Econometrics

Lecture I

Introduction

What is econometrics?

Econometrics

Application of statistical and mathematical methods to study economic theories and relationships

It involves:

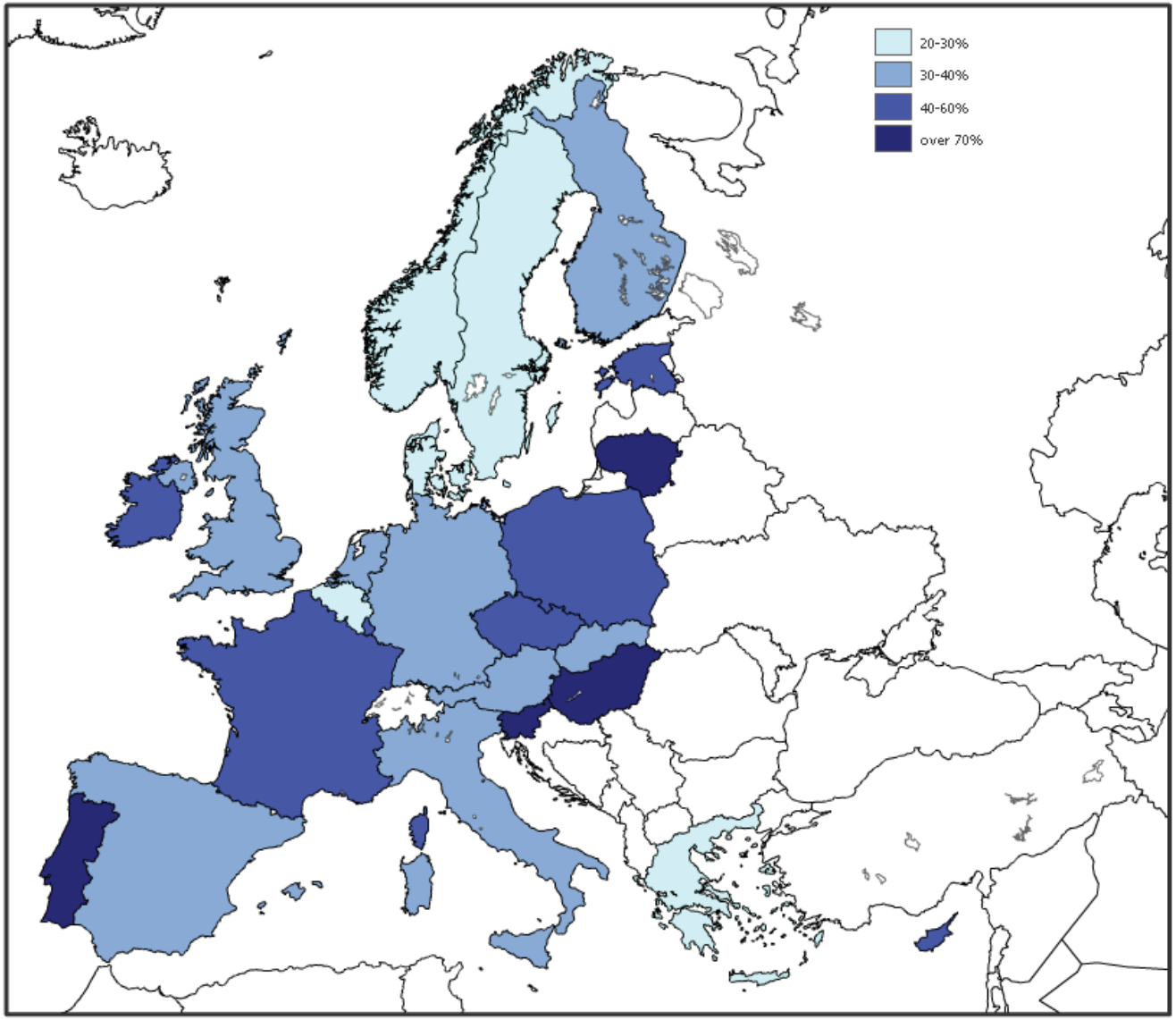
- Economic models
- Economic data
- Mathematical statistics

What is it used for?

- Testing economic theories
- Estimating relationships between economic variables
- Predicting evolution of economic variables

Example: Wage premium in EU countries

Chart 3a: Wage premia for tertiary graduates in European countries - OLS estimates



Source: CRELL estimates based on EU-SILC data

Table 4: Returns to education in European countries - OLS estimates

Countries		First specification*		Second specification**		Number of observations
		Ed_1	Ed_3	Ed_1	Ed_3	
Belgium	BE	-0.154	0.243	-0.145	0.218	2353
		(0.019)	(0.015)	(0.019)	(0.016)	
Czech Republic	CZ	-0.342	0.441	-0.326	0.426	3087
		(0.032)	(0.022)	(0.033)	(0.023)	
Denmark	DK	-0.069	0.207	-0.06	0.185	1730
		(0.026)	(0.023)	(0.026)	(0.022)	
Germany	DE	-0.357	0.322	-0.342	0.318	4963
		(0.051)	(0.011)	(0.053)	(0.011)	
Estonia	EE	-0.203	0.336	-0.171	0.287	3202
		(0.032)	(0.021)	(0.032)	(0.022)	
Greece	GR	-0.179	0.221	-0.177	0.212	2849
		(0.017)	(0.015)	(0.017)	(0.016)	
Spain	ES	-0.157	0.313	-0.143	0.292	7579
		(0.011)	(0.012)	(0.011)	(0.012)	
France	FR	-0.097	0.421	-0.092	0.384	4527
		(0.02)	(0.014)	(0.02)	(0.014)	
Ireland	IE	-0.223	0.387	-0.206	0.365	1676
		(0.031)	(0.025)	(0.032)	(0.027)	
Italy	IT	-0.164	0.278	-0.153	0.241	1556
		(0.018)	(0.032)	(0.018)	(0.033)	
Cyprus	CY	-0.281	0.384	-0.271	0.368	3058
		(0.025)	(0.021)	(0.025)	(0.022)	
Lithuania	LT	-0.125	0.555	-0.117	0.492	3111
		(0.043)	(0.021)	(0.042)	(0.022)	
Luxembourg	LU	-0.312	0.456	-0.28	0.4	2258
		(0.023)	(0.022)	(0.023)	(0.024)	
Hungary	HU	-0.258	0.607	-0.226	0.586	2890
		(0.023)	(0.027)	(0.023)	(0.028)	
Netherlands	NL	-0.164	0.298	-0.154	0.28	1702
		(0.018)	(0.018)	(0.018)	(0.018)	
Austria	AT	-0.365	0.322	-0.339	0.299	1834
		(0.045)	(0.029)	(0.045)	(0.029)	
Poland	PL	-0.286	0.453	-0.261	0.416	7958
		(0.024)	(0.014)	(0.024)	(0.015)	
Portugal	PT	-0.298	0.684	-0.293	0.662	3193
		(0.024)	(0.03)	(0.024)	(0.03)	
Slovenia	SI	-0.36	0.608	-0.341	0.586	2964
		(0.023)	(0.029)	(0.025)	(0.03)	
Slovakia	SK	-0.322	0.305	-0.289	0.252	4372
		(0.041)	(0.021)	(0.041)	(0.022)	
Finland	FI	-0.088	0.315	-0.081	0.285	3058
		(0.025)	(0.015)	(0.025)	(0.016)	
Sweden	SE	-0.129	0.192	-0.105	0.149	1810
		(0.043)	(0.03)	(0.043)	(0.033)	
United Kingdom	UK	-0.245	0.307	-0.216	0.267	1303
		(5.67)	(3.63)	(4.91)	(7.10)	
Norway	NO	-0.117	0.2	-0.067	0.173	1452
		(0.059)	(0.026)	(0.061)	(0.027)	
Full sample	EUR24	-0.182	0.36	-0.165	0.328	64292
		(0.005)	(0.004)	(0.005)	(0.004)	

Source: CRELL estimates based on data from Community Statistics on Income and Living Conditions (SILC)

Example: Wage premium in EU countries

- Economic (human capital) theory: education as an investment to increase productivity
- Economic model: $productivity = f(education; other\ factors)$
- Econometric model:
  $log(wage) = \beta_0 + \beta_1 education + \beta_2 experience + u$
- Residual part u: other (unobserved) factors that determine wages

Example: Wage premium in EU countries

- Data on wage, and level of education (plus other observed variables) in EU countries
- Estimation method to estimate the model
- Statistical properties of the estimators to perform tests and construct confidence intervals for parameters

Causality

- The aim of econometric analysis is typically to estimate a causal relationship
- The causal effect of a variable x (education) on a variable y (log wage) is the effect of the former on the latter keeping everything else constant (ceteris paribus)
- What percentage increase in your wage can you expect from completing a master?
- Useful for making predictions / policy changes

Example: Do hospitals make people healthier?

- "Mostly Harmless Econometrics", Angrist, J., and Pischke, J-S, Princeton University Press (2009)
- Do hospitals make people healthier?
- The National Health Interview Survey includes the questions:
  - "During the past 12 months, was the respondent a patient in a hospital overnight"
  - "Would you say your health in general is excellent, very good, good, fair, poor" (1 is excellent health and 5 is poor health)

Example: Do hospitals make people healthier?

	Group Sample Size	Mean health status	Std. Error
Hospital	7774	2.79	0.014
No Hospital	90049	2.07	0.003

- The result suggests that going to the hospital makes people sicker
- This is probably not the causal effect of hospitalization on health
- It partly captures the fact that those who spent time in a hospital in the past 12 months are anyway less healthy (even if they hadn't gone to hospital)

Objective of the course

- Very applied course
- Actually do econometrics
- Apply econometrics methods to real-world data
- Apply econometrics methods to real-world economic issues
- Understand studies/research articles using econometrics