Empirical Exercise
Time Series Analysis (Econ 2142)
Harvard University, Fall 2013
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One of the requirements for Econ 2142 is a typed paper, which should be turned in by Tuesday November 26. This is not intended as a publishable research paper, but is instead a highly structured exercise in which students are asked to apply a number of specific methods covered in the course. Students are nevertheless invited to use this exercise as a very preliminary step in forming a possible research topic, and encouraged to do their best to try to explain why their findings might be of interest.

For this project you will need to find time-series data on 3 or more variables in which you are interested for which you have at least 50 time-series observations each. Your assignment should include numbered sections with the following headings and material. Each section should be about 1 or 2 paragraphs in length. You can seek assistance from others, but you should not give an example that uses the same series used by another student nor something that you've seen discussed in Econ 2142 lectures.

You are welcome to use any software you have access to and are familiar with. The easiest way to complete this assignment is with RATS (available from www.estima.com). They have most of the procedures covered in the course already coded with examples to implement; for example you can find every empirical illustration in the text at http://www.estima.com/textexam_hamilton_timeseries.shtml. Alternatively you could consult the library of R code at http://weber.ucsd.edu/~jhamilto/RcompHam94_0.1.zip or the libraries of MATLAB and R code at http://www.cambridge.org/features/econmodelling/exercises.htm. If you find other sources that might be helpful to other students for completing this project, let Professor Hamilton or Fernando Yu know and we can add them to this document.

1. Introduction.

Briefly describe some of the questions of interest for this data set with citations to some previous studies.

2. Data.

Describe your data set, indicating frequency, start date, and end date, along with detailed description of what the series are and where they can be obtained. Plot graphs of each series.

3. Stationarity.

Decide whether each of your series individually is well-approximated with an integrated autoregression and whether there is any cointegration. Carefully explain the tests you used with specific values you found for test statistics and what they mean.

4. Spectrum.

Calculate an estimate of the spectrum of one stationary transformation of one of your series. Explain the procedure you used to calculate the spectrum and comment on any insights you gain from the plotted spectrum.

5. Structural stability.

Test one of the key relations you're interested in for structural stability. Again carefully explain the test you used with specific values you found for test statistics and what they mean.

6. Vector autoregression.

Estimate a vector autoregressive representation for your system, describing the procedure you used to select a lag length.

7. Structural identification

Defend a system for identifying at least one dynamic structural equation of interest. Point out both the strengths and weaknesses of the identification.

8. Results

Calculate an impulse-response function of interest along with confidence intervals. Explain the procedure used to calculate confidence intervals.

9. References

Include a list of references that have done something related to what you're doing, with full reference in AER-style format. You should have at least one reference that is relevant for your particular question of interest.