10 Book Notes

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10-1 The Nature of Time Series Data

Data must go in order

A series of random variables indexed by time is a stochastic process or time series process

$\uparrow$ random

10-2 Examples of Time Series Regression models

10-2a Static models

a static model time has an immediate effect
good for judging tradeoffs between y and z

10-2b Finite Distributed Lag models

FDL model

one or more variables can affect y w/ a lag

δ_0 is the impact propensity or impact multiplier

Lag distribution summarizes dynamic effect that a temporary increase in z has on y

Long-run propensity/multiplier (LRP)

for any horizon h, we can define the cumulative effect

10-2c A convention about the time index

Time starts at $t=1$

10-3 Finite sample properties of OLS under classical assumptions

10-3a Unbiasedness of OLS

Assumptions:
1) Linear in Parameters
2) No perfect collinearity
3) Zero conditional mean
4) Homoskedasticity
5) No serial correlation
6) Normality

10-3b The Variance of the OLS estimators and the Gauss-Markov Theorem

Homoskedasticity:
Conditional on x, variance of u_t is same for all t
↳ $Var(u_t) = \sigma^2, t = 1, 2, \dots, n$

No serial correlation:
Conditional on x, errors in two times are uncorrelated
↳ $Corr(u_t, u_s | X) = 0$, for all $t \neq s$
↳ suffer from serial/auto correlation when false

10-3c Inference under the classical linear model Assumptions

Normality:
errors u_t are independent of X and are independentantly and identically distributed as $Normal(0, \sigma^2)$