Midterm Examination
Spring 2013

April 19, 2013

1. (18 points) Consider the following bivariate structural VAR

$$y_{1t} = \gamma_{10} - b_{12}y_{2t} + \gamma_{11}y_{1,t-1} + \gamma_{12}y_{2,t-1} + \varepsilon_{1t}$$

$$y_{2t} = \gamma_{20} - b_{21}y_{1t} + \gamma_{21}y_{1,t-1} + \gamma_{22}y_{2,t-1} + \varepsilon_{2t}$$

where $\begin{pmatrix} \varepsilon_{1t} \\ \varepsilon_{2t} \end{pmatrix} \tilde{\ } iid \left[\begin{pmatrix} \varepsilon_{1t} \\ \varepsilon_{2t} \end{pmatrix}, \begin{pmatrix} \sigma_1^2 & 0 \\ 0 & \sigma_2^2 \end{pmatrix} \right]$

   (a) Can you estimate above two equations by OLS separately? Explain.

   (b) What are the different types of restrictions that have been proposed in literature to identify the above structural VAR?

   (c) Show how the above model can be identified using long-run restriction proposed by Blanchard and Quah.

2. (12 points)

   (a) Consider the following bivariate VAR

$$y_{1t} = 0.8y_{1,t-1} + 0.1y_{2,t-1} + \varepsilon_{1t}$$

$$y_{2t} = 1.1y_{1,t-1} - 0.4y_{2,t-1} + \varepsilon_{2t}$$

   Is this system covariance stationary?

   (b) Suppose y_t is modeled as ARMA(1,1) process :

$$y_t = \phi y_{t-1} + \varepsilon_t + \theta\varepsilon_{t-1}, \varepsilon_t \tilde{\ } WN(0, \sigma^2)$$

   Calculate the long-run variance of the above process.

3. (12 points)Please see the attached regression output for this question

   (a) Figure 1 shows correlogram of the 1-step ahead private sector forecast of GDP growth. What kind of ARMA model is appropriate for modeling this forecast?

   (b) The regression output shows the regression of squared error terms on a constant. ERR4_KK_25 is forecast error from a generic model, whereas ERR4_SPF is forecast error from private sector forecast of GDP growth. Calculate mean squared error (MSE) of the forecast for the generic model and private sector.

   (c) Suppose you want to test whether one forecast is significantly superior to another. How would you perform that test? Write the steps involved in the estimation.

4. (8 points)

   (a) Suppose the estimated AR(1) regression for the detrended Yen-Dollar nominal exchange rate (DTEX) is

$$DTEX = -0.08 + 0.98DTEX(-1) + error_t$$

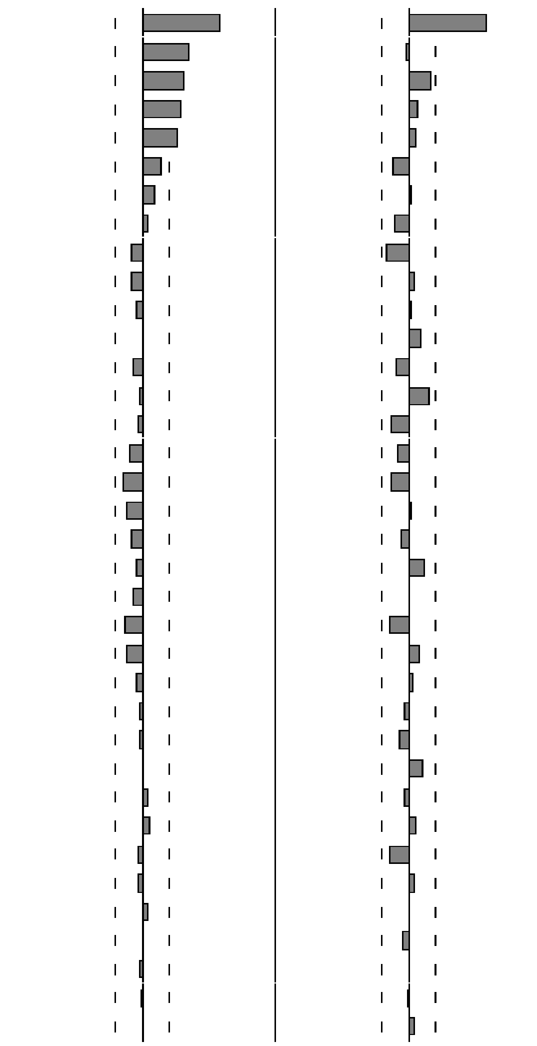
   Which unit root test is appropriate for testing the unit root in DTEX, and why?

   (b) Table shows the estimated AR(2) model for DTEX, calculate the unconditional mean and unconditional variance for DTEX.

(3) (a)

Correlogram of DRGDP1_SPF

Date: 04/15/11   Time: 10:16
Sample: 1980Q1 2007Q2
Included observations: 90



Autocorrelation / Partial Correlation		AC	PAC	Q-Stat	Prob
	1	0.610	0.610	34.609	0.000
	2	0.364	-0.013	47.071	0.000
	3	0.326	0.173	57.170	0.000
	4	0.307	0.070	66.216	0.000
	5	0.276	0.059	73.620	0.000
	6	0.150	-0.121	75.826	0.000
	7	0.104	0.028	76.898	0.000
	8	0.043	-0.103	77.081	0.000
	9	-0.090	-0.169	77.901	0.000
	10	-0.082	0.054	78.601	0.000
	11	-0.045	0.026	78.818	0.000
	12	0.008	0.101	78.825	0.000
	13	-0.060	-0.094	79.206	0.000
	14	-0.018	0.168	79.240	0.000
	15	-0.026	-0.134	79.317	0.000
	16	-0.096	-0.076	80.344	0.000
	17	-0.142	-0.125	82.623	0.000
	18	-0.115	0.023	84.151	0.000
	19	-0.084	-0.051	84.978	0.000
	20	-0.044	0.127	85.210	0.000
	21	-0.063	0.010	85.681	0.000
	22	-0.139	-0.142	88.022	0.000
	23	-0.120	0.086	89.799	0.000
	24	-0.037	0.035	89.966	0.000
	25	-0.018	-0.022	90.010	0.000
	26	-0.016	-0.073	90.041	0.000
	27	0.003	0.122	90.042	0.000
	28	0.041	-0.028	90.268	0.000
	29	0.052	0.059	90.638	0.000
	30	-0.029	-0.146	90.754	0.000
	31	-0.026	0.050	90.849	0.000
	32	0.049	0.002	91.192	0.000
	33	0.015	-0.045	91.225	0.000
	34	-0.019	0.012	91.278	0.000
	35	-0.003	-0.004	91.279	0.000
	36	0.012	0.055	91.300	0.000

(b)

Dependent Variable: ERR4_KK_25^2
Method: Least Squares
Date: 04/15/11 Time: 11:43
Sample (adjusted): 1 49
Included observations: 49 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	3.798811	0.655215	5.797805	0.0000

R-squared	0.000000	Mean dependent var	3.798811
Adjusted R-squared	0.000000	S.D. dependent var	4.586507
S.E. of regression	4.586507	Akaike info criterion	5.904312
Sum squared resid	1009.730	Schwarz criterion	5.942920
Log likelihood	-143.6556	Hannan-Quinn criter.	5.918960
Durbin-Watson stat	1.848328		

Dependent Variable: ERR4_SPF^2
Method: Least Squares
Date: 04/15/11 Time: 12:09
Sample (adjusted): 1 49
Included observations: 49 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	4.670979	0.773496	6.038790	0.0000

R-squared	0.000000	Mean dependent var	4.670979
Adjusted R-squared	0.000000	S.D. dependent var	5.414471
S.E. of regression	5.414471	Akaike info criterion	6.236225
Sum squared resid	1407.192	Schwarz criterion	6.274833
Log likelihood	-151.7875	Hannan-Quinn criter.	6.250873
Durbin-Watson stat	1.846745		

(4)

Dependent Variable: DTEX
Method: Least Squares
Date: 04/19/10 Time: 09:17
Sample (adjusted): 1971M03 2009M01
Included observations: 455 after adjustments

	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.061246	0.216406	-0.283015	0.7773
DTEX(-1)	1.317257	0.044301	29.73417	0.0000
DTEX(-2)	-0.334603	0.044136	-7.581146	0.0000

R-squared	0.980362	Mean dependent var	-0.295528
Adjusted R-squared	0.980275	S.D. dependent var	32.86242
S.E. of regression	4.615345	Akaike info criterion	5.903222
Sum squared resid	9628.238	Schwarz criterion	5.930389
Log likelihood	-1339.983	Hannan-Quinn criter.	5.913925
F-statistic	11282.44	Durbin-Watson stat	1.946852
Prob(F-statistic)	0.000000		