

Economics 413: Economic Forecast and Analysis

Department of Economics, Finance and Legal Studies

University of Alabama

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Midterm II

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

1. Consider two separate stochastic processes: Y_t and X_t . Suppose that Y_t represents yearly excess stock returns and X_t represents yearly inflation. Suppose we are interested in eventually forecasting Y with the help past values of Y as well as a past value of X . With this information, answer the following:
 - (a) Write down an ARMA(2,1) which also includes a (first) lagged value for X .
 - (b) Write down the log-likelihood function for this model.
 - (c) Write down the h -step ahead value for Y (Y_{t+h}) that you put down in part (a).
 - (d) Construct the forecast value of Y ($\widehat{Y}_{t+h|t}$) for $h = 1$.
 - (e) Why is it difficult to forecast for $h = 2$ and beyond?

2. Consider the gretl output listed below. With this information, answer the following:

Model 2: ARMA, using observations 1948–2003 ($T = 56$)

Dependent variable: inf

Standard errors based on Hessian

	Coefficient	Std. Error	z	p-value
const	3.94982	0.506922	7.792	0.0000
θ_1	0.938141	0.0531705	17.64	0.0000
Mean dependent var	3.883929	S.D. dependent var	3.040381	
Mean of innovations	-0.038345	S.D. of innovations	1.973995	
R^2	0.612376	Adjusted R^2	0.612376	
Log-likelihood	-118.6041	Akaike criterion	243.2083	
Schwarz criterion	249.2843	Hannan–Quinn	245.5639	

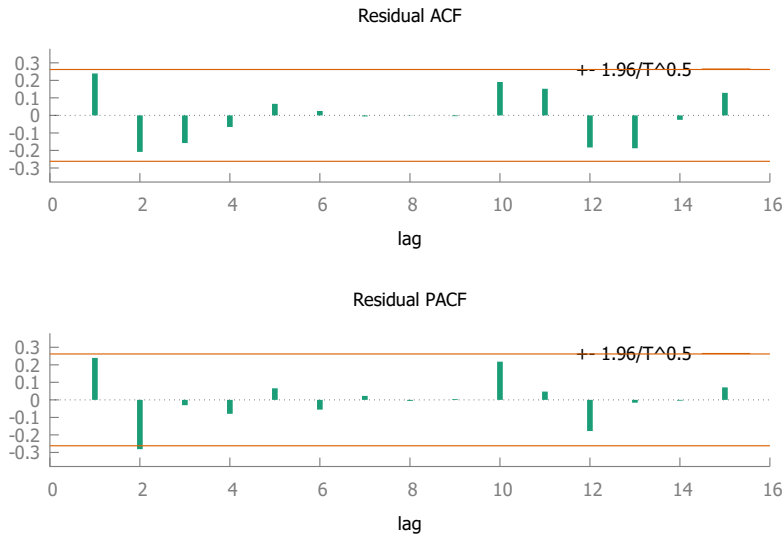
	Real	Imaginary	Modulus	Frequency
MA				
Root 1	-1.0659	0.0000	1.0659	0.5000

- Is this model stationary? Why?
- Is this model invertible? Why?
- Find the h -step ahead point forecast for $h = 1, 2, \dots$
- Find the h -step ahead forecast interval for $h = 1, 2, \dots$
- Plots parts (c) and (d) in a single figure

3. Consider the Box-Pierce test statistic

$$Q = T \sum_{j=1}^m \hat{\rho}_j^2$$

associated with the sample ACF and PACF for a set of residuals stemming from an ARMA(1,1) estimation (given below). With this information, answer the following:



- What are T , j and m ?
- What is the value of Q under the null hypothesis?
- What is the distribution of the test statistic under the null hypothesis?
- What does $\hat{\rho}_j$ measure? Use an equation if this helps.
- For this figure, would you expect to reject or fail to reject the null hypothesis? Why?