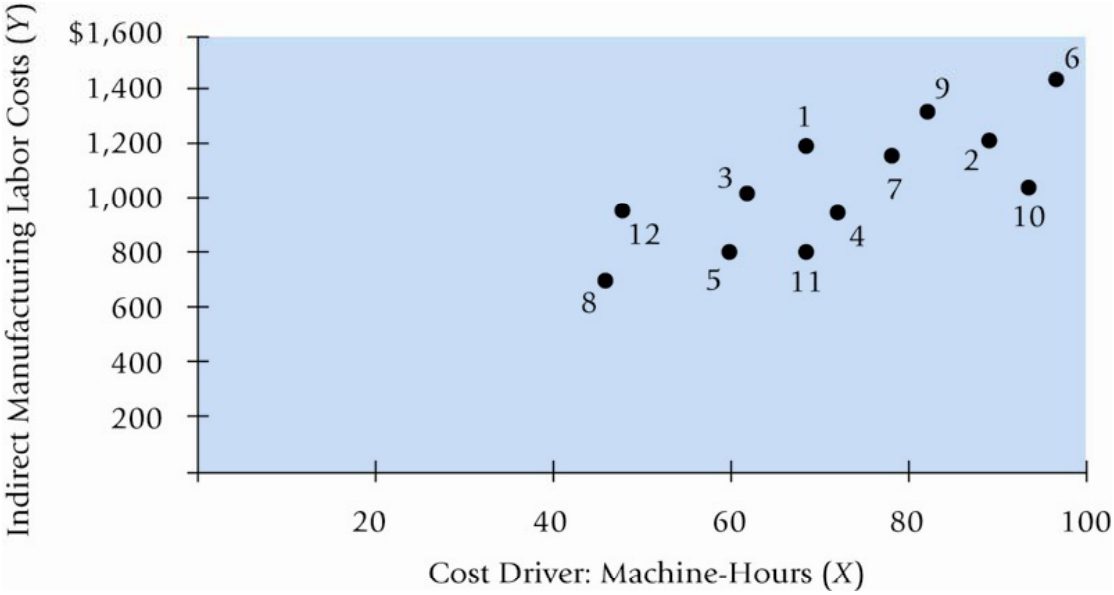
The Dependent Variable: The cost that is being predicted

The Intercept: Fixed Costs

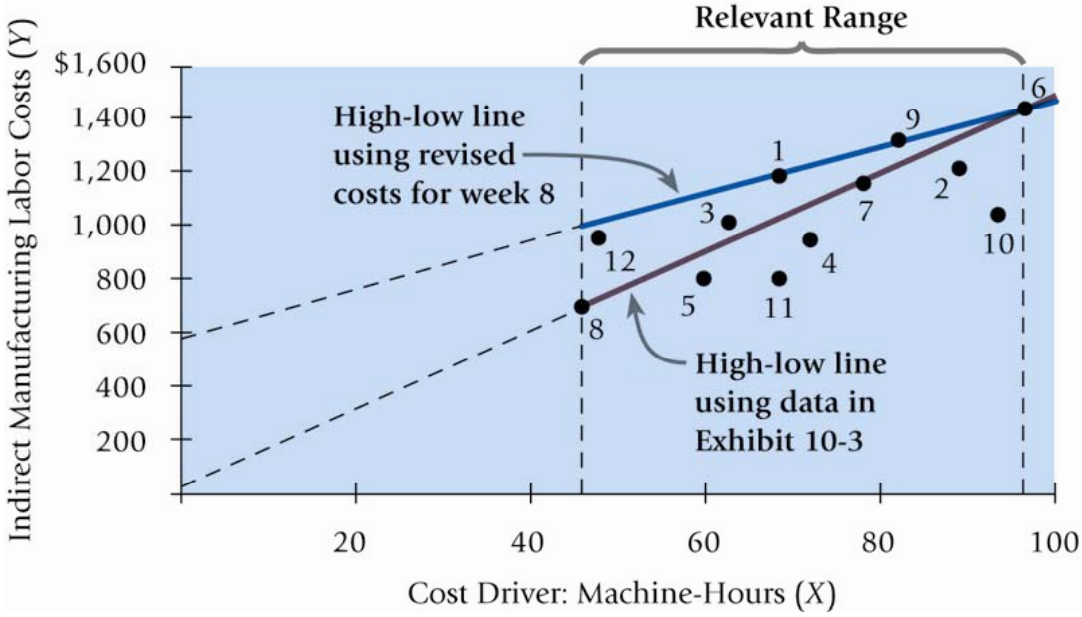
The slope of the line: variable cost per unit

The Independent Variable: The cost driver

Sample Cost – Activity Plot



High – Low Method Plot



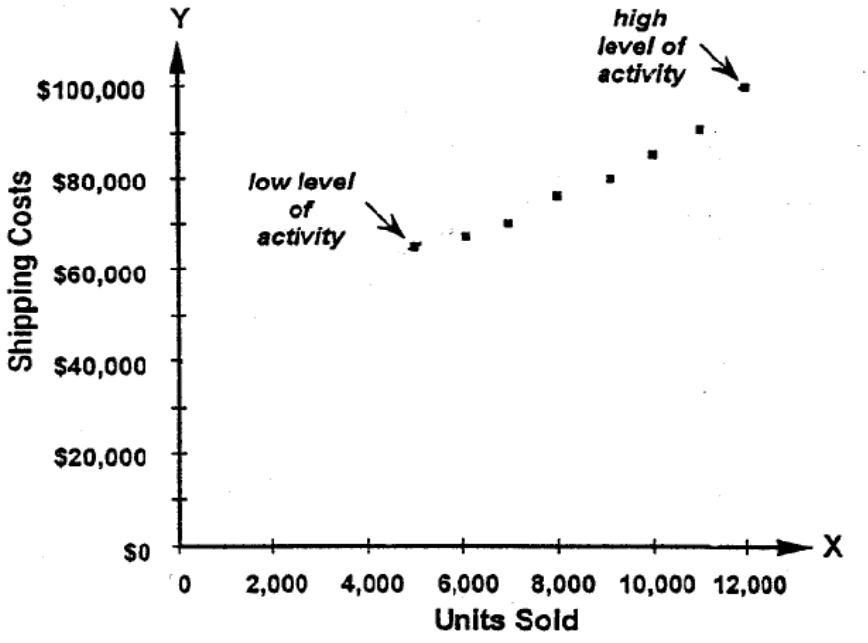
ANALYSIS OF MIXED COSTS: HIGH-LOW METHOD

EXAMPLE: Kohlson Company has incurred the following shipping costs over the past eight months:

	Units Sold	*Shipping Cost*
January...	6,000	$66,000
February.	5,000	$65,000
March	7,000	$70,000
April.....	9,000	$80,000
May.....	8,000	$76,000
June.....	10,000	$85,000
July.....	12,000	$100,000
August	11,000	$87,000

With the high-low method, only the periods in which the lowest activity and the highest activity occurred are used to estimate the variable and fixed components of the mixed cost.

EVALUATION OF THE HIGH-LOW METHOD

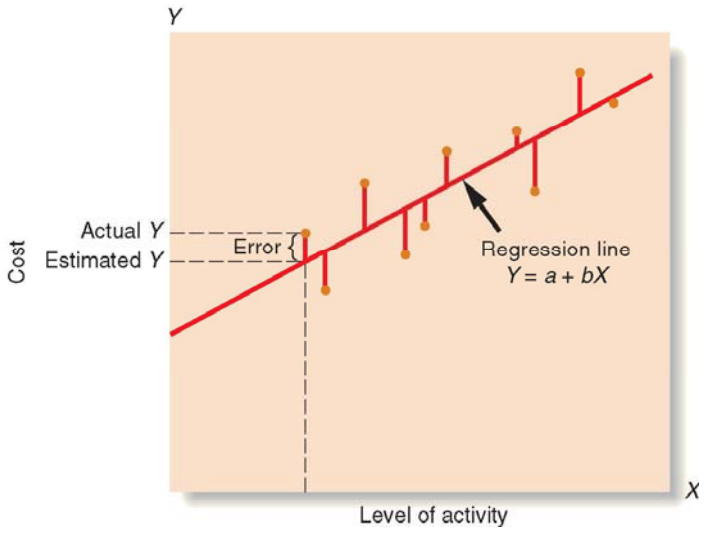


Regression Analysis

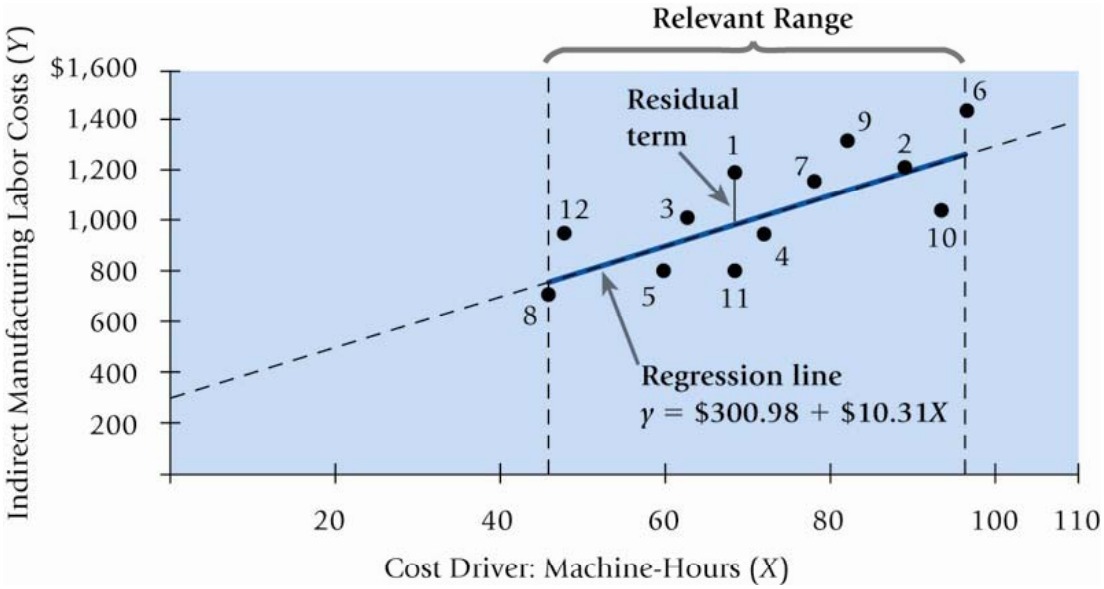
- Regression analysis is a statistical method that measures the average amount of change in the dependent variable associated with a unit change in one or more independent variables
- Is more accurate than the High-Low method because the regression equation estimates costs using information from ***all*** observations; the High-Low method uses only ***two*** observations

LEAST-SQUARES REGRESSION METHOD

The least-squares regression method for analyzing mixed costs uses mathematical formulas to determine the regression line that minimizes the sum of the squared "errors."



Sample Regression Model Plot



The Barnett Company has assembled the following data pertaining to certain costs that cannot be easily identified as either fixed or variable. Barnett Company has heard about a method of measuring cost functions called the high-low method and has decided to use it in this situation.

Cost	Hours
$24,000	5,250
24,000	5,500
36,400	7,500
44,160	9,750
45,000	9,500

What is the cost function?

(a) y = $43,191 + $0.19X
(b) y = $2,430 + $4.28X
(c) y = $4,875 + $5.25X
(d) y = $41,900 + $0.23X

What is the estimated total cost at an operating level of 8,000 hours?

(a) $43,740
(b) $36,670
(c) $37,125
(d) $46,875

Schotte Manufacturing Company uses two different independent variables (machine-hours and number of packages) in two different equations to evaluate costs of the packaging department. The most recent results of the two regressions are as follows:

Machine-hours:

Variable	*Coefficient*	*Standard Error*	*t-Value*
Constant	748.30	341.20	2.19
Independent Variable	52.90	35.20	1.50

$r^2 = 0.33$

Number of packages:

Variable	*Coefficient*	*Standard Error*	*t-Value*
Constant	242.90	75.04	3.24
Independent Variable	5.60	2.00	2.80

$r^2 = 0.73$

Required:

a. What are the estimating equations for each cost driver?
b. Which cost driver is best and why?