Slow Convergence of Simulations

Long-range dependent traffic generators => long transients

Toy example: convergence of sample mean in distribution
heavy tailed probability distribution (Pareto), infinite variance

\[ P[X \leq x] = 1 - \frac{k}{x} \]

Levy's CLT (i.i.d. \( X_i \))

\[ A_n = \frac{1}{n} \sum_{i=1}^{n} X_i \]

then

\[ \left| A_n - \langle A \rangle \right| \sim c_1 n^{1/1} \]

if want k digits accuracy

\[ \left| A_n - \langle A \rangle \right| < 10^k \]

then

\[ n > c_2 10^{1\,\frac{k}{1/1}} \]

for \( k = 2, \ c_2 \sim 1, \) traffic case \( \sim 1.5 \)

need \( n \sim 1,000,000 \) i.i.d. samples!

Crovella, Lipsky 1997