00:30 0

t-test for β_3

PRS 1: In lab, you estimated the following model:

Sales = 17377 - 3865 prose + 2243 pcarn
- 32.3 dinc + 492 d2 + 331 prosed2

$H_0: \beta_3 \leq 0$
$H_A: \beta_3 > 0$

Is the effect of disposable income (dinc) statistically significant at the 10% level of significance?

$H_0: \beta_3 = 0$
$H_A: \beta_3 \neq 0$

1. Yes – it has a statistically significant negative effect.
2. Yes – the estimated effect of "dinc" is statistically different from zero.
3. No – the estimated effect of "dinc" is not statistically different from zero.
4. No – the estimated effect of "dinc" is not statistically less than zero.

start 2 M... Inter... Work... 2:32 PM

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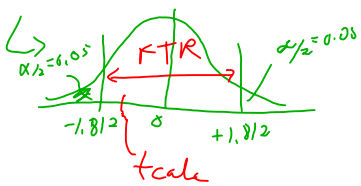
Step 1: $H_0: \beta_3 = 0$; $H_A: \beta_3 \neq 0$

Step 2: $\alpha = 0.10$

Step 3: $t_{(0.05, 10)} = 1.812$



Step 4: $t_{calc} = -1.31$

Step 5: Conclusion – compare → FTR

Step 6: $\hat{\beta}_3$ (-32.3) is not statistically diff. from zero.

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V. Extensions of Multiple Regression

A. Dummy Variables

1. **Definition**: A ***binary variable*** that indicates a quality, condition, characteristic, etc. exits.
2. **Examples**: Cross-Section; Time-Series.
3. **Uses for Dummy Variables**
   a. Shifting the Intercept
   * b. Shifting the Slope (had an intercept shift.)
      └ include an interaction of DV and just the mult. of another indep. variable
4. **Interpretation**

"potential experience"

```
Regression Analysis: wage versus yrsed, exp, f, fexp

The regression equation is
wage = - 4.66 + 1.49yrsed + 0.155exp - 1.03f - 0.048fexp

Predictor       Coef   SE Coef      T      P
Constant      -4.657     2.184  -2.13  0.033
yrsed         1.4850    0.1499   9.91  0.000
exp          0.15522   0.03771   4.12  0.000
f             -1.031     1.311  -0.79  0.432
fexp         -0.04778   0.05348  -0.89  0.372
```

age - 6 - yrsed = exp

1 if value for exp

interaction variable - f x exp

Two regressions:

If f=0:
wage = - 4.66 + 1.49yrsed + 0.155exp

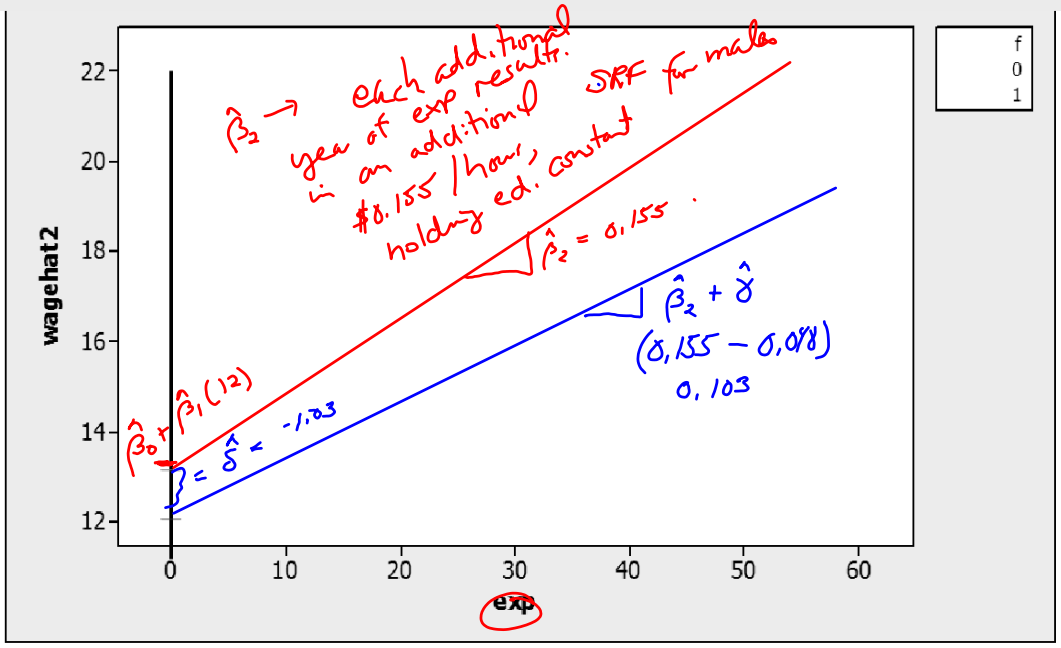
If f=1:
wage = (- 4.66 - 1.03) + 1.49yrsed + (0.155 - 0.048)exp

new intercept for females

new slope for females

Shifting the Intercept and Slope: Male vs. Female Wages

hold yrsed = 12



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PRS 2: The following wage equation was estimated. Wage is in $/hour, education (Ed) and experience (Exp) are measured in years. The dummy variable F is 1 if the individual is female, 0 if male.

Wagehat = -5.40 + 1.45 Ed + 0.27 Exp - 2.92 F - 0.09Exp*F.

$\hat{\beta}_2 + \hat{\gamma}$

F = 1 ⇒ slope $\left.\frac{\partial \widehat{wage}}{\partial exp}\right|_{F=1} = 0.27 - 0.09 = 0.18$/hour

The effect of an additional year of experience on female wages is $ ____ per hour, holding education constant.

Use 2 decimals in answering.

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4. Interpretations

- Model:

$$Yi = \beta_0 + \beta_1 X_{1i} + \beta_2 X_{2i} + \delta D_i + \gamma (X_{1i} D_i) + u_i$$

- The parameter **δ** :

The effect of the dummy variable on the intercept.

Difference in the intercepts for group where D=1 vs. group where D=0

Eg. in lab - time-series dummy 1 if Q2 ⇒ how much different is the intercept in Q2 versus Qs 1, 3 and 4.

Eg. Wage – difference in intercepts for