STAT328/826 – Market Research and Forecasting

Second Semester 2007

Unit Outline

Lecturer in Charge: Stephen Brown, E4A543

Students in this unit should read this unit outline carefully at the start of semester. It contains important information about the unit. If anything in it is unclear, please consult one of the teaching staff in the unit.

ABOUT THIS UNIT

Offered in 2nd semester, this unit introduces a number of widely used methods in market research: principal component analysis (whether to use covariance matrices or correlation matrices, criteria for deciding how many principal components to retain, scores, etc.), factor analysis (maximum likelihood and other methods, how many factors to choose, interpretation of factors), and choice modelling (conjoint analysis). Techniques will be developed for identifying various patterns in observed data and using those patterns to forecast future observations using ARIMA methods. Seasonality will also be incorporated into the forecasting equations. These techniques will be used to further enhance multiple regression methods with Dynamic Regression and Intervention Analyses.

Software:

SPSS but a little use of MINITAB initially.

TEACHING STAFF

Lecturer In Charge:

Stephen Brown
Room: E4A543
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Consultation hours: Wednesday 10-11, Thursday 11-12

Market Research: Julian Leslie
Room: E4A554
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Consultation hours: Tues: 9 am – 11am

Tutor:

Nan Carter
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Consultation hours: only available via e-mail

CLASSES

Lectures

Lectures begin in Week 1. Tuesdays 1 pm – 3 pm. E6A102

Practicals

Prac sessions also begin in Week 1. **Attendance is compulsory**. The aim of the practical session is to carry out techniques discussed in lectures. Pracs are designed so that students work through the

exercises and ask as many questions as they need to improve their understanding. Tutors will be available in the prac sessions.
Pracs sessions take place in the computer labs E4B118 Tues 3 pm – 4 pm).
The timetable for classes can be found on the University web site at: http://www.timetables.mq.edu.au/

RECOMMENDED REFERENCE TEXTS

Books that have been found to be useful in the Market Research part of the course are the following (they have been placed in *Reserve* in the library).

Applied Multivariate Techniques by Subhash Sharma (QA278.S485 1996)
Applied Multivariate Methods for Data Analysts by Dallas E. Johnson (QA278.J615/1998).
Multivariate Statistical Methods by Bryan F. J. Manly (QA278.M35/2004)

There doesn't appear to be much available that is at the right level in Conjoint Analysis. Most treatments appearing in Market Research books are either too waffly or too technical. The supplied notes have quite a bit of detail and should be enough to get the idea of the method and to apply it.

For the Forecasting part of the course the following book has been found useful:

Forecasting: Methods and Applications by Makridakis, S (HD30.27.M34/1998)

WEBCT ACCESS

There will be a WebCT site for this subject. Students are required to log into WebCT using their Student ID Number and myMQ Portal Password (note, information about how to get hold of your password is provided in the weblink below)

The Web site for WebCT log in is: http://online.mq.edu.au

How to use WebCT is explained in the welcome message in the discussion board.

LEARNING OUTCOMES

By the end of this unit students should be able to:

- know how to carry out a principal component analysis
- interpret the output from a principal component analysis
- decide whether to use a correlation or a covariance matrix for the basis of the analysis
- recognise the circumstances under which it is appropriate to carry out a principal component analysis

- decide how many principal components gives an adequate approximation
- recognise whether it is appropriate to carry out a factor analysis
- carry out a factor analysis
- know how to attempt to interpret the factors
- decide how many factors to retain
- know the difference between a factor analysis and a principal component analysis
- know how to carry out factor rotation
- know how to undertake a conjoint analysis
- know how to generate an orthogonal plan
- identify any patterns in the auto-correlations in a data set
- determine whether data are best modelled by an auto-regressive or a moving average process
- obtain forecasts for future observations
- obtain a cross correlation function for two variables and use that to determine which lags of a variable will act as suitable predictors
- improve the accuracy of regression methods by examining the auto-correlations of the residuals
- smooth data using exponential smoothing

GENERIC SKILLS

University study aims, not only to provide you with knowledge and skills in a particular academic discipline, but also to equip you with some generic skills. By the end of this unit students should:

- be competent users of SPSS
- have improved their written communication skills, particularly report writing skills
- have leant how to handle variability and to make judgements based on varying data
- have learnt to be sceptical of claims based on poor data or no data.
- be confident in the use of different software packages for solving problems

TEACHING AND LEARNING STRATEGY

- students are expected to attend all the lectures, practicals and tutorials
- practical exercises are set for most of the 12 weeks and these contain specific questions that have to be completed. Solutions to tutorial exercises are to be submitted to the tutor. These are essential to fix ideas given in the lectures
- if for any reason, students can not hand in their assessment tasks on time, they have to contact one of the teaching staff in advance

students are to hand in their solutions and to collect their marked papers from the tutor. Full solutions to the set tutorial questions will be shown and discussed each week at the tutorials. No other full solutions will be made available.

ASSESSMENT

Weekly lab and tutorial exercises related to the current lecture will be given out in lectures. Solutions to the weekly **tutorial** exercises will be submitted at the tutorial in the week following the issue of the exercises and will be checked briefly by the tutor. A solution will score 0, ½ or 1 depending on whether it is, respectively, an unsatisfactory, mediocre or reasonable attempt. The checked exercises will be distributed in a subsequent tutorial. There are 5 marks available for satisfactory completion of all lab exercises.

It is essential that Assignments and Lab Exercise solutions have a cover sheet with the student's ID, Given Name and Family Name at the TOP of the sheet.
See the WebCT site where you will find Cover page forms.

A student's coursework will be deemed "unsatisfactory" if a student hands in fewer than 70% of tutorial solutions. **Attendance at labs is compulsory**.

In addition to the set tutorial questions, there will be three assignments, each worth 5 marks towards the final grade for the course. They will be due in weeks 6, 8 (conjoint project) and 12 (forecasting). Assignments must be submitted by the due date, late assignments will not be accepted. Failure to submit assignments will result in automatic exclusion from the course.

There will be two one-hour class tests, each contributing 10 marks. They will be held during the first hour of the lecture in week 6 (based on material in weeks 1 – 5) and week 11 (based on material in weeks 7 – 10). The final examination will be based on the whole semester's work with about half the questions from Market Research and half from Forecasting. The final examination will contribute at most 65 marks towards the overall mark. Note, maximum mark possible is 105 for STAT328 students (but this will be rescaled for the Standardized Numerical Grade reported in the official results). Satisfactory performances in both the final exam and the coursework are essential for a passing grade. For the final examination, you can bring into the examination room one A4 page of notes written on both sides IN YOUR OWN HANDWRITING AND NOT PHOTO REDUCED. **NO SUCH SHEET IS PERMITTED IN THE CLASS TESTS.** Candidates must perform satisfactorily in each module to gain a passing grade.

NOTE: To obtain a passing grade, both coursework and exam performance must be satisfactory.

STAT826 "Market Research and Forecasting" forming part of the Master of Applied Statistics, Master of Commerce & M Int. Business Students:

For students enrolled in STAT826 there will be **extra** course work in addition to the above. It will take the form of two special assignments, one given out at the end of Week 6 and the other in Week 10. They will each count at most 10 marks so your examination will be out of 125 and not 105 .

RELATIONSHIP BETWEEN ASSESSMENT AND LEARNING OUTCOMES

While attendance at classes is important it is only a small proportion of the total workload for the unit: reading, research in the library, completing assignments, using the computer and private study are all part of the work involved. At Macquarie it is expected that the average student should spend four hours per week per credit point.

You are expected to present yourself for examination at the time and place indicated on the WebCT site.

Only in the event of documented illness or unavoidable disruption will consideration be given to a candidate who is seeking to sit the exam at a time other than the advertised time. In such circumstances the candidate will need to apply for Special Consideration. Information about unavoidable disruption and the special consideration process is available at http://www.reg.mq.edu.au/Forms/APSCons.pdf

If a Supplementary Examination is granted as a result of the Special Consideration process the examination will be scheduled after the conclusion of the official examination period.

You are advised that it is Macquarie University policy not to set early examinations for individuals or groups of students. All students are expected to ensure that they are available until the end of the teaching semester, that is, the final day of the official examination period.

UNIVERSITY POLICY ON GRADING

Academic Senate has a set of guidelines on the distribution of grades across the range from fail to high distinction. Your final result will include one of these grades plus a standardised numerical grade (SNG).

On occasion your raw mark for a unit (i.e., the total of your marks for each assessment item) may not be the same as the SNG which you receive. Under the Senate guidelines, results may be scaled to ensure that there is a degree of comparability across the university, so that units with the same past performances of their students should achieve similar results.

It is important that you realise that the policy does not require that a minimum number of students are to be failed in any unit. In fact it does something like the opposite, in requiring examiners to explain their actions if more than 20% of students fail in a unit.

The process of scaling does not change the order of marks among students. A student who receives a higher raw mark than another will also receive a higher final scaled mark.

The grades and what they mean are given as below:
HD – High Distinction→ Denotes a performance that meets all unit objectives in such an exceptional way and with such marked excellence that it deserves the highest level of recognition.

D – Distinction→ Denotes performance that clearly deserves a very high level of recognition as an excellent achievement in the unit.

C – Credit→ Denotes performance that is substantially better than would normally be expected of competent students in the unit.

P – Pass→ Denotes performance that satisfies unit objectives.

PC – Conceded Pass→ Denotes performance that meets unit objectives only marginally.
F – Fail→ Denotes that a candidate has failed to complete a unit satisfactorily.

For further explanation of the policy see
http://www.mq.edu.au/senate/MQUonly/Issues/Guidelines2003.doc or
http://www.mq.edu.au/senate/MQUonly/Issues/detailedguidelines.doc.

PLAGIARISM

The University defines plagiarism in its rules: "Plagiarism involves using the work of another person and presenting it as one's own." Plagiarism is a serious breach of the University's rules and carries significant penalties. You must read the University's practices and procedures on plagiarism. These can be found in the *Handbook of Undergraduate Studies* or on the web at:
http://www.student.mq.edu.au/plagiarism/

The policies and procedures explain what plagiarism is, how to avoid it, the procedures that will be taken in cases of suspected plagiarism, and the penalties if you are found guilty. Penalties may include a deduction of marks, failure in the unit, and/or referral to the University Discipline Committee.

STUDENT SUPPORT SERVICES

Macquarie University provides a range of Academic Student Support Services. Details of these services can be accessed at http://www.student.mq.edu.au.

COMPUTER LABS AND THEIR CONDITIONS OF USE

Observe any signage in the computer labs – no food or drink is to be consumed in the labs.

OPENING HOURS (may be varied without notice)

Term Time (Teaching and exam period only):

8 am – 10 pm	**Monday – Friday**
9 am – 5 pm	**Saturday, Sunday**

Outside Term Time (including midsemester break, midyear break):

9 am – 7 pm	**Monday – Friday**
9 am – 5 pm	**Saturday, Sunday**

The above hours are the normal opening hours for all the labs in E4B.

WARNING: students are strongly advised not to remain alone in the labs after normal office hours. You should seek out a lab that has other students working in it and/or has a lab monitor.
You are encouraged to phone University Security

- **phone x7112 from inside the lab,**
- **see http://www.bgo.mq.edu.au/security2.htm)**

at any time after hours, during term time, if you require an escort to your vehicle or public transport.

WHILE USING E4B LABS YOU MUST COMPLY WITH ANY REQUEST BY MACQUARIE UNIVERSITY SECURITY STAFF.

Check the map on the website:
http://www.bgo.mq.edu.au/images/S_E.gif

NOTE: The lab is to be used for doing lab exercises, assignments and projects arising *only from units that use E4B306 for lectures/tutorials or practical classes*.

PROBLEMS WITH LAB COMPUTERS?

Problems with lab computers should be reported as follows:

1. if the problem occurs during a class report problem to your tutor
2. if problem occurs outside class time, then report problem by phone or e-mail to a computer monitor one of which should be in a computer lab on the ground floor (E4B118).

USE YOUR MU E-MAIL BROWSER ACCOUNT and no other (staff are instructed to ignore e-mails from Hotmail accounts, etc). BE SURE TO INCLUDE YOUR NAME AND CLASS, THE LAB AND PC NUMBER AND A BRIEF DESCRIPTION OF THE PROBLEM.

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UNIT SCHEDULE

WEEK	LECTURE TOPIC First hour	Assessment Dates
W1	Principal Component Analysis (PCA)	
W2	PCA	
W3	PCA and Factor Analysis	
W4	Factor Analysis	Assign 1 issued
W5	Conjoint Analysis	
W6	**Class Test 1 (1st hour)** and Conjoint Analysis	**Ass1 submitted** Ass2 issued
W7	Introduction to Time Series	
	MIDSEMESTER BREAK	
W8	ARIMA models	**Ass2 submitted**
W9	ARIMA models	
W10	Dynamic regression models and intervention analysis	Ass3 issued
W11	**Class Test 2 (1st hour)**, Moving averages and exponential smoothing	
W12	Periodicity	**Ass3 submitted**
W13	Revision lecture	