

Economics 413: Economic Forecast & Analysis

Department of Economics, Finance and Legal Studies

University of Alabama

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Midterm II

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

1. Consider the following model

$$Y_t = c + \phi_2 Y_{t-2} + \varepsilon_t + \theta_2 \varepsilon_{t-2},$$

where ε_t is white noise. Answer the following:

- (a) Write the general form of the Q -statistic to test for serial correlation in the residuals.
- (b) What is the distribution of the test-statistic (be sure to give the degrees of freedom)?
- (c) Write an equation which can be used to construct the sample test statistic for the above problem.
- (d) What is the minimal number of lags possible in part (c)?
- (e) Briefly describe one other method to test for serial correlation in the residuals.

2. Consider the following data generating process

$$Y_t = (-1)^t X$$

where X is a random variable whose mean is zero and has constant variance σ^2 . For the process Y_t , answer the following:

- (a) Find the h -step ahead forecast for $h = 1, 2, \dots$
- (b) Find the h -step ahead forecast error for $h = 1, 2, \dots$
- (c) Find the h -step ahead forecast error variance for $h = 1, 2, \dots$
- (d) Find the h -step ahead interval forecast for $h = 1, 2, \dots$
- (e) Plot parts (a) and (d) in a single figure.

3. Suppose we have data for U.S. interest rate data over the period 1960:Q1 to 2008:Q1 and we are interested in estimating a quarterly model of spread between a long-term and a short-term interest rate. Specifically, the interest rate spread (s) can be formed as the difference between the interest rate on a 10-year U.S. government bonds ($r10$) and the rate on a three-month treasury bills ($Tbill$) as

$$s_t = r10_t - Tbill_t$$

Suppose the interest rate spread in the fourth quarter of 2007 is 0.75, the interest rate spread in the first quarter of 2008 is 1.51 and the interest rate spread in the second quarter of 2008 is 1.61. Use the EViews output on the next page to answer the following questions:

- (a) Write the estimated equation given in the EViews output
- (b) Obtain the one-step-ahead forecast
- (c) Obtain the one-step-ahead forecast error
- (d) Obtain the two-step-ahead forecast
- (e) Obtain the three-step-ahead forecast

Dependent Variable: S
 Method: Least Squares
 Date: 12/30/09 Time: 10:28
 Sample (adjusted): 1960Q3 2008Q1
 Included observations: 191 after adjustments
 Convergence achieved after 3 iterations

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	1.387620	0.285227	4.864963	0.0000
AR(1)	1.109152	0.070829	15.65953	0.0000
AR(2)	-0.245386	0.070792	-3.466283	0.0007
R-squared	0.805374	Mean dependent var		1.378220
Adjusted R-squared	0.803304	S.D. dependent var		1.210806
S.E. of regression	0.536998	Akaike info criterion		1.609936
Sum squared resid	54.21291	Schwarz criterion		1.661019
Log likelihood	-150.7489	F-statistic		388.9784
Durbin-Watson stat	1.960866	Prob(F-statistic)		0.000000
Inverted AR Roots	.80	.31		