

Economics 245B  
Exercise 1

Consider the deterministic regression model

$$Y_t = \beta_0 t + U_t, \quad t = 1, \dots,$$

in which  $E|U_t| = O(t^\delta)$  for some  $\delta < 1$ .

- Consider the sequence  $\{U_t\}_{t \geq 1}$ . Is it possible that  $\lim_{t \rightarrow \infty} EU_t = 0$ ?
- Denote the OLS estimator of  $\beta_0$  as  $B$ . Does  $B \xrightarrow{P} \beta_0$ ?
- Replace the deterministic regressor  $t$  with the number 1 (so that the model contains only an intercept). Does  $B \xrightarrow{P} \beta_0$ ?
- What do you conclude about the need for mean zero i.i.d. errors to establish consistency of the OLS estimator?