

Comp Econ Homework Set 4

Date 26th Feb 2016

Due Date: 4th March 2016

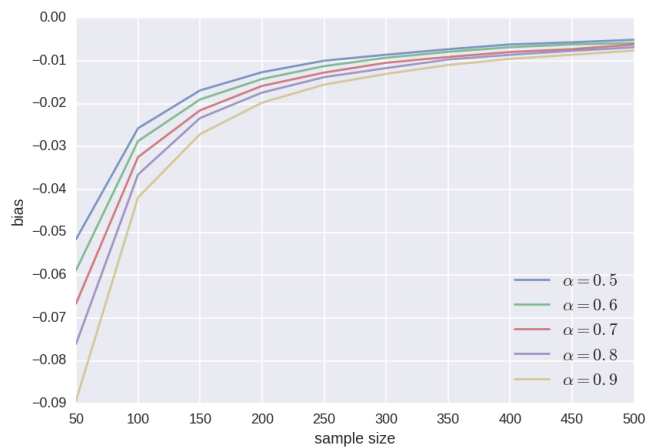
Recall HW set 1, where you showed downward bias in the OLS estimate of α in the AR1 process

$$X_{t+1} = \alpha X_t + \beta + \sigma W_{t+1}, \quad \{W_t\} \sim N(0, 1).$$

Repeat this now in Python using some of the tools from the scientific libraries. Set $\alpha = 0.5$ and compute an estimate of the bias for sample sizes $n = 50, 100, 150, \dots, 500$. Plot with n on the horizontal axis and bias on the vertical axis.

Repeat (on the same figure) with $\alpha = 0.6, 0.7, 0.8, 0.9$.

Here's an example of what your plot might look like (I'm using Seaborn):



Include your code in a Jupyter notebook that displays the resulting figure in the browser. Your notebook should not have external dependencies

beyond Anaconda, in the sense that it runs on my machine when I execute each cell.

Use either Cython or Numba to make your loops run quickly.

Include explanations of your code. Break your code up into functions. Use PEP8. Make sure you have your name at the top of the notebook. Use a large number of observations of the OLS estimate at each (α, n) pair to get a good estimate of the bias. Give a brief discussion of what we see in the figure.