FINANCIAL MODELING AND ECONOMETRICS

Assignment 4: Due on Friday March 31, 2017

Each group will submit a single typed report of less than or equal to 5 pages. Please be sure that you include only the relevant SAS output and your interpretations in answering the each question.

PART I: Quarterly growth rate of GNP

In this assignment we will be interested in modeling quarterly growth rate of the U.S. GNP. The series is seasonally adjusted and it is for the period of 1947 Quarter 2 to 1991 Quarter 1. The time-series data is available in Blackboard under file "GNP_Quarterly.TXT".

(a) Look at the plot of the time-series and its sample autocorrelation function. Discuss why the series look stationary.

(b) By looking at both the autocorrelation and the partial autocorrelation functions of the series identify an autoregressive (AR) process to model the quarterly growth rate of GNP. In so doing, discuss your reasoning.

Estimate the AR process whose order you have identified, write down the estimated model (using the relevant coefficients of the AR process) and discuss whether the coeeficients are statistically significant.

(c) Discuss whether the residuals of the estimated AR model are white noise. In so doing, explain your reasoning.

PART II. Consider a time-series Y. The sample autocorrelation at lag 1 for time-series Y is estimated (by SAS) as: $r_1 = 0.709$. Also, the estimate of the mean of Y series is 40.268 and the estimate of the Y's variance is 12.867.

It is decided that Y can be modeled almost perfectly by a first order stationary autoregressive process, that is,

$$Y_t = C + \phi_1 Y_{t-1} + \epsilon_t \quad \text{where } \epsilon_t\text{'s are zero-mean white-noise terms.}$$

Based on the given information in the above and using properties of AR(1) process:

(a) Estimate the constant term C, coefficient ϕ_1 and write down the estimated AR(1) model.

(b) Estimate the autocorrelations at lag 2 and 3.

Estimate the partial autocorrelation at lag 1.

(c) Estimate the variance of the ϵ_t's (HINT: You can use the relationship between the variance of Y_t and ϵ_t).