

# Economics 413: Economic Forecast & Analysis

Department of Economics, Finance and Legal Studies

University of Alabama

Fall 2012

Midterm I

The exam consists of three questions on five pages. Each question is of equal value.

1. For each series, draw the ACF and PACF. In each case assume that  $\varepsilon_t$  is a white noise sequence,  $t = 1, 2, \dots, T$ .

(a)  $Y_t = 0.5 + \varepsilon_t$

(b)  $Y_t = 0.5 + \varepsilon_t + 0.4\varepsilon_{t-1}$

(c)  $Y_t = 0.5 + 0.4Y_{t-1} + \varepsilon_t$

(d)  $Y_t = 0.5 + 1.4Y_{t-1} + \varepsilon_t$

(e)  $Y_t = 0.5 + 0.4Y_{t-1} + \varepsilon_t + 0.4\varepsilon_{t-1}$

2. Consider the following data generating process

$$Y_t = \varepsilon_t + \theta_2 \varepsilon_{t-2}$$

where  $\varepsilon_t$  is a white noise process. Assuming  $-1 < \theta_2 < 0$ , answer the following:

- (a) Derive the expected value of this process
- (b) Derive the variance of this process
- (c) Derive the covariance of this process for all  $j$ . Note that  $j$  represents the number of periods between  $Y_t$  and  $Y_{t-j}$ .
- (d) Derive the autocorrelation function of this process for all  $j$
- (e) Plot the autocorrelation function with the information you derived above

3. Consider the EViews output for the growth rate of real GDP in Argentina from 1965 to 2007.
- (a) *Briefly* explain why the first spike in the sample ACF and PACF below are identical.
  - (b) Given the information in the sample ACF and PACF, what is the most likely theoretical model (state the name and write it down)?
  - (c) For the model you listed in part (a), what is the theoretical expected value, the variance and covariance (for all  $j$ ) of this series (you do not need to derive them, you can just state it)?
  - (d) Given the information in the regression tables (specifically, the model selection criteria), what model appears to perform best for each criterion?
  - (e) Why does the sample start in 1966 for the second regression model?

### Correlogram of ARGENTINA

Date: 10/08/12 Time: 14:21						
Sample: 1965 2007						
Included observations: 43						
Autocorrelation	Partial Correlation	AC	PAC	Q-Stat	Prob	
■	■	1	0.239	0.239	2.6221	0.105
		2	-0.045	-0.108	2.7174	0.257
		3	-0.014	0.025	2.7273	0.436
		4	-0.041	-0.052	2.8119	0.590
■		5	-0.100	-0.082	3.3187	0.651
		6	-0.030	0.011	3.3653	0.762
		7	0.024	0.016	3.3965	0.846
■	■	8	-0.141	-0.166	4.4905	0.810
		9	-0.067	0.011	4.7443	0.856
		10	-0.041	-0.065	4.8430	0.901

Dependent Variable: ARGENTINA				
Method: Least Squares				
Date: 10/18/12 Time: 10:45				
Sample: 1965 2007				
Included observations: 43				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	1.443488	0.726091	1.988027	0.0534
R-squared	0.000000	Mean dependent var	1.443488	
Adjusted R-squared	0.000000	S.D. dependent var	4.761297	
S.E. of regression	4.761297	Akaike info criterion	5.981898	
Sum squared resid	952.1378	Schwarz criterion	6.022856	
Log likelihood	-127.6108	Hannan-Quinn criter.	5.997002	
Durbin-Watson stat	1.459528			

Dependent Variable: ARGENTINA  
 Method: Least Squares  
 Date: 10/18/12 Time: 10:45  
 Sample (adjusted): 1966 2007  
 Included observations: 42 after adjustments  
 Convergence achieved after 14 iterations  
 MA Backcast: 1965

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	1.356672	0.808286	1.678455	0.1013
AR(1)	-0.673896	0.153600	-4.387346	0.0001
MA(1)	0.949137	0.076094	12.47326	0.0000
R-squared	0.122475	Mean dependent var		1.285238
Adjusted R-squared	0.077474	S.D. dependent var		4.703164
S.E. of regression	4.517305	Akaike info criterion		5.922457
Sum squared resid	795.8357	Schwarz criterion		6.046577
Log likelihood	-121.3716	Hannan-Quinn criter.		5.967952
F-statistic	2.721598	Durbin-Watson stat		1.809126
Prob(F-statistic)	0.078263			