Course information 2025-26

MN2196 Data Analysis for Management Decision Making

General information

MODULE LEVEL: 5

CREDIT: 30

NOTIONAL STUDY TIME: 300 hours

MODE: Online Taught Only

Summary

Management is the act of allocating resources to alternative activities in order to maximise the performance of firms and other organisations. Successful management therefore requires understanding how the world functions. This course is an introduction to the quantitative techniques guiding evidence-based managerial decision-making. For instance, are family-managed firms less productive than other firms? Are there biases in job interviews? Are political connections important for corporations? Does performance-pay increase productivity? This course provides the tools to investigate empirically whether these statements are supported by empirical evidence.

Conditions

Please refer to the relevant programme structure in the EMFSS Programme Regulations to check:

- where this course can be placed on your degree structure; and
- details of prerequisites and corequisites for this course.

You should also refer to the Exclusions list in the EMFSS Programme Regulations to check if any exclusions apply for this course.

Aims and objectives

This course develops a comprehensive framework to evaluate whether the predictions of managerial, social, and economic theories are supported by empirical evidence. The course will provide students with the tools to address questions such as:

- When can we conclude that A causes B? When is it instead sufficient to know that A is correlated with B?
- How certain should we be of our empirical conclusions?
- When are the results of a study externally valid?
- How should quantitative and graphical evidence be interpreted?

The course's approach is tightly built around real-world applications. Students will be provided with tools and datasets to answer highly relevant questions. These applications will be illustrated using the R software package, and the students will be expected to learn the basics of data manipulation and regression running.

Learning outcomes

At the end of this course and having completed the essential reading and activities students should be able to:
- Understand the possibilities and challenges in using quantitative data to learn about the world
- Critically evaluate whether statements and theories are supported by sufficient and/or adequate empirical evidence
- Use the R econometric package to manipulate data, run regressions and interpret the resulting output
- Propose and evaluate simple research designs to untangle causal relations between variables
- Understand how to translate theoretical relations into testable hypotheses

Employability skills

Below are the three most relevant employability skills that students acquire by undertaking this course which can be conveyed to future prospective employers:
1. Decision making
2. Complex problem solving
3. Communication

Essential reading

For full details, please refer to the reading list.

James H. Stock and Mark W. Watson, Introduction to Econometrics, Third Edition, Pearson, 2011.

Optional: Jeffrey M. Wooldridge, Introductory Econometrics - A Modern Approach, Sixth Edition, South-Western, 2015.

Assessment

This course is assessed by a three-hour and fifteen-minute closed-book written examination.

Syllabus

The topics covered in the course include:

1. **Review of Maths and Stats:** Population mean and variance, sample mean and variance, properties of mean and variance, basic elements of inference, interpretation of equations in logarithmic form.
2. **The Linear Regression Model:** The causality problem, the population model, sampling processes, estimators and estimates, the ordinary least squares (OLS) model, assumptions, and properties of the OLS model
3. **Multiple Regression:** Omitted variable bias problem, the multiple regression model, assumptions, and properties of the multiple regression model.
4. **Inference:** Estimators as random variables, hypothesis testing (assumptions and methods, t-test, and F-test), p-values, confidence intervals.
5. **Functional Form:** Dummy variables, conversion of discrete variables into sets of dummy variables, quadratic models, models with interactions, use of dummy variables to explore functional form.
6. **Limitations of Linear Regression**: Omitted variable bias, non-random sampling, measurement error, outlying observations, heteroskedasticity.
7. **Experiments:** Laboratory, field and natural experiments, internal and external validity.
8. **Exploiting Time Variation:** Types of samples (cross-sectional, time series, repeated cross-sections, and panel data), first-difference models, individual fixed effects models, time fixed effects models, differences-in-differences models.
9. **Instrumental Variables:** Instrumental variables as a method to alleviate omitted variable bias, reduced form estimates, two-stage least squares estimates.