Econometrics and Business Statistics at Monash (Clayton)

Unit choice, including progression to Honours

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1. What is Econometrics and Why Study it?

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1. What is Econometrics and Why Study it?

- A wise person once said:

  "Statistics is the operational arm of the scientific method"

- In other words - all scientific progress occurs because new scientific theories (or models) are **tested** against **observed data**

- If a theory regularly fails to **predict** the data we see, it will be **discarded**, and replaced by a new theory

- So all science (including social sciences like economics) use statistical methods to **infer** from **observed data** features of the **true unknown process (or reality)** that has generated that data
1. What is Econometrics and Why Study it?

- **Econometrics** involves the application of the methods of mathematical **statistics** to **economic** (or finance, or marketing, etc.) **models** of reality

- **Models (or theories)** that describe how the **economy** works (rather than how the Universe works, or how the biology of human bodies work, or how the ecology of the Earth works.....)

- **e.g. economic theories** describe:
  - the relationship between a carbon tax and economic growth
  - the influence of a (potential) default of the Greek economy on the Australian stock market
  - the connection between economic growth in China and prosperity in the rest of the world
  - etc. etc....
1. What is Econometrics and Why Study it?

- **Econometrics quantifies and validates** all such models (or theories) using **observed statistical data** ⇒ allows us to:
  - **estimate** the numerical impact on investment and consumption of the carbon tax
  - **predict** the probability of suffering a large loss in a portfolio of Australian shares, as a result of financial problems in Europe
  - **test** for ‘contagion’ between economic conditions in different countries
  - etc. etc.

- Only econometrics/statistics allows such numerical analysis to be conducted
- and for decisions to be based on something other than guesswork!
1. What is Econometrics and Why Study it?

- In brief, **any** person operating in **any** sphere of economics or business should, ideally, have some knowledge of the principles of econometrics so that they can:
  - draw accurate, useful inferences from statistical data that are relevant to their sphere, and use those inferences to enable solid, reliable decision making
  - correctly interpret and criticize statistical results produced by others

- An econometrics training enables people to be result **makers** rather than (blind) result **takers**!

- (Remember my (not entirely fanciful!) story about the GFC, the Gaussian copula and the ‘statistically naive’ asset portfolio managers!)
To further illustrate the value of a statistical/econometric training:

"Data miners find there’s gold in them thar files"

"There’s another mining boom you may have missed. It too involves paying young people six-figure salaries in their first jobs, and exploring deeper for resources that may have been previously overlooked. But it’s not about driving trucks or digging holes. It’s about building algorithms and crunching facts and numbers. It’s mining for data."

"This is the biggest industry that people are only now starting to talk about,” says Anthony Goldbloom, a 28-year-old former Reserve Bank of Australia statistician who has moved his start-up data analytics business, Kaggle, to Silicon Valley where NASA is among its clients. "The whole place is big data mad. Industries like banking, insurance, and increasingly pharmaceuticals are competing on the back of predictive models that get built [by mining data]."
1. What is Econometrics and Why Study it?

- The specific nature of ‘economics’ requires econometrics;
- (The nature of the data and the models)
- e.g. astrophysicists looking for planets in other solar systems can alter the settings of the Kepler Space Telescope (i.e. change the experimental conditions) and (potentially) produce different observations
- economists (usually) can’t - they have to take as given the (non-experimental) data that economic agents (i.e. us!) produce by going about our lives spending, saving, investing, producing etc.
  - However, the fundamental principles that underlie econometrics, and which render it a valuable discipline, are identical to the principles that underlie the application of mathematical statistics in any field
  - i.e. it is underpinned by key mathematical principles that are the outcome of a century or two of intellectual endeavour
  - It is a foundational discipline
2. How Much Econometrics to Study?

- **Two key** questions:
  1. How **much** econometrics should one undertake, given the wealth of other fields of study on offer at University?
  2. Which **stream**? (theoretical? applied? etc.)

- Both questions addressed by the Pathways document at:
  

- On the EBS website at:
  

- A relatively new unit (ETC3860: Integrated Economic Modelling) is not yet listed on Pathways - take note
2. How Much Econometrics to Study?

- Two distinct ‘cohorts’ of students:
  1. Those who wish to major in econometrics (perhaps in addition to a major in something else)
  2. Those who wish to major in something else (but with some econometrics)

- The Pathways document deals with each cohort separately

Remember:

1. This document provides a guide to choosing units which provide a particular type of training, or specialization, within the broad area of econometrics
2. You do not have to follow this guide
3. You are still free to choose (subject to the formal requirements of prerequisites and majors) any units you like!
4. Check the ‘Areas of Study’ section in the handbook (Econometrics and Business Statistics) for official information on a major in econometrics.
3. Which Stream (or Specialization)?

The Pathways document identifies 5 specializations:

1. Mathematical econometrics
2. Actuarial studies
3. Applied econometrics
4. Financial econometrics
5. Business modelling

See document.....
4. Key Points to Remember

- **Third-year ETC units:**
  - Any serious student of econometrics (undertaking *any* stream) should take both:
    - ETC3400 (Principles of Econometrics)
    - ETC3410 (Applied Econometrics)
  - These two subjects are core
  - Any student who may possibly undertake *fourth-year honours in econometrics* should take both ETC3400 and ETC3410, in order to be well-prepared
4. Key Points to Remember

- **Second-year ETC units:**
  - Whilst ETC2410 (Introductory Econometrics) is the only formal prerequisite for ETC3400 and ETC3410 (and some other third-year ETC units):
    1. ETC2440 (Mathematics for economics and business)
    2. ETC2520 (Probability and statistical inference for economics and business)
  - both provide a **very valuable** background for third-year study
  - Once again, any student who is looking towards **fourth-year honours in econometrics** (and possibly post-graduate study) would be well-advised to do both ETC2440 and ETC2520
4. Key Points to Remember

- Economics training to the second year level (at least!) is also strongly advisable
  - ECC2000 (Microeconomics) and ECC2010 (Macroeconomics)

- These units count towards an econometrics major

- If you feel confident in and enjoy mathematics I would strongly advise you to do as many mathematics (MTH) units (in addition to the two ETC maths units on the previous slide) as is feasible within the confines of your degree.....

  - MTH1020 and/or MTH1030 at least
4. Key Points to Remember

- **First year ETC units:**
  - ETC1000 and ETC1010 are both prerequisites for the second-year actuarial units:
    1. ETC2520 (Probability and statistical inference for economics and business)
    2. ETC2430 (Actuarial statistics)
  - and for the third year units in actuarial studies which follow
  - Hence, both ETC1000 and ETC1010 are prerequisites for the actuarial studies specialization (and accreditation)
  - Both ETC1000 and ETC1010 are also prerequisites for the business modelling cross-disciplinary major (with the IT and Arts Faculties)
  - ETC1000 is now the only formal prerequisite for other second-year ETC units, including ETC2410 and ETC2440
  - Although ETC1010 is still highly recommended, in particular for a major in econometrics
4. Key Points to Remember

- The **actuarial program** is a new development in the Department, attracting a lot of attention from students.

- More information about the introduction of new units, the content of those units and accreditation of the Australian Institute of Actuaries to be found at:
  

- and from:
  
  1. Graham.Forbes@buseco.monash.edu.au
  2. Andrew.Leung@buseco.monash.edu.au
  3. Brett.Inder@buseco.monash.edu.au (HOD)

- Details of the new **business modelling** cross-disciplinary major (joint with IT and Arts) can be obtained from:

  1. Ralph.Snyder@buseco.monash.edu.au
  2. Lee.Gordon-Brown@buseco.monash.edu.au
4. Key Points to Remember

- Progression to:
  - honours
  - post-graduate (PhD) study

- is something to start thinking about now

- More detailed information about opportunities (including scholarships) can be found in the document: EBS_Unit_Information_2012_third_year_students.zip will be uploaded on the ETC1000 website

- For post-grad study (in particular), my advice is to do as much:
  - economics
  - mathematics (i.e. including MTH units)

- as possible

- in addition to the econometrics units

- students apply for honours at the end of their third year

- 70% average required (as a minimum)
5. In Conclusion

- My **personal** advice:
- To the extent that you have scope to freely choose units
- Choose units that are *intellectually stimulating and challenging and which hone your analytical, high level skills*
- You are at University! Take advantage of this!
- If not in a joint degree, still look beyond the BusEco Faculty for some of your studies!
- So, if possible, supplement your **econometrics** units by others that will broaden your knowledge, strengthen your skills and....provide further enlightenment!
  - economics, mathematics, finance, languages, philosophy, history, politics..... the possibilities are endless
- Enjoy!