Econometrics I
Lecture 0: Course Brief

Mohammad Vesal

Graduate School of Management and Economics

Sharif University of Technology

44716

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Outline

What is Econometrics?

- Econometrics involves statistical methods used for estimating economic relationships, testing economic theories, and evaluating government and business policies.
- Examples:
  - Economics of crime
  - Evaluate subsidy reform
  - Permenant income hypothesis
- Steps:
  Economic model of behavior $\rightarrow$ econometric specification $\rightarrow$ estimation

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  - theory suggests criminal activity depends on costs and benefits:
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  - $y = f(x_1, x_2, ...)$
- Econometric (empirical) specification
  - Observability
  - Functional form

$$y = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + \beta_3 x_3 + \beta_4 x_4 + u$$

  - What is u?
  - What are the assumptions we made to arrive at the specification?

Example 2: Subsidy reform

- Suppose you are asked to evaluate whether the Subsidy Reform was successful in reducing consumption.
  - How would you approach this question?
  - What type of data would you look for?
  - What are the methods?

Example 3: PIH

- Permanent income hypothesis
  - Theory suggests consumers should consider lifetime income and smooth out transitory income shocks
  - How would you test this?
  - What variables might be relevant here?

A quick quiz!

- Define correlation.
- What would be $\Pr(AUB)$ in terms of $\Pr(A)$ and $\Pr(B)$?
- The recent exchange rate devaluation is the root cause of high inflation during current months in Iran. Discuss in 2 sentences.

Outline

Data

- Observational vs. experimental data
- Administrative vs. survey data
- Data formats: cross-sectional, time series, panel, etc.
- A good source: Statistical Center of Iran (SCI)

Cross-sectional data

- sample of individuals, firms, cities, ... at a point in time.
  - Household expenditure survey (HES)
  - Survey of industry
- random vs. non-random sampling

Time series data

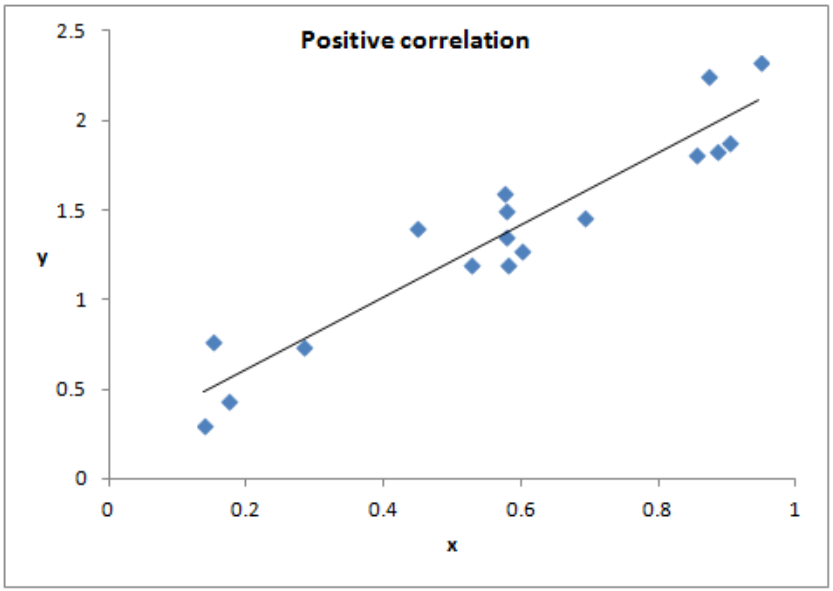
- follow one unit (often a country) over time.
  - inflation, GDP growth, unemployment
- hard to assume observations are independent over time (serial correlation)
- frequency of the data and seasonal variation

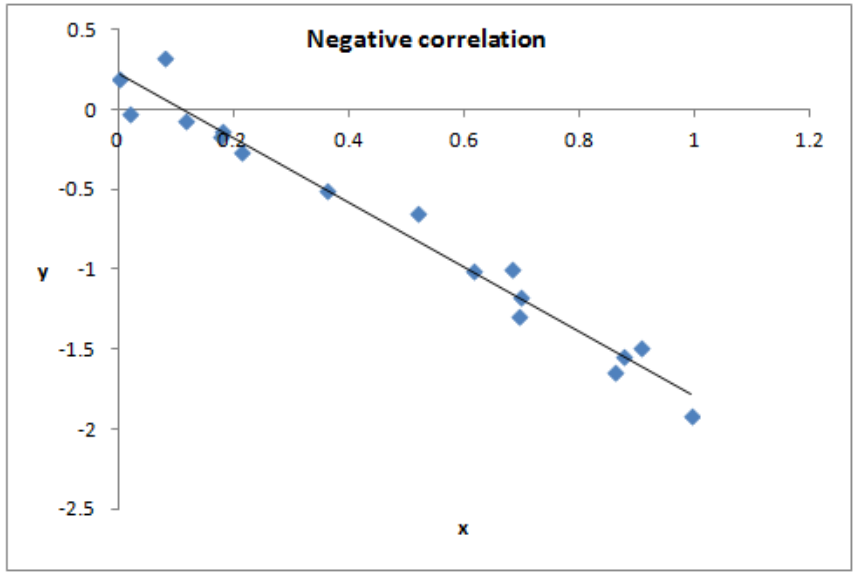
Other data forms

- Pooled cross sections
  - combine cross-sectional data collected at different points in time
  - each sample is drawn independent of the other
- Panel or longitudinal data
  - follow a sample of individuals, firms, ... over a given time period
  - same units observed over time

Outline

Correlation





Question of causality

- As economists we are interested in knowing whether one/several variables affect certain outcomes
  - This is a question about causal relationships.
- Statistical methods, however, rely on observed correlations in the data.
  - Being correlated does NOT necessarily imply a causal relationship.
- Ceteris Paribus

Back to examples

- Ex1 (Crime): using a cross-section of cities we found
  - "crime rates are higher in cities with a higher number of police officers"
  - What is wrong with these?

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- Ex1 (Crime): using a cross-section of cities we found
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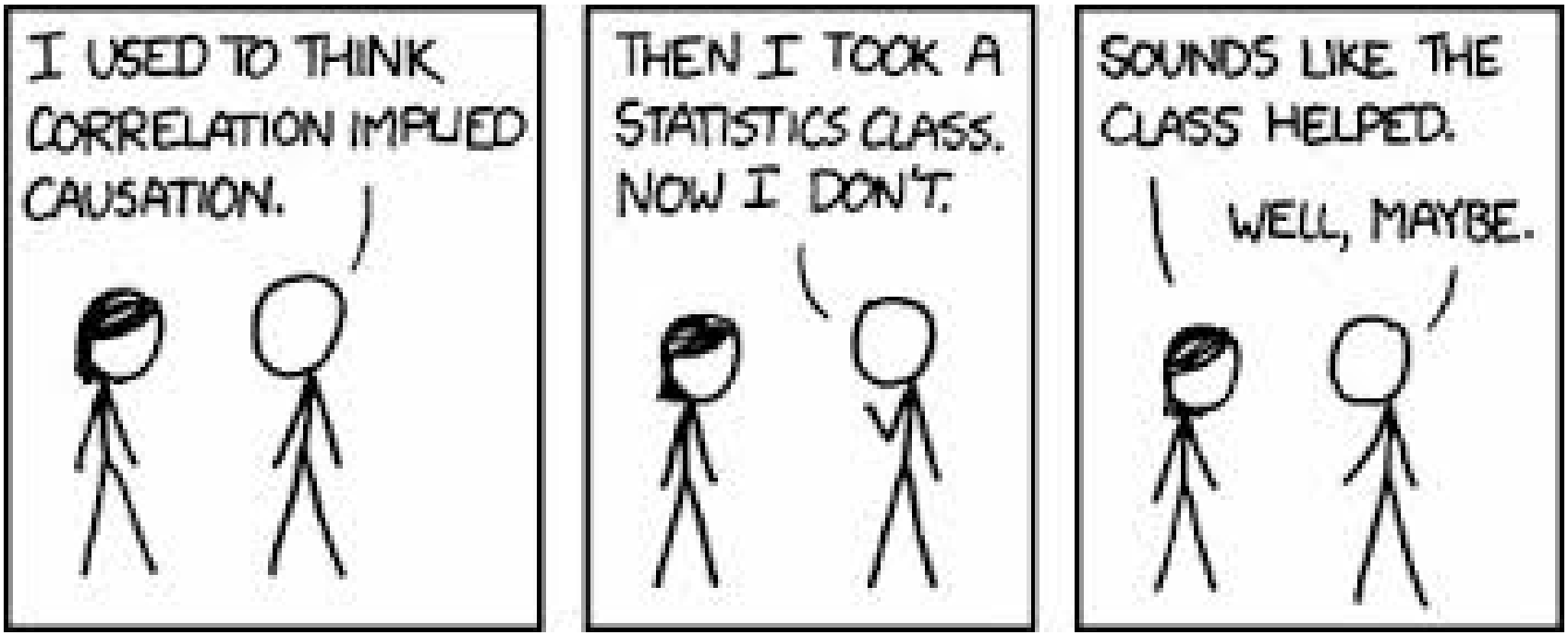
- Ex2 (Subsidy reform): using two cross-sections of HEIS from before and after the subsidy reform we found
  - "average consumption of subsidized commodities is lower in the post reform period"
  - What does this really say?

Correlation vs. causation



Outline

Our goals

- to explain the basics of linear regression
- to discuss the assumptions required for validity of the estimators
- to introduce more advanced tools to deal with failures of simple linear regression

List of topics

- Review of probability and statistics
- Linear Regression Model
  - Simple and Multiple regression models: estimation and inference
  - Further issues: qualitative information, heteroskedasticity, specification problems
- Carrying out an empirical project
- Instrumental variables
- Introduction to Time Series Models
- Introduction to Panel Data Models
- Difference-in-differences
- Textbooks: Wooldridge, J., "Introductory Econometrics"; Greene, W. H., "Econometric Analysis".

Administrative issues

- Lectures:
  - deliver the content, flag important concepts, raise discussion
  - Saturday and Monday 11-13, Class 7.
  - Office hours: Saturday/Monday 13:30-14:30 or by appointment.
  - Contact: m.vesal AT sharif DOT edu
- Classes:
  - for *discussion* of weekly assignments, starts week 2
  - teachers responsible: Sarvin Sharif, Reza Tavakoli (STATA tutorials).
  - Time and location: TBA.

Evaluation

- Midterm exam (30%): Wednesday 29 Aban 1398 at 8:00 AM.
- Final exam (30%): Tuesday 1 Bahman 1398 at 15:00 AM.
- Assignments (10%): ~13 assignments.
- Essay (5 %): two essays, maximum will be counted.
- Quizzes (10%): 5 Quizzes during the term, lowest grade will be eliminated.
- Project (15%): TBC, Submission deadline: Thursday 11 Bahman 1398 at 24:00.
- Bonus: Class participation (5%).