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MGMT 525 Problem Set #3

Github Site: https://github.com/azdrojew/MGMT525

Part 1—Finite Sample Bias:

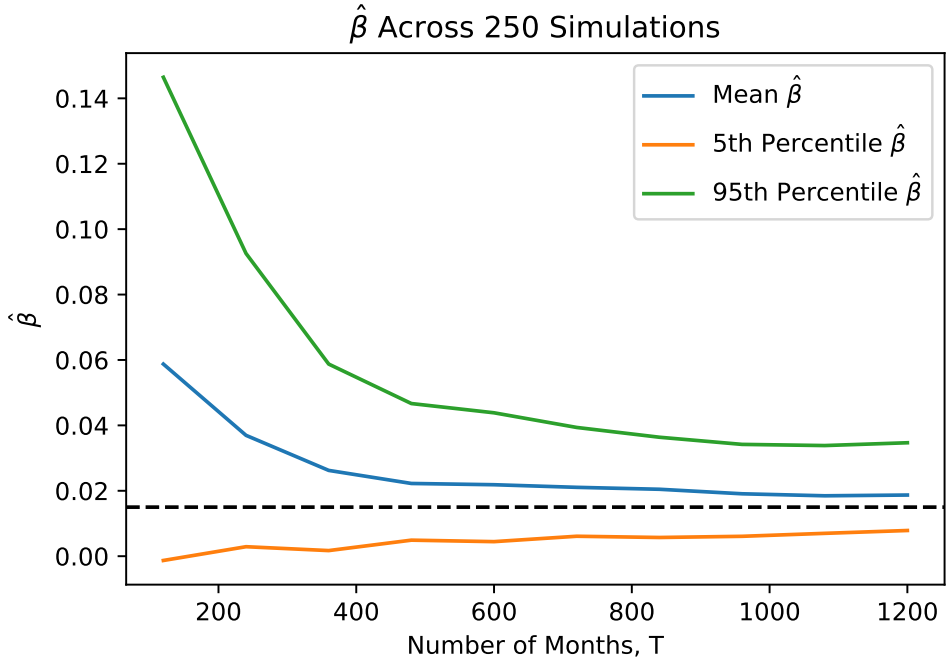
Figure 1 depicts the mean and 95th and 5th percentile β estimates across *B*=250 simulated time-series. In samples with a smaller time-series, the estimates of β are very biased. For instance, with T=120 or T=240, the mean estimate of β is .06 and .0375, respectively. These values are ~400% and ~275% of the true β=.015. The bias decreases as the sample size grows to include many months, but never disappears entirely. Further, there are many practical situations in which 50+ years of monthly data may not exist, so that estimates we obtain are likely to be substantially (upward) biased.

Part 2—Effect of Residual Correlation:

Figure 2 depicts the mean and 95th and 5th percentile β estimates across *B*=250 simulated time-series, generated with ρ_{uv}= -.8, -.5, or -.2. The effects described in Part 1 are present to a degree in each of the panels of Figure 2. However the bias diminishes significantly as ρ_{uv} approaches zero; with T=120, the mean estimated β equals .057, .042, and .024 (for ρ_{uv}= -.8, -.5, and -.2, respectively). Still, even with the least correlated residuals, the mean estimated β with T=120 is ~160% of the true β. So even if the residuals are relatively uncorrelated, we still need a long time series to reliably estimate β.

Part 1 - Finite Sample Bias

Figure 1 : The figure shows the mean, 5th percentile, and 95th percentile beta estimates across B=250 simulated samples, generated with $\rho_{uv} = -.8$. The true β is indicated with a dashed line.



Part 2 - Effect of residual correlation

Figure 2 : The figure shows the mean, 5th percentile, and 95th percentile beta estimates across B=250 simulated samples, generated with $\rho_{uv} = -.8$, $-.5$, or $-.2$. The true β is indicated with a dashed line.