

Problem Set 3

Due Date: 4/1/2011

Econ 608

1. Consider $x_t = \begin{pmatrix} 1.1 & 0 \\ 0 & 0.8 \end{pmatrix} e_{t-1} + e_t$ where e_t has mean zero variance covariance matrix $\begin{pmatrix} 2 & 1 \\ 1 & 1 \end{pmatrix}$ and $y_t = \begin{pmatrix} 0.9091 & 0.1909 \\ 0 & 0.8 \end{pmatrix} u_{t-1} + u_t$ where u_t has mean zero and variance covariance matrix $\begin{pmatrix} 2.21 & 1 \\ 1 & 1 \end{pmatrix}$. Show that x_t and y_t have the same autocovariance functions. Which representation is fundamental?

2. Consider the VAR $y_t = \begin{pmatrix} 0.97 & 0 \\ 0.5 & 0.5 \end{pmatrix} y_{t-1} + e_t$ where e_t is normal with mean zero and variance-covariance matrix $\begin{pmatrix} 1 & 0.3 \\ 0.3 & 1 \end{pmatrix}$. In a Monte-Carlo simulation, simulate the coverage of 95 percent confidence intervals for the response of variable 2 to a shock in variable 1 at a lead time of 12 periods, where the residuals are orthogonalized by the Cholesky decomposition and the confidence intervals are: the other percentile bootstrap and the bias-adjusted bootstrap of Kilian (1998).

3. On my website, there are data on ten macroeconomic series, 1960Q1-2008Q4. Some of the series are in annualized growth rates (i.e. 400 times log first differences), others are in levels. All are, we hope, stationary.

Using a VAR of order 4 with the Minnesota prior as discussed in class, where the prior mean is that all the VAR slope coefficients are equal to zero, construct forecasts of real GDP growth and CPI inflation for 2009Q4. In this exercise, set the hyperparameter λ to 0.2.

4. Suppose that the yields on zero-coupon bonds are as shown in the Table below.

Maturity	Yield (Cont. Comp)	Maturity (cont)	Yield
6 months	5.4	3 years	5.5
1 year	5.3	3-1/2 years	6
18 months	5	4 years	6.5
2 years	4.5	4-1/2 years	7
2-1/2 years	5	5 years	7.5

- (a) What will the price of a bond that pays coupons of 3 percent twice a year (called a 6 percent bond) be? Assume that the first coupon is in exactly 6 months.
- (b) Compute the duration of the bond in (a).

5 (a) From Bloomberg, download the prices of the current-month and next-month Federal Funds futures contracts (FF1 Cmdty and FF2 Cmdty). On the course website, the days of FOMC meetings and policy actions are listed from Feb 1994 to Dec 2008. Construct the surprise components of these FOMC actions, as discussed in class. Use the current-month contract when the meeting is on or before the 22nd of the month and the next-month contract otherwise. Draw a bar chart of the surprises (in basis points) in Matlab.

Note: It does not make much sense to do this after Dec. 2008 because the federal funds rate has been stuck at zero.

(b) Download the ten-year zero-coupon yield from

<http://www.federalreserve.gov/econresdata/researchdata/feds200628.xls>

(it is in column K). Run a regression of the change in ten-year yields on the day of FOMC announcements on the surprise component of the FOMC announcement. Use White standard errors.

6. Here is a table of the prices of NYMEX light sweet crude oil put options expiring in June 2011 as of March 17.

Strike (\$ per barrel)	Price
45	0.01
50	0.02
55	0.03
60	0.05
65	0.09
70	0.16
75	0.25
80	0.46
85	0.87
90	1.62
95	2.87
100	4.80
105	7.52
110	10.88
115	14.77
120	19.02
125	23.49
130	28.10

These were obtained from the NYMEX website

http://www.nymex.com/lSCO_opt_CSO.aspx

Assume that the oil price on settlement day is some integer multiple of 5 from \$40 to \$130 (inclusive). Construct the risk-neutral probability. Draw it in Matlab.