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Applied Econometrics

From the economic theory to the modelling

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Table of contents

Intro

Introduction

Applied econometric is a science that uses statistical and mathematical methods (modelling...) to produce **quantitative analysis**.

The main object of this science is : **causal effect**.

Why causal effect ?

- to make decisions to apply in the future
- to verify economic theories
- the main problem of economic modelling at one time (not now...)

Causal effect

Causal effect

Example :

We want to identify the causal effect of education on the salary *ceteris paribus*

salary=f(education, age, gender, u) **u= the error term**

The difficulty to identify causal effect is the **u**. The term might contain some non observable variable or omitted one.

Linear regression

Linear regression

Linear regression is one of the fundamentals methods used to identify causal effect.

Beware :

Five hypothesis must be verify before approving the existence of causality.

Linear regression

1. Assume there exists some $\beta = (\beta_0, \beta_1, \beta_2, \beta_3)$ so that we can write for all individual :
   salary=$\beta_0 + \beta_1 * education + \beta_2 * gender + \beta_3 * age + u$
2. We suppose that there is no co-linearity between the age, the sex and the education of an individual;
3. The sample we collect is independent and identically distributed;
4. The error term does not contain omitted variables;
5. The variance of the error term must be homogeneous.

Linear regression

These five hypothesis help find the optimum estimators of the β : OLS estimators.

The fifth hypothesis helps discover that OLS estimator best linear unbiased estimator (BLUE).

What is one of the hypothesis isn't verify ?

Omitted variables

Example of not verified hypothesis : omitted variables

salary=$\beta_0 + \beta_1 * education + \beta_2 * gender + \beta_3 * age + u$

With u=β_4*motivation + u

The hypothesis 4 is not respected. Hence the estimators will be biaised.

Discussion