

Slides for the course

# **Statistics and econometrics**

*Part 1: Introduction*

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# Outline

The scope and the toolbox of econometrics

The econometric sequence at the EUI and this course

# Section 1

## The scope and the toolbox of econometrics

# The scope of econometrics

- ▶ To design and estimate statistical models of relationships between socio-economic (but not only ...) variables.
- ▶ To establish under what conditions these relationships have a causal interpretation.

Some examples:

- ▶ Fertility and the number of storks
- ▶ Education and earnings
- ▶ Law enforcement and city crime levels
- ▶ Birth weight and future economic outcomes
- ▶ Minimum wage and unemployment
- ▶ Inequality and growth
- ▶ ...

# The tool-box of econometrics

1. A well defined question and the population for which it matters.
2. The ideal experiment we would like to run to answer the question.
3. A feasible strategy in the absence of the ideal experiment.
4. An accessible sample of data from the population of interest:
  - ▶ Cross-sectional data
  - ▶ Time-series data
  - ▶ Panel data
5. The model of statistical inference:
  - ▶ how to infer from the sample the population relationship between the variables in which we are interested.

## Section 2

The econometric sequence at the EUI and  
this course

# The econometric sequence at the EUI

This course presents the basic tools of econometrics:

- ▶ Probability, random variables and distributions
- ▶ Estimation methods
- ▶ Inference and hypothesis testing
- ▶ Regression

The sequence continues with:

- ▶ *Time-series-econometrics*:

Courses devoted to the study of models for time series data and panel data “with large  $t$  and small  $n$ ”.

- ▶ *Micro-econometrics*:

Courses devoted to the study of models for cross-sectional and panel data “with small  $t$  and large  $n$ ”.

# The content of this course

We will first build on the pre-course to address the problems of:

- ▶ estimating the parameters of a distribution;
- ▶ choosing between different estimators given their properties.

We will have to rely on some basic asymptotic results to which we will not devote specific lectures but that will be recalled when necessary

We will then move from statistics to econometrics, applying what we will have learned at that point to the problems of understanding

- ▶ what simple and multiple regressions are and can do for us,
- ▶ how can we estimate the parameters of a regression,
- ▶ whether these parameters have a causal interpretation,
- ▶ how can we test hypotheses on these parameters.