

# Economics 662D1

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## Assignment 1

Consider the autoregressive model

$$y_t = \beta_1 + \beta_2 y_{t-1} + u_t, \quad t = 2, \dots, n.$$

Consider a DGP for which  $\beta_1 = 2$ ,  $\beta_2 = 0.5$ , and  $u_t \sim \text{NID}(0, 1)$ , and  $y_0 = 1.5$ . Carry out a simulation experiment in order to estimate the bias of the OLS estimator of  $\beta_2$ , and that of the OLS estimator of  $\beta_1$  for this DGP, with sample sizes  $n = 20, 50, 100, 200, 500$ . Do your simulation results suggest that either of the OLS estimators is (i) unbiased, or (ii) consistent? If the estimators appear biased, use your simulation results to estimate the bias. How do these estimates vary with the sample size?