Task: forecast the real price of gasoline for the US.

Dataset: gasoline.xlsx contains two monthly time series. The nominal price of gasoline and the CPI.

- 1. Create the real price of gasoline
- 2. Plot real and nominal prices over time
- 3. From now on you will work with logs: $y_t = log (Real Price_t)$. Consider the sample from obs 1 to Dec 2014. Plot the sample ACF of y_t and that of $\Delta y_t = (y_t y_{t-1})$.
- 4. Using the same sample above fit two AR(1) models: the first for y_t and the second for Δy_t . Report in both cases the coefficient associated with the lagged dependent variable.
- 5. Produce a series of 1 step-ahead forecasts for y_t. Use the following models: random walk (no drift), ARIMA(1,1,0), ARIMA(0,1,1), ARIMA(1,1,1). To produce forecasts start from the sample that ends in Dec 2014 and add 1 observation at the time (i.e. expanding/recursive scheme)
- 6. Transform the forecasts to levels (i.e. real prices)
- 7. Compute the mean squared forecast error and comment.