

Chapter 5 – Cost Estimation Exam Prep Handout

1. Hagler's Toupees has the following machine hours and production costs for the last six months of last year:

<u>Month</u>	<u>Machine Hours</u>	<u>Production Cost</u>
July	15,000	\$12,075
August	13,500	10,800
September	11,500	9,580
October	15,500	12,080
November	14,800	11,692
December	12,100	9,922

If Hagler expects to incur 14,000 machine hours in January, what will be the estimated total production cost using the high-low method?

- A. \$8,750.00
- B. \$11,142.50
- C. \$22,400.00
- D. \$10,889.10

2. The Business School at Eastern College is accumulating data as a first step in the preparation of next year's budget development. One cost that is being looked at closely is administrative costs as a function of student credit hours. Data on administrative costs and credit hours for the past thirteen months are shown below:

Month	Administrative Costs	Credit Hours
July	\$129,301	250
August	82,613	115
September	225,580	1,392
October	216,394	1,000
November	258,263	1,309
December	184,449	1,112
January	219,137	1,339
February	245,000	1,373
March	209,642	1,064
April	191,925	1,123
May	249,978	1,360
June	170,418	420
July	128,167	315
Total	\$2,510,867	12,172
Average	\$193,144	936

The controller's office has analyzed the data and has given you the results from the regression analysis:

SUMMARY OUTPUT								
<i>Regression Statistics</i>								
Multiple R	0.93346722							
R Square	0.87136104							
Adjusted R Square	0.85968659							
Standard Error	19943.5805							
Observations	13							
<i>ANOVA</i>								
	<i>df</i>	<i>SS</i>	<i>MS</i>	<i>F</i>	<i>Significance F</i>			
Regression	1	29636340628	2.96363E+10	74.5106436	3.14788E-06			
Residual	11	4375210454	397746405					
Total	12	34011551082						
	<i>Coefficients</i>	<i>Standard Error</i>	<i>t-Stat</i>	<i>P-value</i>	<i>Lower 95%</i>	<i>Upper 95%</i>	<i>Lower 95.0%</i>	<i>Upper 95.0%</i>
Intercept	\$96,409.42	12521.26261	7.69965611	9.381E-06	68850.28899	123968.543	68850.289	123968.543
Credit Hours	\$103.56	11.9974027	8.6319548	3.1479E-06	77.15491912	129.967156	77.1549191	129.967156

If the controller uses the high-low method to estimate costs, the cost equation for administrative salaries is:

- A. Cost = \$96,409.42 + \$103.56 × Credit-hours.
- B. Cost = \$69,474.40 + \$114.30 × Credit-hours.
- C. Cost = \$201.21 × Credit-hours.
- D. Cost = \$198,808.

3. Thul Company is interested in establishing the relationship between electricity costs and machine hours. Data have been collected and a regression analysis prepared using Excel. The monthly data and the regression output follow:

Month	Machine Hours	Electricity Costs				
January	2,500	18,400				
February	2,900	21,000				
March	1,900	13,500				
April	3,100	23,000				
May	3,800	28,250				
June	3,300	22,000				
July	4,100	24,750				
August	3,500	22,750				
September	2,000	15,500				
October	3,700	26,000				
November	4,700	31,000				
December	4,200	27,750				
SUMMARY OUTPUT						
<i>Regression Statistics</i>						
Multiple R	.965					
R Square	.932					
Adjusted R Square	.925					
Standard Error	1,425.18					
Observations	12.00					
	<i>Coefficients</i>	<i>Standard Error</i>	<i>t Stat</i>	<i>P-value</i>	<i>Lower 95%</i>	<i>Upper 95%</i>
Intercept	3,726.88	1,682.82	2.21	0.05	(22.69)	7,476.45
Machine Hours	5.77	0.49	11.7	0.00	4.67	6.87

If the controller uses regression analysis to estimate costs, the cost equation for electricity cost is:

- A. Cost = \$1,425.18 + \$12.00 × Machine-hours.
- B. Cost = \$3,726.88 + \$1,682.82 × Machine-hours.
- C. Cost = \$1,682.82 + \$0.49 × Machine-hours.
- D. Cost = \$3,726.88 + \$5.77 × Machine-hours.

E 5-39. Interpretation of Regression Results: Simple Regression (LO 5-5)

A local restaurant, Fred's Fish Fry, is estimating nonfood kitchen costs (labor, supervision, utilities, etc.) based on food cost. Data were gathered for the past 24 months and analyzed using a spreadsheet program. The following output was generated:

Equation	
Intercept	\$14,000
Coefficient on food cost	225%
Statistical data	
Correlation coefficient	0.483
R^2	0.233

The company is planning to operate at a level of \$15,000 of food costs per month for the coming year.

Required

- Use the regression output to write the nonfood cost equation.
- Based on the cost equation, compute the estimated nonfood kitchen costs (labor, supervision, utilities, etc.) per month for the coming year.
- Fred has asked you for advice on whether he should rely on the estimate. What will you say?

P 5-54. Methods of Cost Analysis: Account Analysis, Simple and Multiple Regression Using a Spreadsheet (Appendix A) (LO 5-3, 4, 5, 7, 8)

Caiman Distribution Partners is the Brazilian distribution company of a U.S. consumer products firm. Inflation in Brazil has made bidding and budgeting difficult for marketing managers trying to penetrate some of the country's rural regions. The company expects to distribute 450,000 cases of products in Brazil next month. The controller has classified operating costs (excluding costs of the distributed product) as follows:

Account	Operating Cost	Behavior
Supplies	\$ 350,000	All variable
Supervision	215,000	\$150,000 fixed
Truck expense	1,200,000	\$190,000 fixed
Building leases	855,000	\$550,000 fixed
Utilities	215,000	\$125,000 fixed
Warehouse labor	860,000	\$140,000 fixed
Equipment leases	760,000	\$600,000 fixed
Data processing equipment	945,000	All fixed
Other	850,000	\$400,000 fixed
Total	<u>\$6,250,000</u>	

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Although overhead costs were related to revenues throughout the company, the experience in Brazil suggested to the managers that they should incorporate information from a published index of Brazilian prices in the distribution sector to forecast overhead in a manner more likely to capture the economics of the business.

Following instructions from the corporate offices, the controller's office in Brazil collected the following information for monthly operations from last year:

Month	Cases	Price Index	Operating Costs
1	345,000	115	\$5,699,139
2	362,000	117	5,806,638
3	358,000	118	5,849,905
4	380,000	122	5,927,617
5	374,000	124	5,939,135
6	395,000	125	6,043,364
7	367,000	128	5,918,495
8	412,000	133	6,133,868
9	398,000	133	6,126,130
10	421,000	132	6,186,625
11	417,000	136	6,208,799
12	432,000	139	6,362,255

These data are considered representative for both past and future operations in Brazil.

Required

- a. Prepare an estimate of operating costs assuming that 450,000 cases will be shipped next month based on the controller's analysis of accounts.
- b. Use the high-low method to prepare an estimate of operating costs assuming that 450,000 cases will be shipped next month.
- c. Prepare an estimate of operating costs assuming that 450,000 cases will be shipped next month by using the results of a simple regression of operating costs on cases shipped.
- d. Prepare an estimate of operating costs assuming that 450,000 cases will be shipped next month by using the results of a multiple regression of operating costs on cases shipped and the price level. Assume a price level of 145 for next month.
- e. Make a recommendation to the managers about the most appropriate estimate given the circumstances.

P 5-51. Interpretation of Regression Results: Simple Regression (LO 5-5)

Your company provides a variety of delivery services. Management wants to know the volume of a particular delivery that would generate \$10,000 per month in operating profits before taxes. The company charges \$20 per delivery.

The controller's office has estimated overhead costs at \$9,000 per month for fixed costs and \$12 per delivery for variable costs. You believe that the company should use regression analysis. Your analysis shows the results to be:

$$\text{Monthly overhead} = \$26,501 + \$10.70 \text{ per delivery}$$

Your estimate was based on the following data:

Month	Overhead Costs	Number of Deliveries
1.....	\$142,860	11,430
2.....	151,890	12,180
3.....	192,600	15,660
4.....	141,030	11,250
5.....	203,490	12,780
6.....	180,630	14,730
7.....	159,630	12,510
8.....	183,990	15,060
9.....	194,430	15,450
10.....	150,120	11,970
11.....	154,080	12,630
12.....	184,800	15,300
13.....	183,120	14,580

The company controller is somewhat surprised that the cost estimates are so different. You have been asked to recheck your work and see if you can figure out the difference between your results and the controller's results.

Required

- Analyze the data and your results and state your reasons for supporting or rejecting your cost equation.
- Write a report that informs management about the correct volume that will generate \$10,000 per month in operating profits before taxes.

INTEGRATIVE CASE

Case 5-57. Cost Estimation, CVP Analysis, and Decision Making (LO 5-4, 5, 8)

Luke Corporation produces a variety of products, each within their own division. Last year, the managers at Luke developed and began marketing a new chewing gum, Bubbs, to sell in vending machines. The product, which sells for \$5.25 per case, has not had the market success that managers expected and the company is considering dropping Bubbs.

The product-line income statement for the past twelve months follows:

Revenue		\$14,682,150
Costs		
Manufacturing costs	\$14,440,395	
Allocated corporate costs (@5%) ...	<u>734,108</u>	<u>15,174,503</u>
Product-line margin		\$ (492,353)
Allowance for tax (@20%)		<u>98,470</u>
Product-line profit (loss)		<u>\$ (393,883)</u>

All products at Luke receive an allocation of corporate overhead costs, which is computed as 5 percent of product revenue. The 5 percent rate is computed based on the most recent year's corporate cost as a percentage of revenue. Data on corporate costs and revenues for the past two years follow:

	Corporate Revenue	Corporate Overhead Costs
Most recent year	\$106,750,000	\$5,337,500
Previous year	\$ 76,200,000	4,221,000

Roy O. Andre, the product manager for Bubbs, is concerned about whether the product will be dropped by the company and has employed you as a financial consultant to help with some analysis. In addition to the information given on the previous page, Mr. Andre provides you with the following data on product costs for Bubbs:

Month	Cases	Production Costs
1	207,000	\$1,139,828
2	217,200	1,161,328
3	214,800	1,169,981
4	228,000	1,185,523
5	224,400	1,187,827
6	237,000	1,208,673
7	220,200	1,183,699
8	247,200	1,226,774
9	238,800	1,225,226
10	252,600	1,237,325
11	250,200	1,241,760
12	259,200	1,272,451

Required

- a. Bunk Stores has requested a quote for a special order of Bubbs. This order would not be subject to any corporate allocation (and would not affect corporate costs). What is the minimum price Mr. Andre can offer Bunk without reducing profit any further?
- b. How many cases of Bubbs does Luke have to sell in order to break even on the product?
- c. Suppose Luke has a requirement that all products have to earn 5 percent of sales (after tax and corporate allocations) or they will be dropped. How many cases of Bubbs does Mr. Andre need to sell to avoid seeing Bubbs dropped?
- d. Assume all costs and prices will be the same in the next year. If Luke drops Bubbs, how much will Luke's profits increase or decrease? Assume that fixed production costs can be avoided if Bubbs is dropped.