

# ***Empirical Macro I***

## ***First homework***

(This homework is due, via email, at the latest, by midnight of Sunday, April 9.  
Please send me a MATLAB code implementing your solution.)

### ***Question I***

Based on the data for real GDP, the GDP deflator, and M2 for the Gold Standard era (1875Q1-1914Q2), please

- (1) estimate a VAR for the log-differences of the three series, selecting the lag order as the maximum between the lag orders chosen by the Akaike and Schwartz criteria.
- (2) Bootstrap the VAR as we have done in class, using 10,000 bootstrap replications, and build up and store, as we did, the bootstrapped distributions of all of the relevant objects: the vector of intercepts  $B_0$ ; the VAR coefficients matrices  $B_1, B_2, \dots, B_p$ ; and the VAR's covariance matrix of reduced-form innovations.
- (3) Based on this, test the hypotheses that
  - (i) the innovation variance of GDP growth is greater than the innovation variance of inflation;
  - (ii) the innovation variance of M2 growth is greater than the innovation variance of inflation.

### ***Question II***

Based on the data for real GDP, the GDP deflator, the unemployment rate, and the 3-month Treasury bill rate for the period 1948Q1-2014Q4), please

- (1) estimate a VAR for the unemployment rate, the 3-month Treasury bill rate, and the log-differences of real GDP and the GDP deflator, selecting the lag order as the maximum between the lag orders chosen by the Akaike and Schwartz criteria.
- (2) Generate forecasts for the four variables starting from 2015Q1, by bootstrapping the VAR into the future as we did in class. Plot the 16<sup>th</sup>, 84<sup>th</sup>, 5<sup>th</sup>, and 95<sup>th</sup> percentiles of the bootstrapped distributions of the forecasts.
- (3) What is the probability that, in 2020Q1, Inflation is going to be negative?