

TEST 1
Stat 572
Spring 1997

Instructions: Answer all the questions clearly and briefly. Show all relevant work for partial credit. Each question is worth 5 points.

1. An investor's decision to purchase a stock is based on a number of criteria. One of these criteria is the ability to sell the stock at any time, or the *liquidity* of the stock. In this study the liquidity is measured by the number of stocks traded over a specified period of time. The objective of the study was to study the relationships between liquidity and other financial characteristics of the stock. The following variables were recorded from Dec. 1984 to Feb. 1985 for 123 stocks:

LOGVOL: Logarithm of total number of shares traded in millions

AVGT: Average transaction time in minutes

NTRAN: Total number of transactions

PRICE: Stock price at opening on Jan. 2, 1985 in dollars

Shares: Number of outstanding shares on Dec. 31, 1984, in millions

Value: Market value of outstanding shares (PRICE • Shares) in millions

DEB_EQ: Debt-to-equity ratio at the end of 1984

The results of fitting a MLR model appear in the following page

- a) Is the model useful to explain the variation of LOGVOL? Explain.

- b) Are all the regressors contributing to the model?

Response: LOGVOL

Summary of Fit

RSquare	0.878159
RSquare Adj	0.871857
Root Mean Square Error	0.25079
Mean of Response	1.46234
Observations (or Sum Wgts)	123

Parameter Estimates

Term	Estimate	Std Error	t Ratio	Prob> t
Intercept	2.5138144	0.067702	37.13	<.0001
AVGT	-0.020648	0.0053	-3.90	0.0002
NTRAN	-0.000117	0.000012	-9.77	<.0001
Price	-0.004089	0.001311	-3.12	0.0023
Shares	-0.00048	0.000437	-1.10	0.2748
Value	0.0415477	0.006239	6.66	<.0001
DEB_EQ	0.0037119	0.003515	1.06	0.2932

Effect Test

Source	Nparm	DF	Sum of Squares	F Ratio	Prob>F
AVGT	1	1	0.9548161	15.1810	0.0002
NTRAN	1	1	6.0046398	95.4699	<.0001
Price	1	1	0.6116290	9.7245	0.0023
Shares	1	1	0.0757300	1.2041	0.2748
Value	1	1	2.7895214	44.3516	<.0001
DEB_EQ	1	1	0.0701392	1.1152	0.2932

c) A 95% CI for values of 5, 7000, 60, 100, 6, and 2 for the corresponding regressors was (1.439, 1.675). Interpret this interval.

d) Explain in detail how the interval in c) was obtained. Make sure that you define all the terms used.

e) Using the information given in c), construct and interpret a 95% prediction interval for a stock with the given characteristics .

f) A new regressor is added to the model. The coefficient of determination increased to .91. Should it be kept in the model? Justify your answer.

2. An auto company conducted an experiment to study a new motor. At controlled temperatures of 20, 30, ..., 90 F, two "identical" motors were tested by running them for a specific length of time. The fuel consumption in gallons was the response of interest. You are hired as a consultant by the company to explain the results of this expensive experiment. Unfortunately, the only thing available (the previous consultant took the raw data with him) is the following printout:

Response: Consumption

Summary of Fit	
RSquare	0.924886
RSquare Adj	0.919521
Root Mean Square Error	3.930735
Mean of Response	44.875
Observations (or Sum Wgts)	16

Lack of Fit

Parameter Estimates				
Term	Estimate	Std Error	t Ratio	Prob> t
Intercept	13.904762	2.555338	5.44	<.0001
Temperature	0.5630952	0.042888	13.13	<.0001

a) Does the temperature have an effect on the consumption? Justify your answer.

b) If your answer in a) was affirmative, explain this effect as detailed as possible.

c) Is also known that pure error accounted for 11% of the total sum of squares of error which was 216.31. Construct the ANOVA table showing pure error and lack of fit components.

d) Is there evidence that the model is inadequate?