

Convergence Rates:

Consider some sequence $C_n \xrightarrow{n \rightarrow \infty} C$, e.g., C_n = option price for n step binomial tree, and

C = price from Black-Scholes

It is very important to know how fast the convergence is.

Often, the convergence goes like a power law: $E_n = |C_n - C| \approx A n^{-\beta}$ for large n

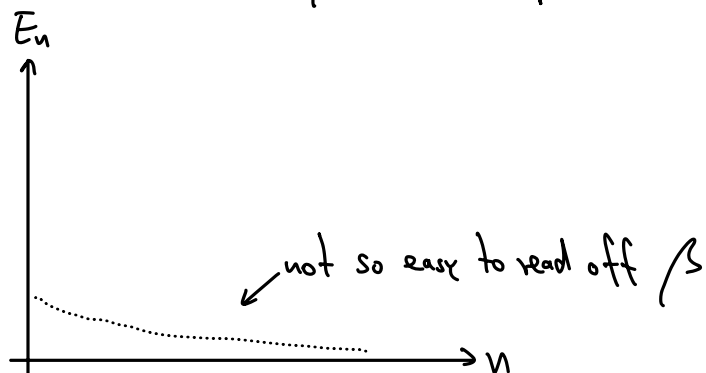
β is called rate of convergence

Remarks: • different β can make a huge difference (e.g. linear vs. quadratic)

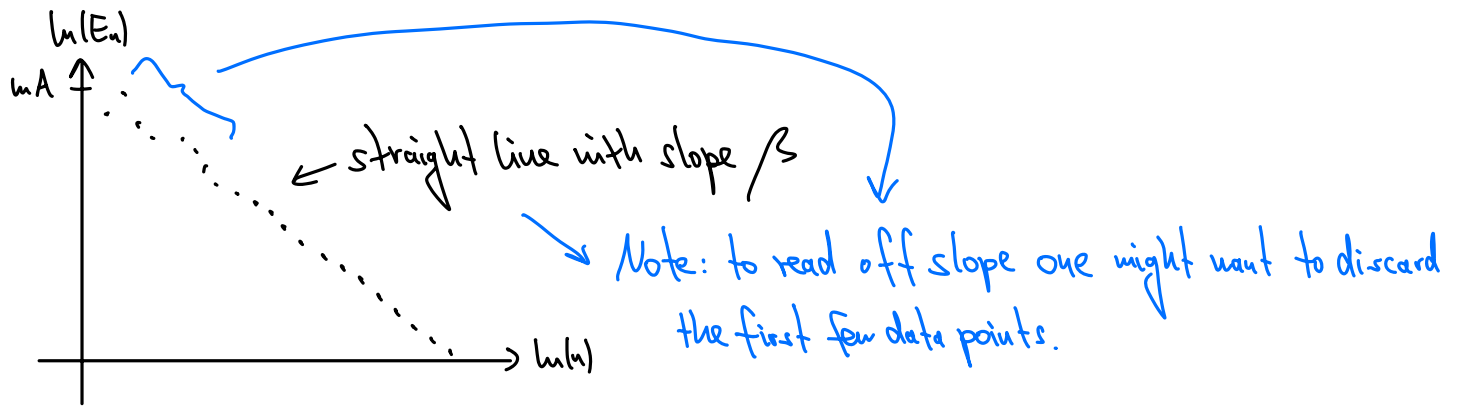
• if limit C is unknown one could, e.g., look at $N \gg n$ and then

$$|C_n - C_N|, \text{ or } E_n = |C_{n+1} - C_n|$$

How can we read off β from a plot?



better: $\ln E_n = \ln A n^{-\beta} = \ln A - \beta \ln n$



python: `log(log(n, E_n))` produces such plots