Week 9:

20. Consider the following process: $y_t = 2.5 + 0.75y_{t-1} + \varepsilon_t + 0.6\varepsilon_{t-1} - 0.3\varepsilon_{t-2}$ where $\varepsilon_t \sim WN(0, \sigma_\varepsilon^2)$:

   a. Given $y_n = 12, \hat{\varepsilon}_n = 1.5$ and $\hat{\varepsilon}_{n-1} = 1$ obtain point forecasts for the next 3 periods.

   b. Characterize the forecasting function , $f_{t,h}$ for the long run (when $h \to \infty$)

21. Given the following estimation outputs what model you think is best to describe and forecast the AIRPASS time series?

M1

Dependent Variable: D(LOG(AIRPASS),1,12)
Method: Least Squares
Sample (adjusted): 1951M02 1961M06
Included observations: 125 after adjustments
Convergence achieved after 8 iterations
MA Backcast: 1950M01 1951M01

Variable	Coefficient	Std. Error	t-Statistic	Prob.
MA(1)	-0.394813	0.082383	-4.792405	0.0000
SMA(12)	-0.640659	0.072003	-8.897624	0.0000

R-squared	0.369398	Mean dependent var	0.000791
Adjusted R-squared	0.364271	S.D. dependent var	0.046431
S.E. of regression	0.037021	Akaike info criterion	-3.739810
Sum squared resid	0.168575	Schwarz criterion	-3.693557
Log likelihood	235.6756	Hannan-Quinn criter.	-3.720426
Durbin-Watson stat	1.934731		

Sample: 1951M02 1961M06
Included observations: 125

	AC	PAC	Q-Stat
1	0.030	0.030	0.1118
2	0.021	0.020	0.1679
3	-0.144	-0.146	2.8815
4	-0.124	-0.118	4.8944
5	0.036	0.050	5.0683
6	0.038	0.022	5.2572
7	-0.051	-0.093	5.6111
8	-0.050	-0.054	5.9560
9	0.090	0.123	7.0687
10	-0.081	-0.102	7.9664
11	0.027	-0.016	8.0647
12	0.018	0.053	8.1093
13	0.055	0.069	8.5337
14	0.034	-0.010	8.6955
15	0.046	0.049	9.0060

Forecast: AIRPASSF
Actual: AIRPASS
Forecast sample: 1961M07 1961M12
Included observations: 6

Root Mean Squared Error	10.43481
Mean Absolute Error	10.19416
Mean Abs. Percent Error	2.071642

M2

Dependent Variable: D(LOG(AIRPASS),1,12)
Method: Least Squares
Sample (adjusted): 1951M02 1961M06
Included observations: 125 after adjustments
Convergence achieved after 10 iterations
MA Backcast: 1949M11 1951M01

Variable	Coefficient	Std. Error	t-Statistic	Prob.
MA(1)	-0.388933	0.082464	-4.716423	0.0000
MA(3)	-0.190940	0.083017	-2.300027	0.0231
SMA(12)	-0.675069	0.069870	-9.661783	0.0000

R-squared	0.392082	Mean dependent var	0.000791
Adjusted R-squared	0.382116	S.D. dependent var	0.046431
S.E. of regression	0.036497	Akaike info criterion	-3.759444
Sum squared resid	0.162511	Schwarz criterion	-3.691564
Log likelihood	237.9652	Hannan-Quinn criter.	-3.731868
Durbin-Watson stat	1.959840		

Sample: 1951M02 1961M06
Included observations: 125

	AC	PAC	Q-Stat
1	0.015	0.015	0.0287
2	0.025	0.025	0.1121
3	0.033	0.032	0.2537
4	-0.083	-0.084	1.1514
5	0.064	0.065	1.6894
6	0.067	0.069	2.2913
7	-0.081	-0.083	3.1658
8	-0.050	-0.063	3.4986
9	0.103	0.120	4.9397
10	-0.087	-0.079	5.9877
11	0.024	-0.002	6.0648
12	0.049	0.050	6.4049
13	0.017	0.058	6.4473
14	0.037	-0.001	6.6433
15	0.039	0.025	6.8612

Forecast: AIRPASSF
Actual: AIRPASS
Forecast sample: 1961M07 1961M12
Included observations: 6

Root Mean Squared Error	10.57776
Mean Absolute Error	8.880508
Mean Abs. Percent Error	1.783386

22. Suppose that the last five observations of a given time series are:

$x_{96} = 60.4, x_{97} = 58.9, x_{98} = 64.7\ x_{99} = 70.4$ and $x_{100} = 62.6.$

Obtain the forecasts of the next four observations for the following estimated models where $\varepsilon_t \sim \mathrm{WN}(0, \sigma_\varepsilon^2)$:

i. $(1 - 0.43\mathrm{L})(1 - \mathrm{L})\mathrm{x}_t = \varepsilon_t$

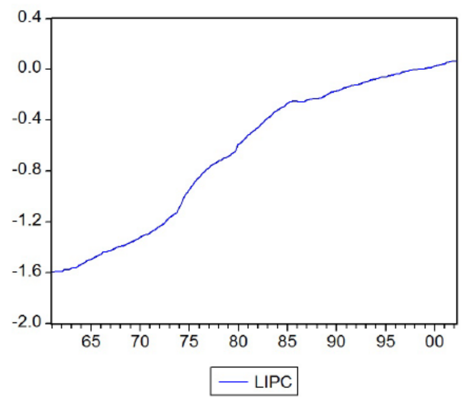
ii. $x_t = 0.2 + 1.8x_{t-1} - 0.81\mathrm{x}_{t-2} + \varepsilon_t$

iii. $(1 - 1.4L + 0.8L^2)(1 - L)x_t = \varepsilon_t$

Week 10:

Exercise 4 (chapter 10 Textbook)

23. This exercise makes use of quarterly data from the Belgium Consumer Price Index. The data has been seasonally adjusted and covers the period 1961Q01-2002Q02. In the next figure you will find the time series plot, in logs. The time series will be denoted mathematically as $log\ (IPC_t)$ and inEViews output by LIPC.



a. Before proposing a model, the practitioner needs to study the stationary properties of the data. A possibility is to apply the Augmented Dickey- Fuller (ADF) test to the log of the time series of interest. What made the practitioner apply the log transformation to the time series? And what are the issues that the practitioner needs to be worry to apply the ADF correctly? Justify your answers

b. According to all the figures given below apply ADF tests to the time series $log\ (IPC_t)$.

Exogenous: Constant, Linear Trend
Lag Length: 2 (Automatic based on SIC, MAXLAG=13)

		t-Statistic
Augmented Dickey-Fuller test statistic		-0.171180
Test critical values:	1% level	-4.015341
	5% level	-3.437629
	10% level	-3.143037

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(LIPC)
Method: Least Squares
Date: 03/26/13 Time: 10:12
Sample(adjusted): 1961:4 2002:2
Included observations: 163 after adjusting endpoints

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LIPC(-1)	-0.000698	0.004079	-0.171180	0.8643
D(LIPC(-1))	0.389586	0.074688	5.216175	0.0000
D(LIPC(-2))	0.340018	0.075088	4.528247	0.0000
C	0.003237	0.007059	0.458514	0.6472
@TREND(1961:1)	-1.11E-05	5.02E-05	-0.221045	0.8253

R-squared	0.486964	Mean dependent var	0.010180
Adjusted R-squared	0.473976	S.D. dependent var	0.008596
S.E. of regression	0.006235	Akaike info criterion	-7.287211
Sum squared resid	0.006141	Schwarz criterion	-7.192311
Log likelihood	598.9077	F-statistic	37.49267
Durbin-Watson stat	2.148955	Prob(F-statistic)	0.000000

(a) ADF test with constant and trend

Exogenous: Constant
Lag Length: 2 (Automatic based on SIC, MAXLAG=13)

		t-Statistic
Augmented Dickey-Fuller test statistic		-1.783204
Test critical values:	1% level	-3.470679
	5% level	-2.879155
	10% level	-2.576241

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(LIPC)
Method: Least Squares
Date: 03/26/13 Time: 10:09
Sample(adjusted): 1961:4 2002:2
Included observations: 163 after adjusting endpoints

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LIPC(-1)	-0.001578	0.000885	-1.783204	0.0765
D(LIPC(-1))	0.391527	0.073948	5.294619	0.0000
D(LIPC(-2))	0.343006	0.073640	4.657877	0.0000
C	0.001689	0.000900	1.877070	0.0623

R-squared	0.486805	Mean dependent var	0.010180
Adjusted R-squared	0.477123	S.D. dependent var	0.008596
S.E. of regression	0.006216	Akaike info criterion	-7.299172
Sum squared resid	0.006143	Schwarz criterion	-7.223251
Log likelihood	598.8825	F-statistic	50.27468
Durbin-Watson stat	2.151675	Prob(F-statistic)	0.000000

(b) ADF test with constant