

## HW 5 EE 325 Answer

1. Consider the following regression results (t ratios are in parentheses):

$$\hat{Y}_i = 1286 + 104.97X_{2i} - 0.026X_{3i} + 1.20X_{4i} + 0.69X_{5i} - 19.47X_{6i} + 266.06X_{7i} - 118.64X_{8i} - 110.61X_{9i}$$

$$t = (4.67) \quad (3.70) \quad (-3.80) \quad (0.24) \quad (0.08) \quad (-0.40) \quad (6.94) \quad (-3.04) \quad (-6.14)$$

$$R^2 = 0.383 \quad n = 1543$$

where

$Y$  = wife's annual desired hours of work, calculated as usual hours of work per year plus weeks looking for work

$X_2$  = after-tax real average hourly earnings of wife

$X_3$  = husband's previous year after-tax real annual earnings

$X_4$  = wife's age in years

$X_5$  = years of schooling completed by wife

$X_6$  = attitude variable, 1 if respondent felt that it was all right for a woman to work if she desired and her husband agrees, 0 = otherwise

$X_7$  = attitude variable, 1 if respondent's husband favored his wife's working, 0 = otherwise

$X_8$  = number of children less than 6 years of age

$X_9$  = number of children in age groups 6 to 13

- a. Do the signs of the coefficients of the various nondummy regressors make economic sense? Justify your answer

As per economic theory, the coefficients of  $X_2$ ,  $X_5$  are expected to be positive and that of  $X_3$ ,  $X_8$ , and  $X_9$  are expected to be negative. The coefficient of  $X_4$  could be positive or negative, depending on wife's age and the number of children. Perhaps an interactive dummy of age and children under 6 or between 6 and 13 might shed more light on the relationship between age and desired hours of work.

- b. Why do you think that age and education variables are not significant factors in a woman's labor force participation decision in this study?

Perhaps, this is due to collinearity between age and education, as well as collinearity of these variables with number of children. Also, notice that the model does not include years of schooling completed by husband.

2. Consider the following regression results.

$$\widehat{UN}_t = 2.7491 + 1.1507D_t - 1.5294V_t - 0.8511(D_tV_t)$$
$$t = (26.896) \quad (3.6288) \quad (-12.5552) \quad (-1.9819)$$
$$R^2 = 0.9128$$

Where UN = unemployment rate, %  
V = job vacancy rate, %  
D = 1, for period beginning in 1966-IV  
= 0, for period before 1966-IV  
t = time, measured in quarters

Note: In the fourth quarter of 1966, the Labor government liberalized the National Insurance Act by replacing the flat-rate system of short-term unemployment benefits by a mixed system of flat-rate and (previous) earnings-related benefits, which increased the level of unemployment benefits.

- a. What are your prior expectations about the relationship between the unemployment and vacancy rates?

The relationship between the two variables is expected to be negative, for if the unemployment rate is high, indicating slackness in the labor market, employers are less likely to advertise job vacancies.

- b. Holding the job vacancy rate constant, what is the average unemployment rate in the period beginning in the fourth quarter of 1966? Is it statistically different from the period before 1966 fourth quarter?

It is 3.8998 (=2.7491+1.1507). Since the dummy coefficient is statistically significant, the unemployment rate post 1966 4th quarter is statistically higher than it was in the pre-1964 4th quarter period.

- c. Are the slopes in the pre- and post-1966 fourth quarter statistically different?

Since the differential dummy coefficient is just about significant at the 5% level, we could say that the slopes of the regression function in the two periods are different.

- d. Is it safe to conclude from this study that generous unemployment benefits lead to higher unemployment rates? Does this make economic sense?

**Most probably yes. By making unemployment benefits more generous, the government reduces the opportunity cost of remaining unemployed.**

Empirical exercise using STATA ☺☺

3. Table 8.11 data containing disposable personal income and personal savings from 1970-2005. We divided the sample period into two, 1970-1981 and 1982-2005, and showed on the basis of the Chow test that there was a difference in the regression of savings on income between the two periods. Consider the following model with the dummy variable:

$$Y_t = \alpha_1 + \alpha_2 D_t + \beta_1 X_t + \beta_2 (D_t X_t) + u_t$$

Where Y = personal savings  
 X = disposable personal income  
 t = time  
 D = 1 for observations in 1970-1981  
 = 0 otherwise

- a. Estimate the preceding regression.

| Source   | SS         | df | MS         |                 |        |  |
|----------|------------|----|------------|-----------------|--------|--|
| Model    | 197167.31  | 3  | 65722.4366 | Number of obs = | 36     |  |
| Residual | 71182.1937 | 32 | 2224.44355 | F( 3, 32) =     | 29.55  |  |
|          |            |    |            | Prob > F =      | 0.0000 |  |
|          |            |    |            | R-squared =     | 0.7347 |  |
|          |            |    |            | Adj R-squared = | 0.7099 |  |
| Total    | 268349.503 | 35 | 7667.12867 | Root MSE =      | 47.164 |  |

  

| savings | Coef.     | Std. Err. | t     | P> t  | [95% Conf. Interval] |
|---------|-----------|-----------|-------|-------|----------------------|
| d       | -400.0487 | 49.57711  | -8.07 | 0.000 | -501.0339 -299.0634  |
| income  | -.0300647 | .004921   | -6.11 | 0.000 | -.0400884 -.020041   |
| dx      | .1318535  | .0293371  | 4.49  | 0.000 | .0720958 .1916112    |
| _cons   | 394.3411  | 27.89695  | 14.14 | 0.000 | 337.5169 451.1654    |

- b. Test the coefficients individually statistically significant at the 5 percent level? From this test, how would you describe the difference in the two regressions (dissimilar regressions, parallel regressions, concurrent regressions)?

$$H_0 : \alpha_2 = 0$$

$$H_1 : \alpha_2 \neq 0$$

$$P\text{-value} = 0.000$$

reject  $H_0$

$$H_0 : \beta_2 = 0$$

$$H_1 : \beta_2 \neq 0$$

$$P\text{-value} = 0.000$$

reject  $H_0$

There is enough evidence suggest that the coefficients individually statistically significant at the 5 percent level.

The two regressions are dissimilar regressions.

- c. Write down the mean personal savings function for 1970-1981 and the mean personal savings function for 1982-2005.

Mean savings function for 1970-1981

$$\begin{aligned} E(Y_t | D_t = 1, X_t) &= (394.3411 - 400.0487) + (-0.0301 + 0.1319)X_t \\ &= -5.7076 + 0.1018X_t \end{aligned}$$

Mean savings function for 1982-2005

$$E(Y_t | D_t = 0, X_t) = \alpha_1 + \beta_1 X_t = 393.3411 - 0.0301X_t$$

- d. What is the advantage of the dummy variable technique over the Chow test

The dummy variable technique has a distinct advantage not only tells if the two are different but also pinpoints the source(s) of the difference – whether it is due to the intercept or the slope or both.