

Abstracts and Short Presentations

Teaching Probability and Mathematical Statistics at the Economics Department of Moscow State University

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Typical shortcomings: We have in mind the shortcomings which are very typical of probability and statistics courses at economics and business departments of Soviet universities (as well as at universities in some other countries). Two of the main ones, in our view, are the following:

- (i) These courses are just shortened versions of the usual mathematical courses (i.e. courses intended for students of mathematical departments), and thus they do not reflect specific features of economics and social-economics applications.
- (ii) These courses are constructed and taught autonomously, separately from one another, and they do not reflect properly the existing tight connections between them.

The sections below summarise the ideas we used to try and combat these shortcomings in the Economics Department at Moscow State University, and the course structure to which these related.

Principles of constructing and teaching probability and statistics courses in economics departments: In constructing programmes of courses and in choosing, one has to solve the following two main questions:

- (i) What to include in the programme (i.e. which methods, models, theoretical results, etc.)?
- (ii) In what form and how to present the chosen topics?

In answering the first question we tried working backwards, i.e. from the final applied request of the user of these methods who may be a researcher in economics or socio-economic processes; a businessman; a person involved in economic management, etc. This led us to consider first of all the methods and models of sampling surveys, then time series analysis, systems of simultaneous econometric equations, production functions and consumption and demand functions, multivariate statistical analysis of economic information, probabilistic models of insurance, statistical behaviouristic models, Markovian models of population movements.

In answering the second question we felt it important to keep in mind that our courses are addressed to the *user* (and *not to the constructor*) of the methods and models described in them. Thus they have to be aimed, first of all, at explaining their applied possibilities, and then at outlining well-founded recommendations on their practical usage. The manner and form of presentation are chosen to attain the following goals:

- (i) to use in the best possible way the contents of the earlier courses for understanding the later applied-statistical courses (Probability Theory, Mathematical Statistics, Statistical Study of Relationships, Multivariate Statistical Analysis);
- (ii) to drop that part of the mathematical formalism which is unnecessary for understanding and utilising methods of realistic statistical modelling and statistical data analysis;
- (iii) to demonstrate the performance of the statistical tools in solving real economic and socio-economic problems;
- (iv) to teach students to analyse, test, and implement on a computer the results, methods, and models described in the courses.

The contents, structure and overall place of the probability and statistics courses:

The probability and statistics block consists of the following four one-semester courses, each consisting of 18 two-hour lectures and 18 two-hour seminars:

1. Probability Theory (3rd semester)
2. Mathematical Statistics (4th semester)
3. Statistical Relationships (5th semester)
4. Multivariate Statistical Analysis (6th semester)

To understand these courses, the students are expected to be acquainted with elements of calculus and linear algebra.

The results, methods, and models of these courses are used in an essential way in other courses given by specialist departments such as "Economic Cybernetics", "Macro-Economic Modelling", "Methods of Optimal Decisions", "Mathematical Methods of Operations Research".

References

The ideas described above are incorporated in detail in Aivazian et al. (1983, 1985, 1989) and in the forthcoming text by Aivazian (1991). These may be compared with texts such as Anderson (1971), Dhrymes (1970), Johnston (1984) and Malinvaud (1980), which are used as complementary references.

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- Johnston, J (1984) *Econometric Methods* (3rd ed). McGraw-Hill.
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Teaching Statistics at the Faculty of Economics at Surabaya University

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There are three kinds of colleges in Indonesia, namely the state, the private and the departmental ones. The state and the private colleges are under the Department of Education whereas higher education is under its own Department.

In increasing order of status, the private colleges are divided into three categories: registered, recognised, and equalised. The difference between these categories is based on the condition of the college itself and its right to carry out state examinations; a registered college may examine by itself only 50% of the course credits, rising to 75% for a recognised college, and 100% for an equalised college.

The Economics Faculty of Surabaya University is one of the private colleges in Surabaya. Its departments of Management, Economic Science and its Development, and Accounting, have equalised, equalised and recognised status respectively.

Statistics is given in all of the departments in the third semester and it is divided into Statistics I, II and III. Statistics III is given only in the Department of Economic Science and its Development. Statistics II is one of the subjects with a state examination, which only about 25-35% of the students pass. Statistics I, II and III each have the value of three credits, where the tutorials are included in the classwork, and a candidate's complete programme comprises 34-38 credits.

Mathematics I and II are prerequisite subjects which also have the value of three credits. The author has conducted an investigation into the correlation between student performance in statistics and in Mathematics I and Mathematics II. The achieved correlations were 0.62 and 0.60 respectively, based on a sample of 135 students.

It is suggested that Mathematics I and II be retained as prerequisite subjects in the new curriculum.

The Teaching of Statistics in Business Programmes in the United States

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A survey of Business programmes in four year colleges in the United States was conducted during the 1989-90 academic year. The survey included both AACSB accredited and non-accredited undergraduate programmes. The results included information regarding: the format and content of required and elective courses, instructor qualifications, student preparation in mathematics and computing, student attitude toward statistics, classroom facilities, computer hardware and software involvement, resource materials (such as books, videotapes, demonstration models, etc.), instructional format and class size, knowledge of availability of resource materials, suggestions for improvement, etc. Further details are available from the authors.

A Survey of the Teaching of Statistics in Introductory Undergraduate Business Statistics Courses

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A survey of all universities in Australia and New Zealand concerning teaching of business statistics in introductory undergraduate classes was conducted. A response rate of over 80% was obtained (26 responses from the 32 institutions surveyed). The questionnaire used was similar to that used in North America by Rose, Machak and Spivey (1988). Topics included location of departments, course organisation, content, textbooks used, level and usage of mathematics, computing use, major teaching problems, and imminent changes foreseen. Of particular interest was the extent to which innovative ideas advanced at conferences such as ICOTS and the annual conferences in North America on "Making Statistics More Effective in Schools of Business" were being implemented.

The courses are predominantly taught within the business school/commerce faculty. In addition, two further universities indicated that the courses were likely to be soon relocated in the business schools. Faculty teaching the courses were most commonly in Economics (7) and Econometrics (4) departments. Similarly to Rose et al. (1988), we found that the main professional identity of the faculty teaching the courses was often not statistics. Specifically, 31% of respondent universities indicated that most or all of the persons teaching in the courses regarded statistics as a secondary activity rather than their primary profession. The courses were typically compulsory for all or most business students. Large classes were common (median class size of 535).

All but one of the courses using a mainframe or minicomputer were on VAX systems. Similarly, all but one of the courses using microcomputers were using IBM or compatible machines. MINITAB was the most common statistical package in both environments (6 on minicomputers, 5 on microcomputers). However, eight universities were using spreadsheets or intending to switch to spreadsheets.

Of 24 respondents, eight claimed that no real data sets were used but six claimed that over 50% of data sets were collected or derived from actual practices. An open-ended question was used to survey the most pressing problems involved in teaching the courses. Responses similar to other studies were found; problems most commonly cited focussed on lack of motivation and making courses interesting/relevant for students. New Zealand universities in particular also mentioned lack of basic mathematical skills in students as being problematic. A second open-ended question concerned changes foreseen in the next five years. The most common responses were diverse ways of using computers.

Reference

Rose, E L, Machak, J A and Spivey, W A (1988) A survey of the teaching of statistics in MBA programs. *Journal of Business and Economic Statistics* 6, 273-282.

Computer Aided Introduction to Time Series Analysis

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Introducing time series analysis to economics and business students is known to be rather difficult. In order to improve the learning process a program for Computer Assisted Instruction (CAI) has been developed. The program, based on the "Self Education Facility for Personal Computers" by IBM, is intended to aid students in learning effectively some elementary methods of time series analysis and to help them in testing their knowledge in this respect.

The program is designed to cover those topics in time series analysis which are part of the undergraduate course "Introduction to Statistics I" for economics and business students at the University of Cologne (F.R. Germany). It:

- (i) gives a short and elementary introduction into the use of the program;
- (ii) describes the basic concepts of time series analysis and their visual display;
- (iii) explains the method of least squares and evaluates linear trends in time series without seasonal variations;
- (iv) deals with moving averages as a method for evaluation of trends in time series with and without seasonal variations;
- (v) introduces the decomposition of time series, which contain both a trend and seasonal variation.

Each chapter of the program is separated into:

- (i) the presentation of knowledge; and
- (ii) tests of knowledge by means of questions and answers.

The presentation of knowledge is divided into portions in such a way that each of these portions just fills a screen of the computer. The student is able to skim through the pages like a book, to go forwards and, if necessary, also backwards.

Questions and answers are provided to enable the student to check and to confirm his knowledge of time series analysis. Four kinds of questions are asked: open-ended questions and questions which are to be answered either by filling text into gaps or by a numerical value or by multiple choice. Generally, the student can call some online help if he wishes. Each answer will be examined by the program. If the student is right, this will be confirmed. Otherwise he gets some hints and the chance to provide another answer. Further, the right answer can be requested for each question.

The program works on IBM-compatible personal computers under DOS 2.0 or later and needs at least 192 kB of memory and a graphics card.