

Masters in Finance
FINANCIAL ECONOMETRICS
Spring 2010
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Exam 2

The points allocated suggest the time that you should spend on a question. You have 90 minutes to complete the exam and 100 total points on the exam.

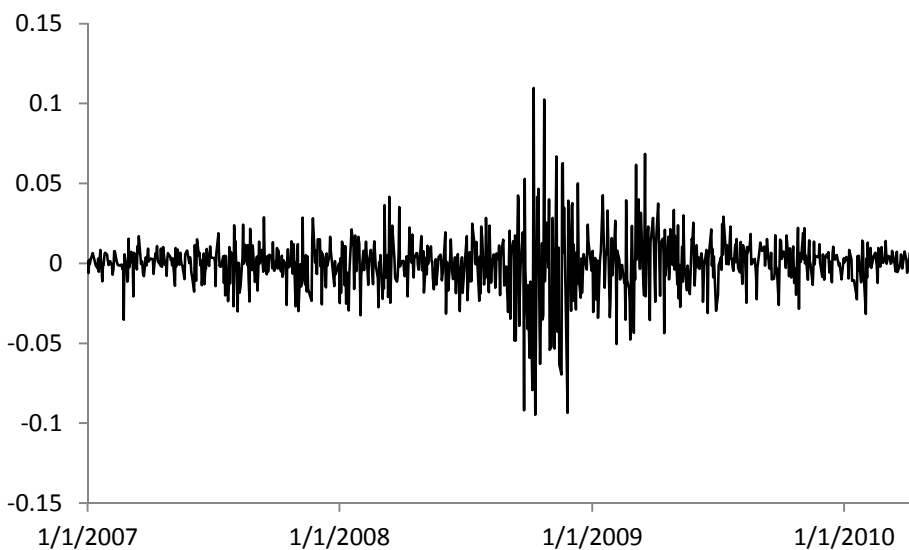
Your grade on all questions will be based solely on your explanation.

Answer all questions.

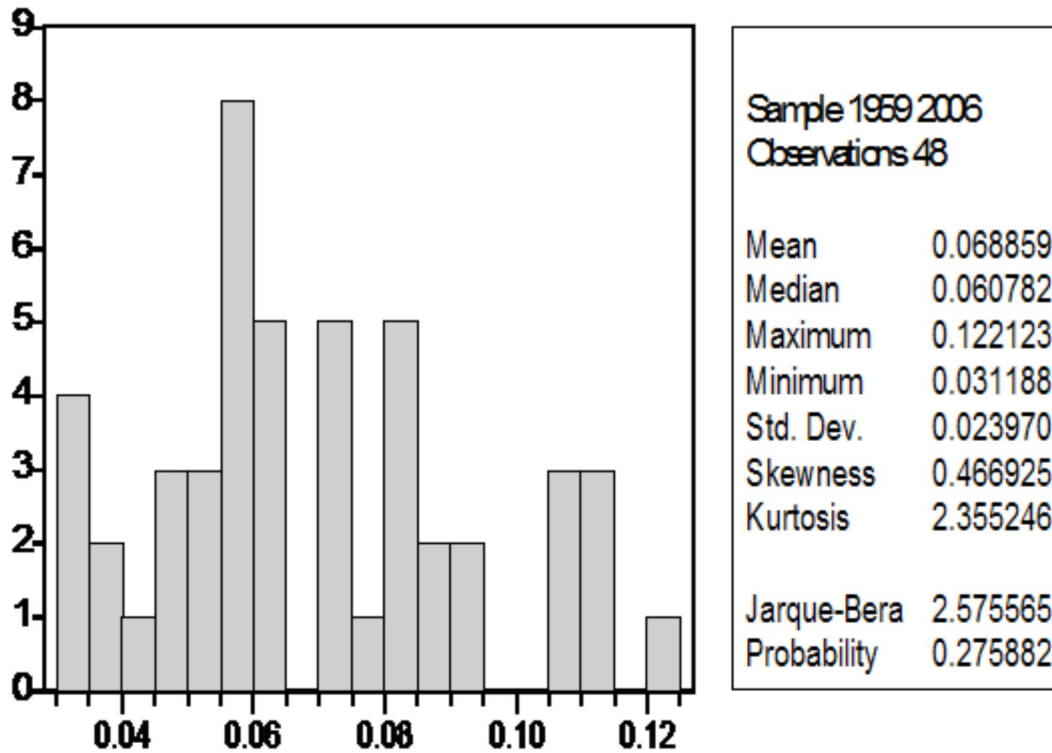
1. (20 points) A colleague says that everyone knows that stock prices are a random walk: a time series with serially uncorrelated changes and a constant variance. Your colleague says the graphs below obviously show a random walk. The graphs below show the level of a stock index and the change in the logarithm of the stock index. Looking at the graph of the first differences, what do you see that suggests to you that the series is not a random walk. What statistical analyses would you use to decide whether or not the stock prices below are a random walk?



Sources: Dow Jones, NY Times, Wall



2. (20 points) You are analyzing a time series “X”, which has the following histogram of values and sample statistics. Explain the implications of the graph and sample statistics for the distribution of X including, but not limited to, whether X has a normal distribution. Is there a sense in which a typical value is about 0.06 to 0.07? Why or why not?



3. (25 points) A test for a unit root in the series “Spread” produces the statistical results below using EViews.

- a. Are these results consistent with Spread having a unit root? Why or why not? Briefly explain the role of the autoregression in producing the test results, especially why there are levels and changes in Spread on the right-hand side of the regression estimated.

Null Hypothesis: Spread has a unit root
 Exogenous: Constant
 Lag Length: 4 (Automatic based on SIC, MAXLAG=25)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-4.312758	0.0004
Test critical values: 1% level	-3.433704	
5% level	-2.862908	
10% level	-2.567545	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
 Dependent Variable: D(Spread)
 Method: Least Squares
 Date: 05/18/10 Time: 15:07
 Sample (adjusted): 12/11/2001 12/24/2009
 Included observations: 1839 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
Spread(-1)	-0.011758	0.002726	-4.312758	0.0000
D(Spread(-1))	0.176138	0.023188	7.596221	0.0000
D(Spread(-2))	0.089814	0.023616	3.803027	0.0001
D(Spread(-3))	0.079535	0.023731	3.351568	0.0008
D(Spread(-4))	0.082033	0.023454	3.497544	0.0005
C	0.254456	0.113948	2.233082	0.0257
R-squared	0.077130	Mean dependent var		0.020609
Adjusted R-squared	0.074613	S.D. dependent var		4.398727
S.E. of regression	4.231445	Akaike info criterion		5.726222
Sum squared resid	32820.10	Schwarz criterion		5.744222
Log likelihood	-5259.261	Hannan-Quinn criter.		5.732859
F-statistic	30.63919	Durbin-Watson stat		2.050333
Prob(F-statistic)	0.000000			

- b. “Spread” is the spread between two other series, Y1 and Y2. In fact, Spread=Y1-Y2. Y1 and Y2 have unit roots. Can you tell whether Y1 and Y2 are cointegrated from the results above?

4. (20 points) A colleague tries various estimation options in Eviews and brings you the following sets of results for the series “Values” and asks for help concerning whether the autoregression or the autoregression with ARCH is a better model. Assume that two lags of Values are the only lags that are statistically significant in the autoregression. Is the autoregression or the autoregression with ARCH a better model?

Provide as thorough an answer as you can given the statistics provided.

Autogression

Dependent Variable: VALUES
 Method: Least Squares
 Date: 05/18/10 Time: 16:42
 Sample (adjusted): 5 102
 Included observations: 98 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.313622	0.047858	6.553180	0.0000
VALUES(-1)	0.329327	0.100861	3.265172	0.0015
VALUES(-2)	-0.163720	0.102382	-1.599111	0.1131
R-squared	0.105306	Mean dependent var		0.375931
Adjusted R-squared	0.086471	S.D. dependent var		0.154815
S.E. of regression	0.147970	Akaike info criterion		-0.953474
Sum squared resid	2.080050	Schwarz criterion		-0.874342
Log likelihood	49.72022	Hannan-Quinn criter.		-0.921467
F-statistic	5.590802	Durbin-Watson stat		1.920221
Prob(F-statistic)	0.005064			

Autocorrelations of squared residuals

Date: 05/18/10 Time: 16:48
 Sample: 5 102
 Included observations: 98

Autocorrelation	Partial Correlation	AC	PAC	Q-Stat	Prob
* .	* .	1 -0.132	-0.132	1.7641	0.184
. *	. *	2 0.115	0.099	3.1182	0.210
* .	* .	3 -0.116	-0.092	4.5072	0.212
. .	* .	4 -0.033	-0.071	4.6224	0.328
. .	. .	5 -0.008	0.001	4.6296	0.463
. *	. *	6 0.082	0.085	5.3500	0.500
. .	. .	7 0.061	0.073	5.7519	0.569
. .	. .	8 0.025	0.021	5.8179	0.668
. .	. .	9 -0.008	0.001	5.8246	0.757
** .	** .	10 -0.226	-0.221	11.526	0.318
. .	. .	11 0.016	-0.028	11.556	0.398
** .	** .	12 -0.226	-0.206	17.359	0.137

Estimation of ARCH equation

Dependent Variable: VALUES

Method: ML - ARCH (Marquardt) - Normal distribution

Date: 05/18/10 Time: 16:45

Sample (adjusted): 5 102

Included observations: 98 after adjustments

Convergence achieved after 18 iterations

Presample variance: backcast (parameter = 0.7)

GARCH = C(4) + C(5)*RESID(-1)^2

Variable	Coefficient	Std. Error	z-Statistic	Prob.
C	0.302916	0.045535	6.652365	0.0000
VALUES(-1)	0.341409	0.081736	4.176953	0.0000
VALUES(-2)	-0.138507	0.104249	-1.328623	0.1840

Variance Equation

C	0.025955	0.008870	2.926164	0.0034
RESID(-1)^2	-0.210352	0.239142	-0.879614	0.3791

R-squared	0.103954	Mean dependent var	0.375931
Adjusted R-squared	0.085090	S.D. dependent var	0.154815
S.E. of regression	0.148082	Akaike info criterion	-0.925000
Sum squared resid	2.083194	Schwarz criterion	-0.793114
Log likelihood	50.32501	Hannan-Quinn criter.	-0.871655
F-statistic	2.755337	Durbin-Watson stat	1.949132
Prob(F-statistic)	0.032308		

5. (15 points) "Value At Risk as measured by RiskMetrics does not measure 'risk' in any interesting sense of the word."

True, false or uncertain. Your grade will be based on your explanation.