STAT726

Market Research and Forecasting

S2 Evening 2014

Statistics

Contents

General Information

Unit convenor and teaching staff
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Credit points
4

Prerequisites
Admission to MRes

Corequisites

Co-badged status
STAT826 STAT328

Unit description
Advanced quantitative methods including multivariate and other statistical methods that have important applications in market research will form the first part of this unit. Consumer choice modelling (conjoint analysis) will also be discussed. Methods for modelling and forecasting trends based on time series data, including techniques for seasonal adjustment will be covered. The unit will make extensive use of appropriate computer packages including SPSS.

Important Academic Dates

Information about important academic dates including deadlines for withdrawing from units are available at https://www.mq.edu.au/study/calendar-of-dates

Learning Outcomes

On successful completion of this unit, you will be able to:

Know when it is appropriate to carry out a principal component analysis (PCA), whether to use a correlation matrix or covariance matrix for the PCA, be able to perform a PCA using a computer package, be able to interpret the output from a PCA and determine how many principal components to use.

Know when it is appropriate to carry out a Factor Analysis (FA), be able to perform the appropriate FA using a statistics package, know how to interpret the factors, determine how many factors to retain, and be aware of the difference between a FA and PCA.

Know how to conduct a Conjoint Analysis (CA) and how to generate an orthogonal plan.

Know what a time series model is and be familiar with the two major types of forecasting

models. Be able to fit AR, MA and ARIMA models using a statistics package and be able to interpret the output. Be able to to decide which is the appropriate model to fit to the time series data.

Know why you would want to smooth the data first. Be able to use a statistical package to smooth the data and then fitting an ARIMA to the smoothed data.

Know how to combine a regression and an ARIMA in the same model. Be able to fit such a model using a statistical package and be able to interpret the output.

Assessment Tasks

Name	Weighting	Due
Assignment 1	5%	29 August
Assignment 2	10%	17 October
Assignment 3	10%	7 November
HW & Tutorial Participation	5%	Weekly
Test 1	10%	10 September
Test 2	10%	31 October
Final Examination	50%	TBA

Assignment 1

Due: **29 August**
Weighting: **5%**

Online submission through iLearn by 2 pm on the due date. Must be submitted as a pdf. This can be done in Word or using freeware like Cute PDF Writer. There is no "group work" assessment in this unit. All work is to be the student's own.

On successful completion you will be able to:

- Know when it is appropriate to carry out a principal component analysis (PCA), whether to use a correlation matrix or covariance matrix for the PCA, be able to perform a PCA using a computer package, be able to interpret the output from a PCA and determine how many principal components to use.
- Know when it is appropriate to carry out a Factor Analysis (FA), be able to perform the appropriate FA using a statistics package, know how to interpret the factors, determine how many factors to retain, and be aware of the difference between a FA and PCA.

Assignment 2

Due: **17 October**
Weighting: **10%**

Online submission through iLearn by 2 pm on the due date. Must be submitted as a pdf. This can be done in Word or using freeware like Cute PDF Writer. There is no "group work" assessment in this unit. All work is to be the student's own.

On successful completion you will be able to:

- Know when it is appropriate to carry out a Factor Analysis (FA), be able to perform the appropriate FA using a statistics package, know how to interpret the factors, determine how many factors to retain, and be aware of the difference between a FA and PCA.
- Know how to conduct a Conjoint Analysis (CA) and how to generate an orthogonal plan.
- Know what a time series model is and be familiar with the two major types of forecasting models. Be able to fit AR, MA and ARIMA models using a statistics package and be able to interpret the output. Be able to to decide which is the appropriate model to fit to the time series data.

Assignment 3

Due: **7 November**
Weighting: **10%**

Online submission through iLearn by 2 pm on the due date. Must be submitted as a pdf. This can be done in Word or using freeware like Cute PDF Writer. There is no "group work" assessment in this unit. All work is to be the student's own.

On successful completion you will be able to:

- Know why you would want to smooth the data first. Be able to use a statistical package to smooth the data and then fitting an ARIMA to the smoothed data.
- Know how to combine a regression and an ARIMA in the same model. Be able to fit such a model using a statistical package and be able to interpret the output.

HW & Tutorial Participation

Due: **Weekly**
Weighting: **5%**

Every week tutorial participation will be monitored and most weeks there will be set homework to submit to the lecturer at the start of the following lecture.

On successful completion you will be able to:

- Know when it is appropriate to carry out a principal component analysis (PCA), whether to use a correlation matrix or covariance matrix for the PCA, be able to perform a PCA using a computer package, be able to interpret the output from a PCA and determine how many principal components to use.
- Know when it is appropriate to carry out a Factor Analysis (FA), be able to perform the appropriate FA using a statistics package, know how to interpret the factors, determine how many factors to retain, and be aware of the difference between a FA and PCA.
- Know how to conduct a Conjoint Analysis (CA) and how to generate an orthogonal plan.
- Know what a time series model is and be familiar with the two major types of forecasting models. Be able to fit AR, MA and ARIMA models using a statistics package and be able to interpret the output. Be able to to decide which is the appropriate model to fit to the time series data.
- Know why you would want to smooth the data first. Be able to use a statistical package to smooth the data and then fitting an ARIMA to the smoothed data.

Test 1

Due: **10 September**
Weighting: **10%**

This will be held in the second hour of the lecture in Week 6.

Permitted materials for the class test are a calculator, lecture notes, assignments, assignment solutions, homework solutions and tutorial solutions. There is no computer access during the class test. No electronic devices are allowed (e.g. iPhones, iPads, tablets, laptops, mobile phones).

Failure to attend the test without relevant documentation to explain the absence (submitted as Disruption to Studies within 5 working days of the test) will result in zero marks being awarded for the test. The test is compulsory and there will be NO supplementary class tests.

The procedure for submitting a Disruption to Studies online can be obtained by visiting ask.mq.edu.au.

Test 1 covers lecture material from Weeks 1 - 5 inclusive and will be of 50 minutes duration.

On successful completion you will be able to:
- Know when it is appropriate to carry out a principal component analysis (PCA), whether to use a correlation matrix or covariance matrix for the PCA, be able to perform a PCA using a computer package, be able to interpret the output from a PCA and determine how many principal components to use.

- Know when it is appropriate to carry out a Factor Analysis (FA), be able to perform the appropriate FA using a statistics package, know how to interpret the factors, determine how many factors to retain, and be aware of the difference between a FA and PCA.

Test 2

Due: **31 October**
Weighting: **10%**

This will be held in the second hour of the lecture in Week 11.

Permitted materials for the class test are a calculator, lecture notes, assignments, assignment solutions, homework solutions and tutorial solutions. There is no computer access during the class test. No electronic devices are allowed (e.g. iPhones, iPads, tablets, laptops, mobile phones).

Failure to attend the test without relevant documentation to explain the absence (submitted as Disruption to Studies within 5 working days of the test) will result in zero marks being awarded for the test. The test is compulsory and there will be NO supplementary class tests.

The procedure for submitting a Disruption to Studies online can be obtained by visiting ask.mq.edu.au.

Test 2 covers lecture material from Weeks 6 - 10 inclusive and will be of 50 minutes duration.

On successful completion you will be able to:
- Know how to conduct a Conjoint Analysis (CA) and how to generate an orthogonal plan.
- Know what a time series model is and be familiar with the two major types of forecasting models. Be able to fit AR, MA and ARIMA models using a statistics package and be able to interpret the output. Be able to to decide which is the appropriate model to fit to the time series data.
- Know how to combine a regression and an ARIMA in the same model. Be able to fit such a model using a statistical package and be able to interpret the output.

Final Examination

Due: **TBA**
Weighting: **50%**

The final Examination will be held during the end-of-year Examination period. The final Examination is 3 hours long (with an additional 10 minutes' reading time).

The final examination will cover all topics in the unit. Students may take into the final Exam **ONE** A4 page of notes **handwritten (not typed)** on **BOTH** sides. Calculators will be needed but must not be of the text/programmable type.

You are expected to present yourself for examination at the time and place designated in the

University Examination Timetable. The timetable will be available in draft form approximately eight weeks before the commencement of the examinations and in final form approximately four weeks before the commencement of the examinations.

The only exemptions to sitting an Examination at the designated time are because of documented illness or unavoidable disruption. In these circumstances you may wish to consider applying for Disruption to Studies. Information about unavoidable disruption and the Dissruption to Studies process is available at

http://students.mq.edu.au/student_admin/exams/disruption_to_studies/.

Students need to apply for Disruption to Studies online at https://ask.mq.edu.au

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

NOTE: Special Consideration will only be granted to students whose performance in all parts of the coursework is satisfactory.

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.

On successful completion you will be able to:
- Know when it is appropriate to carry out a principal component analysis (PCA), whether to use a correlation matrix or covariance matrix for the PCA, be able to perform a PCA using a computer package, be able to interpret the output from a PCA and determine how many principal components to use.
- Know when it is appropriate to carry out a Factor Analysis (FA), be able to perform the appropriate FA using a statistics package, know how to interpret the factors, determine how many factors to retain, and be aware of the difference between a FA and PCA.
- Know how to conduct a Conjoint Analysis (CA) and how to generate an orthogonal plan.
- Know what a time series model is and be familiar with the two major types of forecasting models. Be able to fit AR, MA and ARIMA models using a statistics package and be able to interpret the output. Be able to to decide which is the appropriate model to fit to the time series data.
- Know why you would want to smooth the data first. Be able to use a statistical package to smooth the data and then fitting an ARIMA to the smoothed data.
- Know how to combine a regression and an ARIMA in the same model. Be able to fit such a model using a statistical package and be able to interpret the output.

Delivery and Resources

There is one two hour lecture and one two hour practical each week in this unit. Lectures

commence in Week 1 and practicals commence in Week 2.

Technologies used and required

Lecture material will be placed on iLearn. The statistical package SPSS will be used in some of the lectures.

Recommended Texts

There is no set textbook for this unit. Useful reference texts for the Market Research part of the unit are

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

There is no suitable reference text for Conjoint Analysis. Most treatments in Market Research textbooks are either too simple or too technical.

A useful reference for the Forecasting part of the unit is

- Forecasting: Methods and Applications by Spyros Makridakis, Steven C. Wheelwright and Rob J. Hyndman (HD30.27.M34/1998)

Unit Schedule

Week	Topic
1 (4 August)	Principal Component Analysis (PCA)
2 (11 August)	PCA
3 (18 August)	PCA and Factor Analysis (FA)
4 (25 August)	FA
5 (1 September)	Conjoint Analysis (CA)
6 (8 September)	CA
7 (15 September)	Introduction to Time Series
8 (7 October)	ARIMA models
9 (13 October)	ARIMA models
10 (20 October)	Dynamic regression models and intervention analysis
11 (27 October)	Exponential Smoothing Class Test 2
12 (3 November)	Periodicity

13 (10 November)	Revision

Learning and Teaching Activities

PCA

Know when it is appropriate to carry out a principal component analysis (PCA), whether to use a correlation matrix or covariance matrix for the PCA, be able to perform a PCA using a computer package, be able to interpret the output from a PCA and determine how many principal components to use.

FA

Know when it is appropriate to carry out a Factor Analysis (FA), be able to perform the appropriate FA using a statistics package, know how to interpret the factors, determine how many factors to retain, and be aware of the difference between a FA and PCA.

CA

Know how to conduct a Conjoint Analysis (CA) and how to generate an orthogonal plan.

Time Series 1

Know what a time series model is and be familiar with the two major types of forecasting models. Be able to fit AR, MA and ARIMA models using a statistics package and be able to interpret the output. Be able to to decide which is the appropriate model to fit to the time series data.

Time Series 2

Know how to combine a regression and an ARIMA in the same model. Be able to fit such a model using a statistical package and be able to interpret the output.

Time Series 3

Know why you would want to smooth the data first. Be able to use a statistical package to smooth the data and then fitting an ARIMA to the smoothed data.

Policies and Procedures

Macquarie University policies and procedures are accessible from Policy Central. Students should be aware of the following policies in particular with regard to Learning and Teaching:

Academic Honesty Policy http://mq.edu.au/policy/docs/academic_honesty/policy.html

Assessment Policy http://mq.edu.au/policy/docs/assessment/policy.html

Grading Policy http://mq.edu.au/policy/docs/grading/policy.html

Grade Appeal Policy http://mq.edu.au/policy/docs/gradeappeal/policy.html

Grievance Management Policy http://mq.edu.au/policy/docs/grievance_management/policy.html

Disruption to Studies Policy http://www.mq.edu.au/policy/docs/disruption_studies/policy.html *The Disruption to Studies Policy is effective from March 3 2014 and replaces the Special Consideration Policy.*

In addition, a number of other policies can be found in the Learning and Teaching Category of Policy Central.

Student Code of Conduct

Macquarie University students have a responsibility to be familiar with the Student Code of Conduct: https://students.mq.edu.au/support/student_conduct/

Student Support

Macquarie University provides a range of support services for students. For details, visit http://students.mq.edu.au/support/

Learning Skills

Learning Skills (mq.edu.au/learningskills) provides academic writing resources and study strategies to improve your marks and take control of your study.

- Workshops
- StudyWise
- Academic Integrity Module for Students
- Ask a Learning Adviser

Student Services and Support

Students with a disability are encouraged to contact the Disability Service who can provide appropriate help with any issues that arise during their studies.

Student Enquiries

For all student enquiries, visit Student Connect at ask.mq.edu.au

IT Help

For help with University computer systems and technology, visit http://informatics.mq.edu.au/help/.

When using the University's IT, you must adhere to the Acceptable Use Policy. The policy applies to all who connect to the MQ network including students.

Graduate Capabilities

PG - Discipline Knowledge and Skills

Our postgraduates will be able to demonstrate a significantly enhanced depth and breadth of

knowledge, scholarly understanding, and specific subject content knowledge in their chosen fields.

This graduate capability is supported by:

Learning outcomes

- Know when it is appropriate to carry out a principal component analysis (PCA), whether to use a correlation matrix or covariance matrix for the PCA, be able to perform a PCA using a computer package, be able to interpret the output from a PCA and determine how many principal components to use.

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Assessment tasks

- Assignment 1
- Assignment 2
- Assignment 3
- HW & Tutorial Participation
- Test 1
- Test 2
- Final Examination

PG - Critical, Analytical and Integrative Thinking

Our postgraduates will be capable of utilising and reflecting on prior knowledge and experience, of applying higher level critical thinking skills, and of integrating and synthesising learning and knowledge from a range of sources and environments. A characteristic of this form of thinking is the generation of new, professionally oriented knowledge through personal or group-based critique of practice and theory.

This graduate capability is supported by:

Learning outcomes

- Know when it is appropriate to carry out a principal component analysis (PCA), whether to use a correlation matrix or covariance matrix for the PCA, be able to perform a PCA using a computer package, be able to interpret the output from a PCA and determine how many principal components to use.

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Assessment tasks

- Assignment 1
- Assignment 2
- Assignment 3
- HW & Tutorial Participation
- Test 1
- Test 2
- Final Examination

PG - Research and Problem Solving Capability

Our postgraduates will be capable of systematic enquiry; able to use research skills to create new knowledge that can be applied to real world issues, or contribute to a field of study or practice to enhance society. They will be capable of creative questioning, problem finding and problem solving.

This graduate capability is supported by:

Learning outcomes

- Know when it is appropriate to carry out a principal component analysis (PCA), whether to use a correlation matrix or covariance matrix for the PCA, be able to perform a PCA

using a computer package, be able to interpret the output from a PCA and determine how many principal components to use.

- Know when it is appropriate to carry out a Factor Analysis (FA), be able to perform the appropriate FA using a statistics package, know how to interpret the factors, determine how many factors to retain, and be aware of the difference between a FA and PCA.

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Assessment tasks

- Assignment 1
- Assignment 2
- HW & Tutorial Participation
- Test 1
- Test 2
- Final Examination

PG - Effective Communication

Our postgraduates will be able to communicate effectively and convey their views to different social, cultural, and professional audiences. They will be able to use a variety of technologically supported media to communicate with empathy using a range of written, spoken or visual formats.

This graduate capability is supported by:

Learning outcomes

- Know when it is appropriate to carry out a principal component analysis (PCA), whether to use a correlation matrix or covariance matrix for the PCA, be able to perform a PCA using a computer package, be able to interpret the output from a PCA and determine how many principal components to use.

- Know when it is appropriate to carry out a Factor Analysis (FA), be able to perform the appropriate FA using a statistics package, know how to interpret the factors, determine

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Assessment tasks

- Assignment 1
- Assignment 2
- Assignment 3
- HW & Tutorial Participation
- Test 1
- Test 2
- Final Examination

PG - Capable of Professional and Personal Judgment and Initiative

Our postgraduates will demonstrate a high standard of discernment and common sense in their professional and personal judgment. They will have the ability to make informed choices and decisions that reflect both the nature of their professional work and their personal perspectives.

This graduate capability is supported by:

Learning outcomes

- Know when it is appropriate to carry out a principal component analysis (PCA), whether to use a correlation matrix or covariance matrix for the PCA, be able to perform a PCA using a computer package, be able to interpret the output from a PCA and determine how many principal components to use.

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Assessment tasks

- Assignment 1
- Assignment 2
- Assignment 3
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- Test 1
- Test 2
- Final Examination

Changes from Previous Offering

Some of the lecture material has been rewritten.