



Econometrics Models

Salahaddin University / Msc Course

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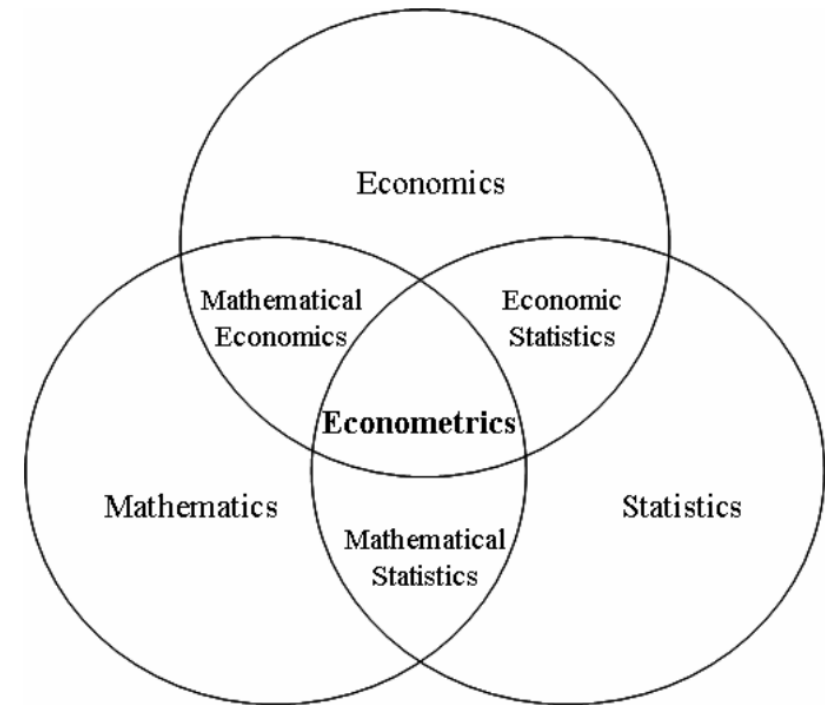
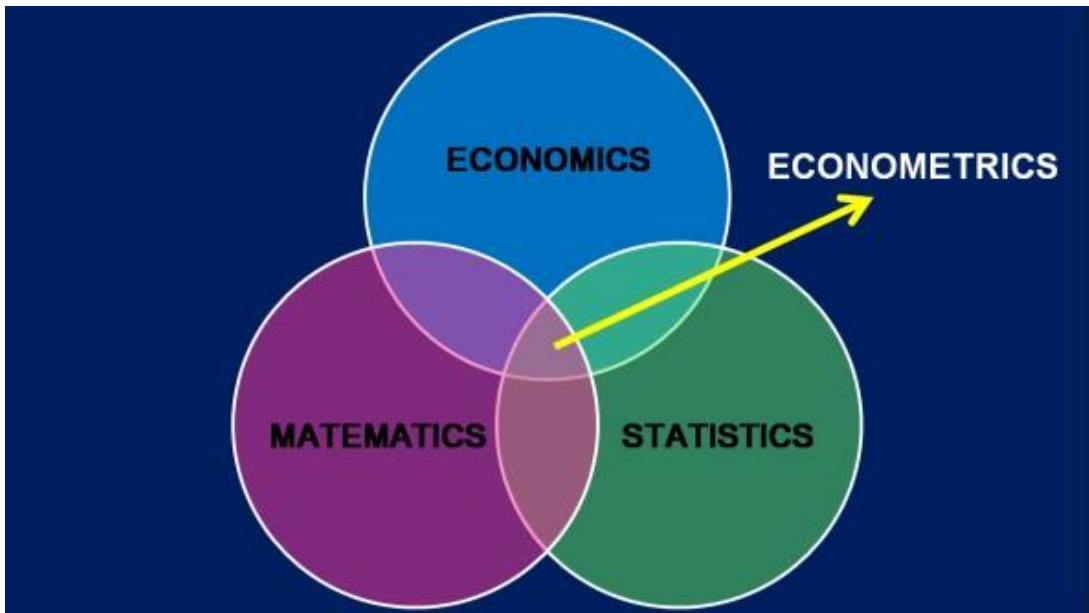
Lect. 1



Ch. 1. Introduction and Econometrics Modelling.

1.1 What is Econometrics?

- Econometrics is the use of statistical and mathematical models to develop theories or test existing hypotheses in economics and to forecast future trends from historical data. It subjects real-world data to statistical trials and then compares the results against the theory being tested.



1.2 Definition of Econometrics

- **Econometrics** analyzes data using statistical methods in order to test or develop economic theory. These methods rely on statistical inferences to quantify and analyze **economic theories** by leveraging tools such as frequency distributions, probability, and probability distributions, statistical inference, correlation analysis, simple and multiple regression analysis, simultaneous equations models, and time series methods.
- **Econometrics** is a set of techniques for measuring economic relationships. What is an economic relationship? It is a relationship among economic variables, where an economic variable is one that measures some aspect of the economy.



- **Economic theory**, makes statements or hypotheses that are mostly qualitative in nature. Only econometrics gives empirical or numerical content to most economic theory. The main concern of mathematical economics is to express economic theory in mathematical form (equations) without regard to measurability or empirical verification of the theory.

1.3 Relationship of econometrics with other sciences

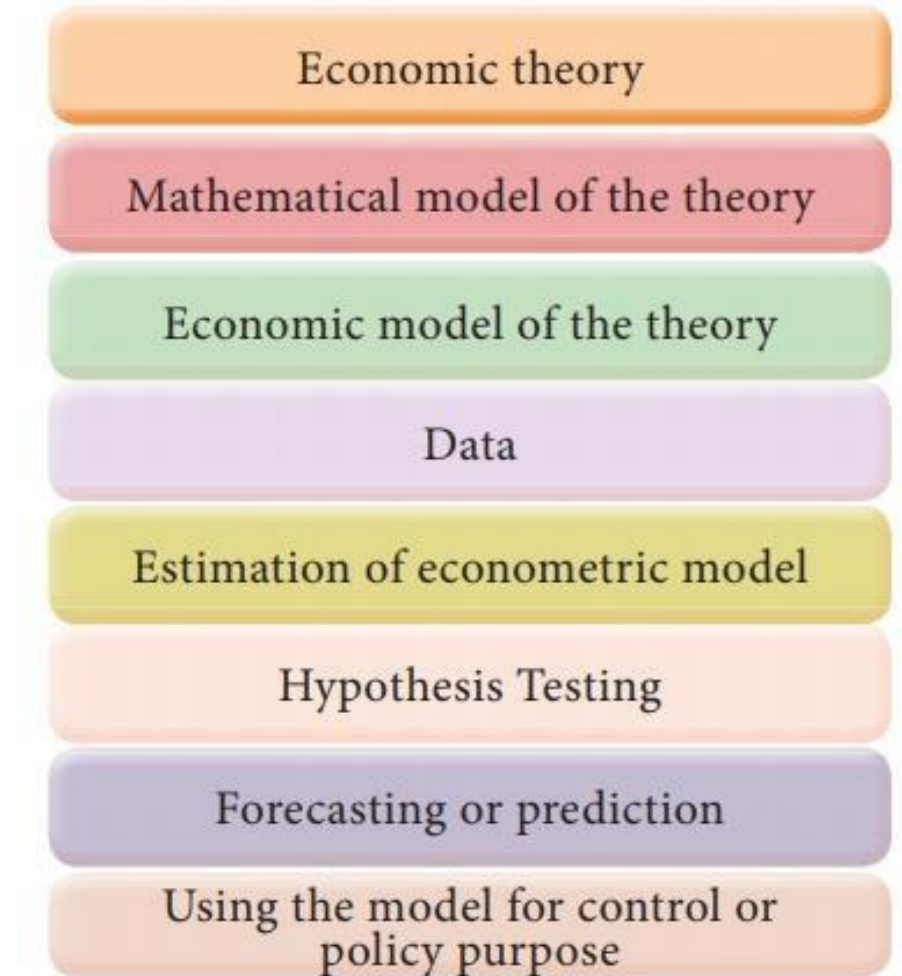
- Economics is closely related to the other social sciences, particularly politics, sociology (because some academics argue that economics is in fact a branch of sociology) and ethics; there are also strong connections with psychology, as economics is often influenced and affected by human behavior patterns.



1.4 Methodology of Econometrics

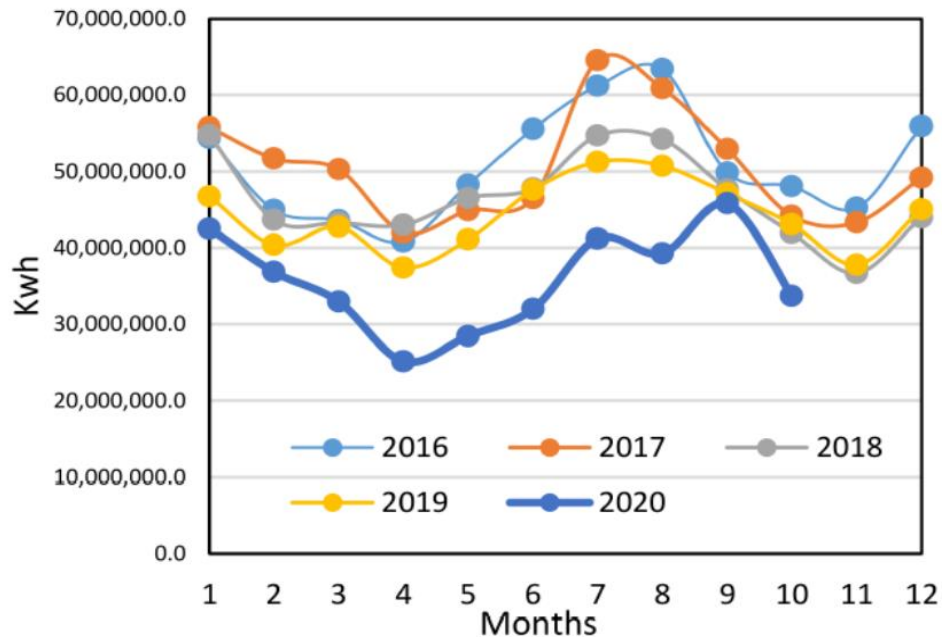
Traditional econometrics methodology proceeds along the following lines:

1. Statement of economic theory.
2. Specification of the mathematical model of the theory.
3. Specification of the econometric model of the theory.
4. Obtaining the data.
5. Estimation of the parameters of the econometric model.
6. Hypothesis testing.
7. Forecasting or prediction.
8. Using the model for control or policy purposes.

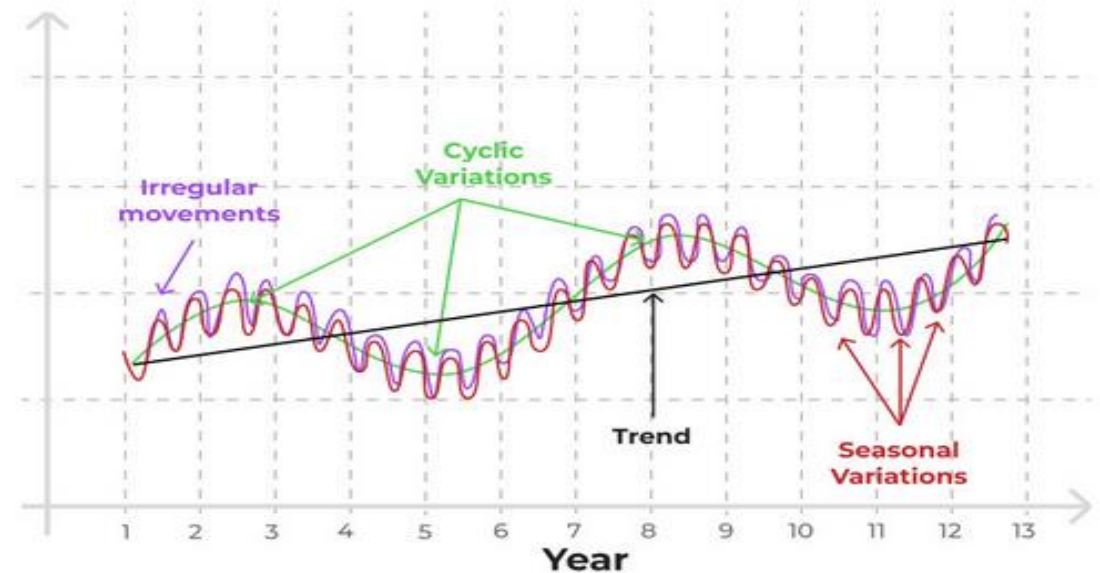


1.5 Types of Economic data (Data and Variables)

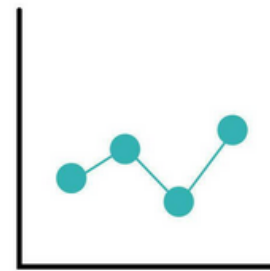
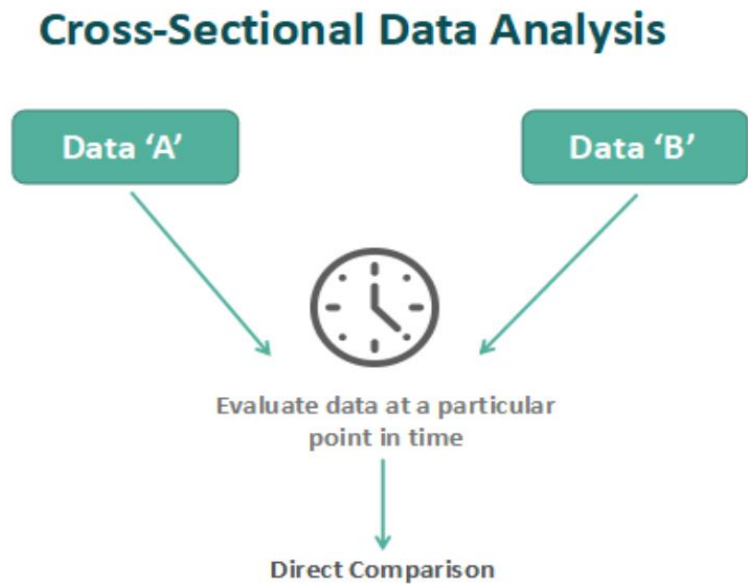
1. Time Series Data / These are data from a unit (or a group of units) observed in several successive periods. Time series data gives information about the numerical values of variables from period to period and are collected over time. A time series is a set of observations on the values that a variable takes at different times. Such as data of daily, weekly, monthly, quarterly, annually, quinquennially or decennially.



TIME SERIES DATA COMPONENTS



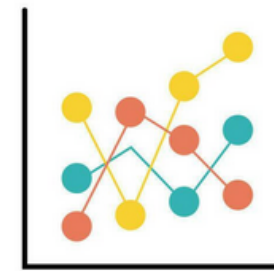
2. Cross-Sectional Data / These are data from units observed at the same time or in the same time period. The data may be single observations from a sample survey or from all units in a population. The key difference between time series and cross sectional data is that the time series data focuses on the same variable over a period of time while the cross sectional data focuses on several variables at the same point of time.



Time series data



Cross-Sectional data



Panel Data
(Longitudinal Data)



Time series data



Cross-Sectional data



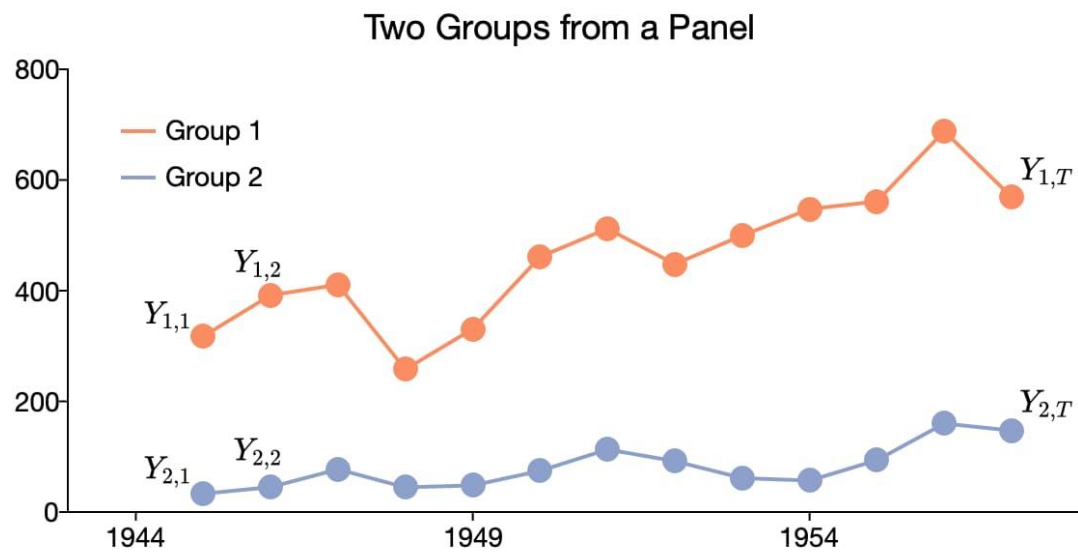
Panel Data
(Longitudinal Data)



- Examples of time-series data are National Accounts data (production, private and public consumption, investment, export, import etc.), the Index of Manufacturing Production, the Consumer Price Index and Financial statistics (money stock, exchange rates, interest rates, bank deposits, etc.)
- Examples of cross-section data are the Household Survey for the year 1999, The Manufacturing Statistics for the year 2000, the Population Census for the year 2001.
- For example of panel data we will take household income data on households X, Y and Z, in 1990. And then we will take the same income data on households G, F and A in 1995. Although we are interested in the same data, we are taking different samples (using different households) in different time periods.



3. Panel Data or Pooled Data / Pooled data occur when we have a “time series of cross sections,” but the observations in each cross section do not necessarily refer to the same unit. Panel data refers to samples of the same cross-sectional units observed at multiple points in time. A panel-data observation has two dimensions: Y_{it} where i runs from 1 to N and denotes the cross-sectional unit and t runs from 1 to T and denotes the time of the observation.



Time	Y_1	Y_2	Y_N
1	Y_{11}	Y_{21}	Y_{N1}
2	Y_{12}	Y_{22}	Y_{N2}
3	Y_{13}	Y_{23}	Y_{N3}
4	Y_{14}	Y_{24}	Y_{N4}
⋮	⋮	⋮	⋮
$T-1$	Y_{1T-1}	Y_{2T-1}	Y_{NT-1}
T	Y_{1T}	Y_{2T}	Y_{NT}



1.6 The Econometric model

- In general, one of the objectives in modeling is to have a simple model to explain a complex phenomenon. Such an objective may sometimes lead to oversimplified model and sometimes the assumptions made are unrealistic. In practice, generally, all the variables which the experimenter thinks are relevant to explain the phenomenon are included in the model. Rest of the variables are dumped in a basket called “disturbances” where the disturbances are random variables error. This is the main difference between economic modeling and econometric modeling. This is also the main difference between mathematical modeling and statistical modeling.
- An econometric model consists of a set of equations describing the behavior. These equations are derived from the economic model and have two parts : observed variables and disturbances or error.

