Problem Set 2

1

- Data: Hamburger Chain 1
- Model: $tr_t = \beta_1 + \beta_2 p_t + \beta_3 a_t + \varepsilon_t$
- Test the hypothesis that changes in price (p) have no effect on total revenue (tr) against the alternative that price does have an effect.
- H_0: $\beta_2 = 0$ $\qquad\qquad$ H_1: $\beta_2 \neq 0$
- The restricted model assumes that the null hypothesis is true while the unrestricted model is the original model:
- Restricted model: $tr_t = \beta_1 + \beta_3 a_t + \varepsilon_t$
- Unrestricted model: $tr_t = \beta_1 + \beta_2 p_t + \beta_3 a_t + \varepsilon_t$ □

1

- Perform an F test using the statistic
- $$F = \frac{(RSS_R - RSS_U)/j}{RSS_U/(n-k)} \sim F(j, n-k)$$
- Obtain RSS_R and RSS_U from the computer regression output and compute the F value.
- Compare this value to the critical F value at the 5% level of significance and state the conclusion.
- Remark. This F test can be performed in Eviews and Stata by using the Wald Test. Perform the Wald Test and show that you get the same conclusion. □

2

- Data: Investment
- (1) Estimate an investment function:
- $realinv = \beta_1 + \beta_2 trend + \beta_3 realgnp + \beta_4 interest + \beta_5 infl + \varepsilon$
- (2) It might be appropriate to formulate the regression in terms of real interest rather than to treat interest rate and inflation rate separately. If investors were only interested in the real interest rate, equal increases in interest rate and inflation rate would have no effect on investment.
- To test this, the null hypothesis is H_0: $\beta_4 + \beta_5 = 0$. Perform a Wald test. □

2

- (3) Perform the following joint test:
  - $\beta_2 = 0$ (there is no time trend)
  - $\beta_3 = 1$ (the marginal propensity to invest = 1)
  - $\beta_4 + \beta_5 = 0$ (investors consider the real interest rate) □

- **3.** Use the macroeconomics data set to test the hypothesis that the long-run MPC in the model
- $\log(C_t) = \beta_1 + \beta_2 \log(Y_t) + \beta_3 \log(C_{t-1}) + \varepsilon_t$
- is equal to 1.
- **4**. Comment on the following equation:
- $E[\varepsilon_t^2] = E[\varepsilon_t \varepsilon_t] = \varepsilon_t E[\varepsilon_t] = \varepsilon_t 0 = 0$
- **5**. In the simple regression model $Y_t = \beta_1 + \beta_2 X_t + \varepsilon_t$, what is the effect of multiplying each X_t by a constant k on
  - (a) the regression coefficients
  - (b) the predicted values of Y
  - (c) R^2?