ABSTRACT

Data Envelopment Analysis (DEA) is a rapidly growing area of operational research that deals with the assessment of the relative efficiency of organisations. Examples include schools, hospitals, airlines, banks, utility companies, agricultural farms, and so on. The core DEA models are linear, with extensions to non-linear and mixed integer linear programming. Duality theory also plays an important role in DEA. This course provides an introduction to the concepts and models of efficiency measurement, and is supported by practical exercises and class discussions.

PRE-REQUISITES

There are no formal pre-requisites. However, most participants would benefit from familiarity with linear programming and duality theory.

AIMS

The course aims at providing the participants with a working understanding of the main concepts of efficiency analysis, modelling approaches used in DEA and practical applications of the method.

LEARNING OUTCOMES

1. On completion of the course, participants should:
2. understand the basic concepts of efficiency analysis;
3. be able to adapt one of the core DEA models to a new problem;
4. be aware of the strengths and limitations of different DEA models;
5. be capable of interpreting the results of the application of DEA;
6. be familiar with the use of DEA software.

SYLLABUS

1. Understand principals behind the non-parametric performance measurement.
2. Basic DEA models for measuring efficiency in multi input multi-output situations.
3. Graphical Presentation and linear programming formulations for input and output radial efficiency measures. Interpretation of efficient targets and reference sets.
4. Dual multiplier DEA models, their interpretation, weight restrictions.
5. Assessment under variables returns to scale and target setting.
7. Methods in efficiency and productivity, including Malmquist index and its decomposition.

**PREPARATORY MATERIAL**

Textbooks on DEA are expensive and students are not expected to have one. Instead, the course will be self-contained and based solely on the materials provided. For advanced reference, the following are the best textbooks on the subject, and some libraries stock them:


**ACCOMMODATION**
For those arriving to stay overnight on Friday 27th June in the accommodation provided: After 14:00, please make your way to Reception on the Pollock Halls residential campus where you will register, collect your keys and be directed to your accommodation in Chancellor’s Court. Note that Reception is open 24 hours so don’t worry if you arrive really late.

**TRAVEL DIRECTIONS**

Since the Pollock Halls campus is pretty much in the centre of Edinburgh, travel directions to it are unnecessary.

**COURSE VENUE AND TRAVEL INFORMATION**

The course itself will take place in rooms 1501 and 1512 of the James Clerk Maxwell Building (JCMB) at the King’s Buildings science campus, starting at 09:00 (see below for the full timetable). The most convenient means of transport to King’s Buildings is the 41 bus which runs every 20 minutes from the centre of Edinburgh, taking 20 minutes to get to King’s Buildings. Central stops near Waverley Station are on Hannover Street and The Mound. For those staying in Pollock Halls (and for anyone else if convenient) you will be guided to the nearest 41 bus stop (Gifford Park) if you gather at the pedestrian entrance of Pollock Halls (see map above) by **08:20**.

At King’s Buildings, the 41 bus stop will be used as a meeting point since, on Saturdays, access to JCMB requires the use of a swipe card. You will be admitted to the building by the Course Organiser and guided to room 1501 where we hope to be able to issue temporary swipe cards to those attending the course. There will be a secure area where luggage may be left.

If you have problems on the day, the Course Organiser can be contacted on 07787 197 460.

**The University King’s Buildings**
CONFERENCE RECEPTION

If you are staying in the accommodation provided you may use Reception at Pollock Halls as a point of contact.

ACCOMMODATION AND DEPARTURE

We ask that your room be vacated by 10:30 am on the morning of your departure and your key be returned to Reception. Note that Reception is open 24 hours so don’t worry when you arrive or leave.

Please note that failure to return your key may result in excess charges being made.

Breakfast will be served between 07:30 and 10:00 hrs in the John McIntyre Centre (see Pollock Halls map above).

PARKING

Those staying in the accommodation provided may park at Pollock Halls. It is on a first come first served basis but, during June, there will be no problem with this.

INTERNET ACCESS

Those staying in the accommodation provided will have high speed wireless and wired internet. King’s Buildings has “eduroam” wireless.

CATERING FACILITIES

The accommodation provided is pretty much in the centre of Edinburgh where there many places to eat according to your tastes and pocket. Lunch will be provided at King’s Buildings.

UNIVERSITY BARS

Teviot Row House is the oldest purpose-built student union in the world and is home to six bars. The heart of Teviot is the Library Bar. Another favourite is the stylish Loft Bar, with its beautiful roof terrace and impressive cocktail menu.

SHOPS AND AMENITIES

The accommodation provided is pretty much in the centre of Edinburgh where there are all the shops and amenities that one would expect in a city the size of Edinburgh. A shopping centre is within a short walk of King’s Buildings.

TRAVEL INFORMATION & NUMBERS

Taxis: 0131 228 1211, 0844 448 8576 and “black cabs” available on the street.

Trains: Pollock Halls Reception will be happy to look up train times for you.
**Buses:** For the return from King’s Buildings and for other travel in Edinburgh the bus service is very good (at a price of £1.50 per journey with no change given). Lothian Buses has an excellent free app for navigation and virtual tickets (min spend £10) available for iOS and Android.

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**THE CITY**

Hundreds of thousands of people are drawn to visit Edinburgh each year, and for good reason. Its riches in terms of architecture, history and culture are unmatched in Scotland and the setting stunning. It is a UNESCO World Heritage Site and what city in Britain has a rocky 250m “mountain” in a royal park close to its centre? Enjoy!

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**COURSE TIMETABLE**

**Saturday 28th June**

09:00 – 09:30  Registration in 1501 where luggage can be left securely.


11:00 – 11:30  Coffee/tea

11:30 – 13:00  Introducing recent developments in DEA including weights restrictions, super efficiency, and category selection. Practice: An exercise with PIM-DEA on related topics

13:00 – 14:00  Lunch (provided)

14:00 – 15:15  Assessment under variables returns to scale and target setting. Learn about new methods in efficiency and productivity, including Malmquist index and its decomposition. Practice: Get hands-on experience of the “PIM-DEA”.

15:15 – 15:30  Coffee/tea

15:30 – 16:30  Advance modelling and application of DEA in the different areas. Practice: Advance features of “PIM-DEA”.

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