

### Problem Set III

MIT (14.32)  
Spring 2003

A. From Wooldridge, 3.5, 3.12, 4.5, 4.8

B. Additional problems

1. More on wine

In the last problem set, you estimated

$$(1) \quad \ln[f(\tau)] \approx r\tau + \ln[f(0)]$$

where  $\tau$  is the age of the wine. A major determinant of wine quality besides age is the weather at the time the grapes used to make the wine were grown. Good wine grapes are a consequence of hot dry summers.

The data set for this exercise includes observation on rainfall and temperature since 1952.

a. For comparison with what follows, estimate equation (1) using observations from the 1952 and later subsample only.

b. Suppose that  $f(0)$ , the price of wine when first bottled, is a Cobb-Douglas function of the weather:

$$(2) \quad f(0) = \delta_t W_t^\beta H_t^\gamma, \text{ for a wine bottled in year } t,$$

where

$W_t$  is the average rainfall in August and September

$H_t$  is the average temperature in July and August

$\delta_t$  is an unobserved random shock that is independent of  $W_t$  and  $H_t$

Estimate and  $\beta$  and  $r$  assuming  $\gamma = 0$ . What impact does the inclusion of data on rainfall have on your estimate of  $r$ ? Why?

c. Estimate  $r$ ,  $\beta$ , and  $\gamma$  together. How does your estimate of  $r$  change? Why?

d. Construct an F-test of the joint hypothesis:  $\beta=0$  and  $\gamma=0$ .

e. Use your model and the 1984 and 1985 weather data to forecast the price of 1984 and 1985 vintages in the year when they are bottled.

## 2. CEO Salaries

Use the dataset on CEO salaries (from the course website) to answer the following questions.

a. Estimate the following equation to see how CEO salary is affected by company sales:

$$\log(\text{salary}) = \beta_0 + \beta_1 \log(\text{sales})$$

b. Based on your results, what is the percentage increase in CEO salary if company sales increase by 10%?

c. CEO salary might depend on the characteristics of the CEO as well. Run the multivariate regression of  $\log(\text{salary})$  on  $\log(\text{sales})$  and the number of years the individual has spent as CEO (*ceoten*). Does the length of tenure as CEO have a significant impact on CEO salary? Does including length of tenure change the coefficient on  $\log(\text{sales})$ ?

d. Based on your results above, what is the percentage increase in CEO salary for every additional year spent as CEO?

e. Run the multivariate regression of  $\log(\text{salary})$  on  $\log(\text{sales})$  as well as the CEO's tenure and a dummy for whether he went to graduate school (*grad*). Do CEOs who went to graduate school make more money than those who did not?