Introduction to Econometric Methods

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Econometrics

- “A rapidly developing branch of economics which broadly speaking aims to give empirical content to economic relations”
  - Hashem Pesaran in Palgrave
- Using statistical methods to estimate economic relations

Interactive Synthesis

- Theory:
  - usually in mathematical form
- Measured Data
- Procedures for Statistical Inference
  - probabilistic framework for estimating parameters and testing hypotheses
- Methods of Computation

Econometrics

- Important to recognise synthesis
  - implies trade offs
- End result:
  - empirical econometric model
- But for some:
  - econometrics only the study of methods of inference applied to economics

Should be Judged by:

- Its relevance to a particular purpose
  - forecasting
  - decision making
- Its consistency with other information
  - theoretical
  - historical
  - institutional
- Its adequacy in representing data
- See Pesaran and Smith(1995)

Judgement

- Econometric work needs to be judged on all of these and there are trade-offs
- Although technical, econometrics is not neutral and objective
  - techniques: regression/eugenics
  - Keynesianism: data
  - Keynesian: Large models, control of economy

Attacks on techniques

- Right wing: Monetarist/New Classical
  - Lucas critique
    - agents expectations
    - general problem structural instability
    - empirical question whether instability large enough to destroy use

Attacks on techniques

- Radical critiques
  - embody orthodox theory
- Bayesian attacks
  - statistical inference
  - debate
- Others more positive

Problems

- Data
  - Keynesian constructs
  - convention/theory
  - overcome practical problems
  - Marxist data?
- Cannot test theories
  - Duhem-Quine thesis worse in economics
    - falsify model -> not necessarily -> reject core theory
    - auxiliary assumptions

Problems

- Economic theory too general to be operational
  - equilibrium conditions
  - unobserved variable
  - ceteris paribus: always used, always unlikely
  - exogenous/endogenous
  - functional forms unspecified

Problems

- Main developments in econometrics are how to test the auxiliary hypotheses
  - model linear?
  - Regressors exogenous?
  - Disturbances independent/normal
  - Parameters stable?
- These help produce a better model but don't test theories

Problems

- Value in asking if a particular theory can be cast in the form of a model that is consistent with the data

Positive view

- Synthesise large amounts of info in effective way
- provides framework for systematic thought
  - assumptions explicit/non contradictory
- provides consistency and structure
  - adding up etc
  - linkages clear
  - judgement/extraneous info used

Positive view

- Can ask clear questions and evaluate answers
  - do quickly on computer
- Used sensibly would
  - recognise synthesis
  - evaluate generally
- Can try to understand economy
  - analyse policy and provide forecasts
- Can get good jobs with these skills

Recent Development: Time Series Econometrics

- Established tradition of time series analysis in statistics
- Consider the value of a variable over time
- Explain the value a variable takes in a particular year by its past values
- Eg explain consumption only by past consumption

Econometrics

- Econometric models: $y_t = \alpha + \beta x_t + \varepsilon_t$
- Eg Consumption explained by income in a consumption function
- To forecast econometrics:requires forecast of x_t so its incomplete
- Time series can't ask "what if"

Time Series Econometrics

- Simple time series model better forecast than large econometric models
- Response: model + team that is important
- Criticism led to developments in econometrics
- Fuse econometrics and time series methods
- EG consumption explained by income, past values of consumption and past values of income

Developments

- Concern with causality: Granger
- Concern with spurious regression
  - mispecification testing
    - serial correlation
    - functional form
    - homoscedasticity
    - normality
    - exogeneity
- specification tests to find model that passes design criteria

Developments

- Other important developments don't consider
  - Microeconometric methods:
    - Analyse survey/cross sectional data.
    - Eg look at food consumption across households
  - Panel data methods
    - Pool time series and cross section data eg look at food consumption across households over time

So applied economics...

- Uses the plethora of applicable theories in an appropriate way: use to identify relevant variables
- structures the problem consistently with explicit accounting identities/measurement system

So applied economics...

- uses the econometrics when appropriate
  - to see if model provides coherent quantitative explanation of what is happening
  - to provide estimates of relevant parameters
- model is then used to forecast and evaluate consequences of different policies
- results are input into the decision making process.

So applied economics...

- Distinctive style of economic thinking that poses particular questions
  - what are objectives
  - what are constraints and external influences
  - what are the decision variables
  - can you assess the consequences of changes in decision variables
  - can you forecast how constraints and external influences respond to different choices.

Demand function

- Example of operationalising theory: to confront theory with real data.
- To do that need to take: $q = f(p)$
  - choose data for q and p
  - choose functional form
  - add ceteris paribus variables (income etc..)
  - provide dynamics (allow for lags
  - treat process as probabilistic rather than deterministic (distribn for random vars p,q)

Demand function

- Having made all of these decisions, assumption, auxiliary hypotheses
  - estimate model
  - apply statistical tests to estimated model
- So moving from theory to applied work is not straightforward or simple
  - there are many choices to be made
  - there are many issues involved

Conclusion

- So as we started off arguing:
- clearly applied economics is an art not a science

Web Site

- The course has a website

  http://carecon.org.uk/BUE/Econometrics/

- It is an important resource containing:
  - Notes
  - Exercises
  - Data
  - Links