Problem Set 2
Econ 40357 Financial Econometrics
University of Notre Dame
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1. Let ϵ_t be a white noise error process and consider the following three models that Louie the researcher, says might be a reasonable model of p_t,the logarithm of stock prices

$$p_t = p_{t-1} + \epsilon_t \tag{1}$$
$$p_t = 0.5p_{t-1} + \epsilon_t \tag{2}$$
$$p_t = 0.8\epsilon_{t-1} + \epsilon_t \tag{3}$$

   (a) What class of models are these examples of?

   (b) Compute the first three autocorrelations for each of these models.

   (c) From a theoretical perspective, which model is the best candidate for representing stock prices and give a short explanation why.

2. Louie the researcher estimates the following model for some returns data

$$r_t = 0.803r_{t-1} + 0.682r_{t-2} + \epsilon_t$$

   where ϵ_t is a white noise error process. Is the process stationary? Write a couple of sentences about the implications of whether the process is stationary or not.

3. The objective of any econometric modeling exercise is to find the model that most closely 'fits' the data. adding mor lags to an ARMA model will almost always lead to a better fit. Therefore, a large model will be best because it will fit the data more closely. Comment.

4. Use the Eviews workfile PS02.wf1, sheet entitled FF_3Factors. Mkt_rf is the monthly market excess return–value-weight return of all CRSP firms incorporated in the US and listed on the NYSE, AMEX, or NASDAQ that have a CRSP share code of 10 or 11 at the beginning of month t, good shares and price data at the beginning of t, and good return data for t minus the one-month Treasury bill rate (from Ibbotson Associates). For Mkt_rf, estimate an ARMA(2,2). Report the AIC, BIC, and HQIC for each model.

5. Open the series mkt_rf. Click proc, automatic ARIMA forecasting. On the options tab, there is a choice of AIC, BIC, and HQIC. For each of these three ICs, run the automatic ARIMA and report the models suggested by AIC, BIC, and HQIC.

6. Estimate an ARMA(2,2) for mkt_rf on observations 1926M07 through 1999M12, then generate static forecasts from 2000M01 through 2019M07. Ask for plots of the forecasts and actuals. Submit the resulting graph that also shows Theil's U2 coefficient.

   Note: what is Theil's U2? In the following, a is the actual.

   U2 = sqrt(fpe2/ape2)

   fpe2 = sum (fpe*fpe)

   ape2 = sum (ape*ape)

   fpe = (f(t)-a(t))/a(t-1)

   ape = (a(t-1)-a(t))/a(t-1)