Solution of managerial accounting assignment

Business

Chapter 5: Cost Behavior: Analysis and Use As we shall see in later chapters, the ability to predict how costs respond to changes in activity is critical for making decisions, controlling operations, and evaluating performance. Three major classifications of costs were discussed in this chapter??? variable, fixed, and mixed. Mixed costs consist of variable and fixed elements and can be expressed in equation form as $Y = a + bX$, where X is the activity, Y is the cost, a is the fixed cost element, and b is the variable cost per unit of activity.

Several methods can be used to estimate the fixed and variable cost components of a mixed cost using past records of cost and activity. If the relation between cost and activity appears to be linear based on a scatter graph plot, then the variable and fixed components of the mixed cost can be estimated using the quick-and-dirty method, the high-low method, or the least-squares regression method. The quick-and-dirty method is based on drawing a straight line and then using the slope and the intercept of the straight line to estimate the variable and fixed cost components of the mixed cost.

The high-low method implicitly draws a straight line through the points of lowest activity and highest activity. In most situations, the least-squares regression method is preferred to both the quick-and-dirty and high-low methods. Computer software is widely available for using the least-squares regression method. These software applications provide a variety of useful statistics along with estimates of the intercept (fixed cost) and slope (variable cost per unit).

Nevertheless, even when least-squares regression is used, the data should be plotted to confirm that the relationship is really a straight line. Managers use costs organized by behavior to help make many decisions. The contribution format income statement can aid decision making because it classifies costs by cost behavior (i. e. , variable versus fixed) rather than by the functions of production, administration, and sales. In this chapter, the following learning objectives will be covered: In this chapter, the following learning objectives will be covered: | | Understand how fixed and variable costs behave and how to use them to predict costs. | |[pic] | |[pic] | |[pic] | | | | Use a scattergraph plot to diagnose cost behavior. |[pic] | |[pic] | |[pic] | | | | Analyze a mixed cost using the high-low method. |[pic] | |[pic] | |[pic] | | | | Prepare an income statement using the contribution format. |[pic] | |[pic] | | [pic] | | | |(Appendix 5A) Analyze a mixed cost using the least-squares regression method. | Key terms: Account analysis???? | A method for analyzing cost behavior in which an account is classified as either variable or fixed based on | | | the analyst's prior knowledge of how the cost in the account behaves. | |[pic] | |[pic] | |[pic] | | Activity base???? | A measure of whatever causes the incurrence of a variable cost.

For example, the total cost of X-ray film in a| | | hospital will increase as the number of X-rays taken increases. Therefore, the number of X-rays is the | | | activity base that explains the total cost of X-ray film. |[pic] | |[pic] | |[pic] | | Committed fixed costs???? | Investments in facilities, equipment, and basic organizational structure that can't be significantly reduced | | | even for short periods of time without making fundamental changes. |[pic] | |[pic] | |[pic] | |

Contribution approach???? | An income statement format that organizes costs by their behavior.

Costs are separated into variable and fixed| | | categories rather than being separated according to organizational functions. | |[pic] | |[pic] | |[pic] | | Contribution margin???? | The amount remaining from sales revenues after all variable expenses have been deducted. |[pic] | |[pic] | |[pic] | | Cost structure???? | The relative proportion of fixed, variable, and mixed costs in an organization. |[pic] | |[pic] | |[pic] | | Dependent variable???? | A variable that responds to some causal factor; total cost is the dependent variable, as represented by the | | | letter Y, in the equation Y = a + bX. |[pic] | |[pic] | | [pic] | | Discretionary fixed costs???? | Those fixed costs that arise from annual decisions by management to spend on certain fixed cost items, such as| | | advertising and research. |[pic] | |[pic] | |[pic] | | Engineering approach???? | A detailed analysis of cost behavior based on an industrial engineer's evaluation of the inputs that are | | | required to carry out a particular activity and of the prices of those inputs. |[pic] | |[pic] | |[pic] | | High-low method???? | A method of separating a mixed cost into its fixed and variable elements by analyzing the change in cost | | | between the high and low activity levels. |[pic] | |[pic] | |[pic] | | Independent variable???? | A variable that acts as a causal factor; activity is the independent variable, as represented by the letter X,| | | in the equation Y = a + bX. |[pic] | |[pic] | | [pic] | | Least-squares regression | A method of separating a mixed cost into its fixed and variable elements by fitting a regression line that | | method???? | minimizes the sum of the squared errors. |[pic] | |[pic] | |[pic] | | Linear cost behavior???? | Cost behavior is said to be linear whenever a straight line is a

reasonable approximation for the relation | | | between cost and activity. | [pic] | |[pic] | |[pic] | | Mixed cost???? | A cost that contains both variable and fixed cost elements. |[pic] | |[pic] | |[pic] | | Multiple regression???? | An analytical method required when variations in a dependent variable are caused by more than one factor. |[pic] | |[pic] | |[pic] | | R 2???? | A measure of goodness of fit in least-squares regression analysis. It is the percentage of the variation in | | | the dependent variable that is explained by variation in the independent variable. |[pic] | |[pic] | |[pic] | | Relevant range???? | The range of activity within which assumptions about variable and fixed cost behavior are reasonably valid. |[pic] | |[pic] | |[pic] | | Step-variable cost???? | The cost of a resource that is obtainable only in large chunks and that increases and decreases only in | | | response to fairly wide changes in activity. | Review Problem 1: Cost behavior Neptune Rentals offers a boat rental service.

Consider the following costs of the company over the relevant range of 5, 000 to 8, 000 hours of operating time for the boats: | Hours of operating time | | | 5, 000 | 6, 000 | 7, 000 | 8, 000 | | Total costs: | | | | | | Variable costs | $20, 000 |$? $? |$? | | Fixed costs |$1, 68, 000 |$? |$? |$? | | Total costs | $1, 88, 000 |$? |$? |$? | | Cost per hour: | | | | | | Variable cost |$? |$? |$? |$? | | Fixed cost |$? |$? |$? $? | | Total cost per hour |$? |$? |$? |$? | Required: Compute the missing amount assuring that cost behavior patterns remain same within the relevant range of 5, 000 to 8, 000 hours. Solution to Review Problem 1: Per Unit Variable Cost = 20, 000/5, 000= 4. 00 per Unit. | Hours of operating time | | | 5, 000hr 6, 000hr | 7, 000hr | 8, 000hr | | Total Costs Variable costs |$20, 000 |$24, 000 |$28, 000 |$32, 000 | | Fixed costs |

1, 68, 000 | 1, 68, 000 | 1, 68, 000 | 1, 68, 000 | | Total costs |$1, 88, 000 |$1, 92, 000 |$1, 96, 000 |$2, 00, 000 | | Cost per hour: |$4. 0 |$4. 00 |$4. 00 |$4. 00 | | Variable cost | | | | | | Fixed cost | 33. 60 | 28. 00 | 24. 00 | 21. 00 | | Total cost per hour |$37. 60 |$32. 00 |$28. 00 |$25. 0 | Review problem 2: High Low Method The administrative of azalea hills hospitals would like a cost formula linking the costs involved in admitting patients to the number of patients admitted during a month. The admitting department's costs and number of patients admitted during the immediately preceding eight month are given in the following table: | Month | number of patients | admitted dep.

Costs | | May | 1, 800 | 14, 700 | | June | 1, 900 | 15, 200 | | July | 1, 700 | 13, 700 | | August | 1, 600 | 14, 000 | | September | 1, 500 | 14, 300 | | October | 1, 300 | 13, 100 | | Nov | 1, 100 | 12, 800 | | Dec | 1, 500 | 14, 600 | Required: 1. Use the high low method to establish the fixed and variable components of admitting costs. 2. Express the fixed and variable components of admitting costs as a formula in the linear equation form: Y= a+bx. Solution to Review Problem 2 1. | Number of Patients Admitted | Admitting Department cost | | High activity level (June) |$1, 900 | 15, 200 | | Low activity level (November) | 1, 100 | 12, 800 | | Change |$800 |$2, 400 | Variable cost per unit of activity: Variable Cost = 2, 400 / 800 = 3 Fixed cost = Total cost ??? variable cost = 15, 200 ??? (3*1, 900) = 9, 500 2. The cost formula expressed in the linear equation form is: Y= $9, 500+$3X Problem 5-12 House of Organs, Inc purchases organs from a well-known manufacturer and sells them at the retail level. The organs sell, on the average, for $2500 each. The average cost of an organ from the manufacturer is $1500. House of Organs, Inc has always kept careful records of its costs. The costs that the

company incurs in a typical month are presented below in the form of a spreadsheet Costs | Cost Formula | | Selling: | | Advertising |$950 per month | | Delivery of organs |$60 per organ sold | | Sales salaries and commissions | $4, 600 per month plus 4% interest | | Utilities |$650 per month | | Depreciation of sales facilities |$5, 000 per month | | Administrative: | | Executive salaries |$13, 500 per month | | Depreciation of equipment |$900 per month | | Clinical |$2, 500 per month plus $40 per organ sold | | Insurance |$700 per month | During November, the company sold and delivered 60 organs. Required: 1.

Prepare an income statement for November using the traditional format with costs organized by function. 2. Redo (1) above, this time using the contribution format with costs organized by behavior. Show costs and revenues on both a total and per unit basis down through contribution margin. 3. Refer to the income statement prepared in (2) above. Why might it be misleading to show the fixed costs on a per unit basis? Solution 5-12 1. House of Organs, Inc. Income Statement For the Month Ended November 30 | Sales (60 organs ? $2, 500 per organ) | |$1, 50, 000 | | Cost of goods sold (60 organs ? 1, 500 per organ) | | 90, 000 | | Gross margin | | 60, 000 | | Selling and administrative expenses: | | | | Selling expenses: | | | | Advertising | $???????? 950 | | | Delivery of organs (60 organs ? $60 per organ) | 3, 600 | | | | Sales salaries and commissions [$4, 800 + (4% ? 150, 000)] | 10, 800 | | | Utilities | 650 | | | Depreciation of sales facilities | 5, 000 | | | Total selling expenses | 21, 000 | | | Administrative expenses: | | | | Executive salaries | 13, 500 | | | Depreciation of office equipment | 900 | | | Clerical [$2, 500 + (60 organs ? 40 per organ)] | 4, 900 | | | | Insurance | 700 | | | Total

administrative expenses | 20, 000 | | | Total selling and administrative expenses | | 41, 000 | | Net operating income | |$? 19, 000 | 2. House of Organs, Inc. Income Statement For the Month Ended November 30 | | Total | Per Unit | | Sales (60 organs $2, 500 per organ) |$1, 50, 000 |$2, 500 | | Variable expenses: | | | | Cost of goods sold (60 organs ? $1, 500 per organ) | 90, 000 | 1, 500 | | Delivery of organs (60 organs ? $60 per organ) | 3, 600 | 60 | | Sales commissions (4% ? $150, 000) | 6, 000 | 100 | | Clerical (60 organs ? 40 per organ) | 2, 400 | 40 | | Total variable expenses | 1, 02, 000 | 1, 700 | | Contribution margin | 48, 000 |$???? 800 | | Fixed expenses: | | | | Advertising | 950 | | | Sales salaries | 4, 800 | | | Utilities | 650 | | | Depreciation of sales facilities | 5, 000 | | | Executive salaries | 13, 500 | | | Depreciation of office equipment | 900 | | | Clerical | 2, 500 | | | Insurance | 700 | | | Total fixed expenses | 29, 000 | | | Net operating income |$?? 19, 000 | | 3. Fixed costs remain constant in total but vary on a per unit basis with changes in the activity level. Problem 5-15: High-Low Method, Predicting Cost Golden Company's total overhead costs at various levels of activity are presented below: Month | Machine-Hours | Total Overhead Costs | | March | 50, 000 |$1, 94, 000 | | April | 40, 000 | 1, 70, 200 | | May | 60, 000 | 2, 17, 800 | | June | 70, 000 | 2, 41, 600 | Assume that the overhead costs above consist of utilities, supervisory salaries, and maintenance. The breakdown of these costs at the 40000 machine-hour level of activity is as follows: | Utilities (variable)……………………….. |$52, 000 | | Supervisory salaries (fixed) ……………. | 60, 000 | | Maintenance (mixed)…………………….. | 58, 200 | | Total overhead costs…………………….. $1, 70, 200 | The company wants to break down the maintenance cost into its basic variable and fixed cost elements. Required: 1. As shown above overhead costs in June amounted to

$241600. Estimate how much of this consisted of maintenance cost. (Hint to do this, it may be helpful to first determine how much of the $241600 consisted of utilities and supervisory salaries. 2. Using the high-low method, estimate a cost formula for maintenance. 3. Express the company's total overhead costs in the linear equation form Y= a+bx. 4. What total overhead costs would expect to be incurred at an operating activity level of 45000 machine-hours. Solution 5-15 . Maintenance cost at the 70, 000 machine-hour level of activity can be isolated as follows: | | Level of Activity | | | 40, 000 MH | 70, 000 MH | | Total factory overhead cost |$1, 70, 200 |$2, 41, 600 | | Deduct: | | | | Utilities cost @ $1. 0 per MH* | 52, 000 | 91, 000 | | Supervisory salaries | 60, 000 | 60, 000 | | Total maintenance cost at the low activity level |$?? 58, 200 |$?? 90, 600 | |$58, 200 | | | | | | | *$52, 000 ? 40, 000 = $1. 30 per MH 2.

High-low analysis of maintenance cost: | | Maintenance Cost | Machine-Hours | | High activity level |$90, 600 | 70, 000 | | Low activity level | 58, 200 | 40, 000 | | Change |$32, 400 | 30, 000 | Variable cost per unit of activity: [pic] Total fixed cost: Therefore, the cost formula is $15, 000 per month plus $1. 8 per machine-hour or Y = $15, 000 + $1. 08X, where X represents machine-hours. 3. | | Variable Rate per Machine-Hour | Fixed Cost | | Maintenance cost |$1. 08 |$15, 000 | | Utilities cost | 1. 30 | | | Supervisory salaries cost | | 60, 000 | | Totals |$2. 8 |$75, 000 | Therefore, the cost formula would be $75, 000 plus $2. 38 per machine-hour, or Y = $75, 000 + $2. 38X. 4. | Fixed costs |$? 75, 000 | | Variable costs: $2. 38 per MH ? 45, 000 MHs | 1, 07, 100 | | Total overhead costs |$1, 82, 100 | Problem 5-17: High-Low Method cost of Goods Manufactured. NuWay. Inc, manufactures a single product. Selected

data from the company's cost records for two recent months are given below. | Level of Activity | | | July-Low | | | October-High | | | | | Number of units produced | 9, 000 | | | 12, 000 | | Cost of goods manufactured | | | |$2, 85, 000 | | Work in process inventory, beginning | 3, 90, 000 | | | | | Work in process inventory, ending | 14, 000 | | | 22, 000 | | Direct materials cost per unit | | | | 25, 000 | | Direct labor cost per unit | 15, 000 | | | | | Manufacturing overhead cost, total | 15 | | 15 | | | | | | 6 | | | 6 | | | | | |? | |? | | | | The company's manufacturing overhead cost consists of both variable and fixed cost elements. In order to have data available for planning, management wants to determine how much of the overhead cost is variable with units produced and how much of it is fixed per year. Required: 1. For both July and October, estimate the amount of manufacturing overhead cost added to production. The company had no under-or over applied overhead in either month. Hint: A useful way to proceed might be to construct a schedule of cost goods manufactured.) 2. Using the high low method of cost analysis, estimate a cost formula for manufacturing overhead. Express the variable portion of the formula in terms of a variable rate per unit of product. 3. If 9500 units were produced during a month, what would be the cost of goods manufactured? (Assume that the company's beginning work in process inventory for the month is $16000 and that its ending work in process inventory is $19000. Also, assume that there is no under or over applied overhead cost for the month. Solution 5-17: High Low Method, COGM 1. Nu Way Inc. Schedule of Cost of Goods Manufactured | July??? Low | October??? High | | | 9, 000 Units | 12, 000 Units | | Direct materials cost @ $15 per unit | $1, 35, 000 | |$1, 80, 000 | | | Direct labor cost @ $6 per unit | 54, 000 | | 72, 000 | | | Manufacturing overhead cost | 1, 07, 000 |* | 1, 31, 000 |* | | Total

manufacturing costs | 2, 96, 000 | | 3, 83, 000 | | | Add: Work in process, beginning | 14, 000 | | 22, 000 | | | | 3, 10, 000 | | 4, 05, 000 | | | Deduct: Work in process, ending | 25, 000 | | 15, 000 | | | Cost of goods manufactured |$2, 85, 000 | |$3, 90, 000 | | 2. | | Units Produced | Cost Observed | | | October??? High level of activity | 12, 000 |$1, 31, 000 | | | July??? Low level of activity | 9, 000 | 1, 07, 000 | | | Change | 3, 000 |$?? 24, 000 | [pic] | Total cost at the high level of activity |$1, 31, 000 | | Less variable cost element ($8 per unit ? 12, 000 units) | 96, 000 | | Fixed cost element |$???? 35, 000 |

Therefore, the cost formula is: $35, 000 per month plus $8 per unit produced, or Y = $35, 000 + $8X, where X represents the number of units produced. 1. The cost of goods manufactured if 9, 500 units are produced: Nu Way Inc. Schedule of Cost of Goods Manufactured | Direct materials cost (9, 500 units ? $15 per unit) | |$1, 42, 500 | | Direct labor cost (9, 500 units ? $6 per unit) | | 57, 000 | | Manufacturing overhead cost: | | | | Fixed portion | $35, 000 | | | Variable portion (9, 500 units ? 8 per unit) | 76, 000 | 1, 11, 000 | | Total manufacturing costs | | 3, 10, 500 | | Add: Work in process, beginning | | 16, 000 | | | | 3, 26, 500 | | Deduct: Work in process, ending | | 19, 000 | | Cost of goods manufactured | |$3, 07, 500 | Edition 11: Problem 5-18: Marwicks pianos inc. purchase pianos from a large manf. And sells them at the retail level . the pianos cost on the average $2450 each from the mnf. Marwicks pianos inc. sell the pianos to its customers at an average price of $3125 each . the selling and administrative costs that the company incurs in a typical month are presented below: Costs | Cost Formula | | Selling | | | Advertising |$700 per month | | Delivery of organs |$30 per organ sold | | Sales salaries and commissions |$950 per month plus 4% interest | | Utilities

|$350 per month | | Depreciation of sales facilities |$800 per month | | Administrative: | | | Executive salaries |$2, 500 per month | | Depreciation of equipment |$400 per month | | Clinical |$1, 000 per month plus $20 per organ sold | | Insurance |$300 per month |

During august, marwicks pianos inc. sold and delivered 40 pianos REQUIRED: 1. Prepare income statement for marwicks pianos inc. for august. Use the traditional format, with cost organized by function. 2. Redo 1 above, this time using the contribution format, with cost organized by behavior. Show costs and revenues on both a total and a per unit basisdown through contribution margin. 3. Refer to the income statement you preferred in 2 above. Why might it be misleading to show the fixed costs on a per unit basis? Problem 5-19: Amfac comp. manf. A single product. The company keeps careful records of manufacturing activities from which the following inf. Have been extracted. | Level of Activity | | | March ??? low | | | June ??? high | | | | | Number of units produced | 6, 000 | | | 9, 000 | | Cost of goods manufactured | | | |$1, 68, 000 | | Work in process inventory, beginning | 2, 57, 000 | | | | | Work in process inventory, ending | 9, 000 | | | 32, 000 | | Direct materials cost per unit | | | 15, 000 | | Direct labor cost per unit | 21, 000 | | | | | Manufacturing overhead cost, total | 6 | | | 6 | | | | | | 10 | | | 10 | | | | | |? | | |? | | | | Required: For the both March and June, estimate the amount of manufacturing overhead cost added to production. The comp. had no under O. H . IN either month Using the high low method, estimate a cost formula for manf. O. H. expresses the variable portion of the formula in terms of a variable rate per unit of product. If 7000 units are produced during a month, what would be the cost of good manufacture? Work in process is same.

Problem 5-24 High-Low Method; Predicting cost [L01, L03] Nova Company's total overhead costs at various levels of activity are resented below: | Month | Machine-Hours | Total Overhead Costs | | April | 70, 000 |$1, 98, 000 | | May | 60, 000 | 1, 74, 000 | | June | 80, 000 | 2, 22, 000 | | July | 90, 000 | 2, 46, 000 | Assume that total overhead costs above consist of utilities, supervisory salaries and maintenance. The breakdown of these costs at the 60, 000 machine- hour level of activity is: | Utilities (variable)............................ | $48, 000 | | Supervisory salaries (fixed)................ |$21, 000 | | Maintenance (mixed).......................... |$1, 05, 000 | | Total overhead costs............................ |$1, 74, 000 |

Nova Company's management wants to break down the maintenance cost into its variable and fixed cost elements. Required: 1. Estimate how much of the $246, 000 of overhead cost in July was maintenance cost. (Hint: to do this, it may be helpful to first determine how much of the $246, 000 consisted of utilities and supervisory salaries. Think about the behavior of variable and fixed costs!) 2. Using the high-low method, estimate a cost formula for maintenance. 3. Express the company's total overhead costs in the linear equation form 4. Y= a + bX 5. What total over head costs would you expect to be incurred at an operating activity level of 75, 000 machine-hours? ——————– Page4