

**FINANCIAL MODELING AND ECONOMETRICS  
FIN 6271**

**Assignment 8**

**PART I: Time Series Modeling of US Unemployment**

Consider the monthly data given in the file UNEMPLOYMENT\_OLD.TXT The data is in free-format and the only variable is the monthly unemployment rate in the United States for twenty five years.

(1) Look at the sample autocorrelation function (ACF) of the series and discuss why there is nonseasonal nonstationary behavior. Please use a nonseasonal difference of the series.

(2) Look at the sample ACF of the nonseasonal difference of the series you have created in (1). Discuss why there is seasonal nonstationary behavior. Please use a seasonal difference of the series.

(3) After the differencing performed in (1) and (2) discuss if the series looks stationary.

(4) By studying the sample ACF and the sample partial autocorrelation function (PACF), try to identify a multiplicative seasonal ARIMA model for the series. Please give a justification of the model you choose (HINT: Note that you use the properties of pure seasonal and nonseasonal processes in identifying the model)

(5) Estimate the identified model and discuss its appropriateness by discussing the behavior of the residuals. Write down the estimated model using the backshift operator notation.

**PART II: Volatility of errors from the the regression of Monthly Change in Earnings Index for British Workers**

Consider the regression model CEAR from Assignment 5 using the three independent variables as

$$\text{CEAR}_t = \beta_0 + \beta_1 \text{UNEMP}_t + \beta_2 \text{INFL}_t + \beta_3 \text{PARTY}_t + \epsilon_t.$$

Test if the errors from the regression model has any ARCH effects. In so doing, state the relevant hypotheses and justify your conclusions,