Empirical Research in Operations Management

Management 245
Winter 2001

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Class hours: Friday 2pm-5pm, though occasionally rescheduled for guest speakers
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Objective of course

Most PhD students of operations management at schools such as UCLA focus almost exclusively on analytical methods, and will continue to do so after their graduation. This course is not intended to develop empirical researchers, as that requires a far longer and deeper program; rather, the objective is to broaden your horizons, to introduce you to a range of other research methods and paradigms you are probably less familiar with, and in the process, further your development as researchers (whether analytical or empirical).

Empirical research is, obviously, quite different in nature than most analytical research in operations. Roughly speaking, analytical research in OTM has one of two objectives: either to model and solve a specific problem in practice (let’s call this the “OR approach”), or to model an abstract problem in order to derive qualitative insights about phenomena that occur in practice (the “economist approach”). In empirical research, the objective is more typically to use data about practical phenomena to describe and predict how those phenomena work; this could be called the “scientist’s approach”. The (social) scientist’s stereotypical approach is to pick a phenomenon, explore existing theory, develop a set of hypotheses, collect data or conduct experiments, test the hypotheses, then discuss acceptance or rejection of the hypotheses. Let’s not get hung up on labels (OR and economics are also scientific disciplines), but the research paradigms and corresponding value systems of the three perspectives are quite different.

Especially in recent years, the field of OM has gone through extensive soul-searching, with substantial disagreements about how to evaluate different strands of work. This is largely due to the field of OM as a whole being influenced by each of the three perspectives, but most people individually operating only within one perspective. My belief is that, by understanding each of the three approaches, you will be better at performing whichever type of research you choose to focus on.

Readings

The basic background texts for the course are:

Hair, Anderson, Tatham and Black, *Multivariate Data Analysis: Fifth Edition*, Prentice-Hall, 1998. Chapters of this book are referred to as HATB in the outline below. Both books are excellent and well worth having, but will be made available to students in the class. Other articles will be distributed as we go forwards.

**Course method**

During the course, we will spend about half the time critiquing empirical papers in OM, focusing primarily on the logical correctness of the study. To do so, we will also need to spend some time studying the underlying empirical research methods.

**Evaluation**

Grades will be determined as follows:

- **In-class presentations:** every session will include several examples of research using the methods discussed in that session. At least one of those papers in each session will be presented by a student, briefly summarizing content (which everybody should be familiar with) but focusing on a careful critique of the methods and findings.
- **Term paper:** everybody will submit an individual term paper, conducting empirical research. I have some datasets available, and within the school there are many others. It would be good for you to start thinking EARLY about what you would like to do, and start trying to find data. I do have several datasets too as backup, but would much rather help you find something you really want to work on. The term paper should be a short empirical research note, consisting of a brief description of the question, why it is of interest, the data, the methodology, the analysis, discussion of the findings, and conclusions. It does not need the same level of preceding theoretical analysis as a full empirical research paper would require. The deadline for proposals will be the week after the course is completed; the deadline for complete papers will be June 30, 2001. After June 30, 2001, a grade of incomplete will be entered; after September 30, 2001, a grade of F will be entered.
- **The term paper is experimental but meant to lead to something that could be published in a reasonable (but not top) journal; if you cannot come up with a reasonably promising by the end of the course, I may substitute the term paper requirement for a written exam, to be discussed on a case-by-case basis.**

Questions:

- Need to find out what software (statistics, simulation) students are familiar with.

January 12

**Session 1: Methodology of empirical research**

**Readings:**

- Friedman, M. “The methodology of positive economics”, in *Essays in Positive Economics*
- Chapter 1 in HATB
• Verma and Goodale, “Statistical power in operations management research”, *Journal of Operations Management* 13, 1995, 139-152

January 19

**Session 2: Basic regression analysis**

Readings:
• Chapters 2 and 4 and 4A, HATB.
• Background: Chapters 6-13 in G.
• Lieberman and Demeester, “Inventory reduction and productivity growth: linkages in the Japanese automotive industry”, *Management Science*, vol 45 no 4, April 1999, 466-485
• Lieberman, Helper and Demeester, “The empirical determinants of inventory levels in high-volume manufacturing”, *Production and Operations Management*, vol 8 no 1, Spring 1999, 44-55.

February 2

**Session 3: Advanced regression analysis**

Readings:
• Chapter 5, HATB; focus on pp. 276-281 (introduction to logistic regression) and pp. 314-321 (example).
• Chapters 19-20 in G.
• Anderson, Daly and Johnson, “Why firms seek ISO 9000 certification: regulatory compliance or competitive advantage?”, *Production and Operations Management*, vol 8, no 1, september 1999, 28-43
February 9: CMIE conference  
**Session 4: Times series and panel data methods**

Readings:  
- Chapter 14 in G.  
- Tsikriktsis and Lapré, 2000, “Knowledge Acquisition And Transfer In Service Settings: Customer Outrage In Airlines”, working paper #2000-13, Boston University, School of Management  
  *panel data (TSCSREG)*  
  *panel data*

February 16  
**Session 5: Qualitative research**

Readings:  
- Yin, R.K., *Case Study Research: Design and Methods*, SAGE Publications. This is a classic, short introduction to case study research. Read Chapters 1, 2, 4 and 5.  

February 23: Paul Kleindorfer  
**Session 6: Multivariate statistics: factor analysis, path analysis, cluster analysis**

Readings:  
- Chapters 3, 9, 11 in HATB.  
  *mail survey, measurement model, factor analysis, LISREL*  
  *factor analysis, regression*  
  *cluster analysis, discriminant analysis*  
  *cluster analysis*
March 2: Guest speaker: Sharon Novak, Kellogg

**Session 7: Multivariate statistics: analysis of variance**

Readings:
- Chapter 6 in HATB.

Assignments: ANOVA (Excel)

March 9

**Session 8: Survey-based research in OM**

- Chapters 1 and 2 of HATB.

Assignments: mail survey, factor analysis, LISREL

March 16

**Session 9: Experimental design, simulation, goodness of fit tests**

- Chapters 1, 5 and 12 in Law and Kelton, *Simulation Modeling and Analysis*.

Assignment: simple simulations with Crystal Ball

- introduction to goodness-of-fit tests
- introduction to empirical fitting of copulas

Assignment: given random data (eg Pellton), fit distributions, using Crystal Ball?