

Problem Set #7
Spring 2014

1. If y_t is a quarterly seasonal time series, with the model

$$y_t = \sum_{i=1}^4 \gamma_i D_{it} + e_t$$

where D_{1t} , D_{2it} are the dummies for the first quarter, second quarter, etc.. The estimates are $\hat{\gamma}_1 = 0.5$, $\hat{\gamma}_2 = 0.8$, $\hat{\gamma}_3 = 0.2$ and $\hat{\gamma}_4 = 0.4$. Construct point forecasts for 2014Q1, Q2, Q3 and Q4.

2. Explain why the seasonal model

$$S_t = \sum_{i=1}^4 \gamma_i D_{it}$$

is the same as

$$S_t = \alpha + \sum_{i=1}^3 \beta_i D_{it}$$

3. The model is

$$y_t = \beta_0 + \beta_1 Time_t + \sum_{i=1}^3 \gamma_i D_{it} + e_t$$

with estimates

$$\begin{aligned}\hat{\beta}_0 &= 0.2 \\ \hat{\beta}_1 &= 0.01 \\ \hat{\gamma}_1 &= 0.5 \\ \hat{\gamma}_2 &= 0.8 \\ \hat{\gamma}_3 &= 0.2\end{aligned}$$

The time index at the end of sample is $Time_n = n = 200$, and this final observation is the second quarter of 2014. What is your point forecast for 2014Q3 and 2014Q4?

4. In the February 2014 Employment Situation, the Bureau of Labor Statistics reports that from December 2013 to January 2014 the seasonally unadjusted number of employed increased from 9,984,000 to 10,855,000, and the unemployment rate increased from 6.5% to 7.0%. Yet over the same period the reported seasonally adjusted number of unemployed fell from 10,351,000 to 10,236,000 and the seasonally adjusted unemployment rate fell from 6.7% to 6.6%. Are these numbers consistent? Is the BLS trying to trick the country about a hidden increase in unemployment? Explain.
5. The file "ur_nsa.dta" contains monthly unemployment rates, 1948m1 through 2010m1. The variable "ur" is the unemployment rate in the full population, "men" is the unemployment rate for all men, "women" is for all women, and "whitemen", "whitewomen", "blackmen" and "blackwomen" is for four subsets of the population, corresponding to white men, white women, black men and black women. The variable "t" is the time index, "m" is a month indicator (runs from 1 to 12), and "m1", "m2", etc are dummy variables for the 12 months.
- (a) Fit a simple seasonal dummy models for the two series "men" and "women". Plot fitted values for one year. It may be convenient to plot the two on the same graph, or you can plot them separately. These fitted values are the estimated seasonal patterns. Is the seasonality in unemployment rates the same for men and women, or are they different? What is different about the two patterns?
- (b) Now fit simple seasonal dummy models for the four series "whitemen", "whitewomen", "blackmen", and "blackwomen". Describe the similarities and differences between the estimated seasonal unemployment rate models for these four series.