

# Methods of Economic Investigations (Ec402) 2010–2011 Study Guide

## Instructors:

### Michaelmas Term Lectures:

Mon&Tue&Thu, 10–11am — in weeks to be specified, only two lectures.  
Instructor: Vassilis Hajivassiliou (S.564)  
Office hour: Mon 12:30-13:30  
Secretary: Sue Kirkbride (S.683)

### Lent Term Lectures:

Mon&Tue&Thu, 10–11am — in weeks 6-10 only two lectures.  
Instructors: Mark Schankerman and Danny Quah

## Description:

The overall purpose of this course is to present and illustrate the main econometric techniques of empirical investigation in economics. In the Michaelmas Term, we develop the general methodology that is applicable to all types of data that are commonly encountered. In the Lent Term, attention will focus on methods for specific data types: in the first part, taught by Mark Schankerman (MS), specialized methods suitable for Cross-Section and Panel data will be covered, while in the second, taught by Danny Quah (DQ), the focus will be Time-Series methods.

Knowledge of calculus, linear algebra, probability and statistics are assumed to the level of the September Courses in Mathematics and Statistics. Some knowledge of elementary econometrics will obviously be useful, although not absolutely essential.

## Teaching Arrangements:

There are 25 lectures time-tabled for this course in each term, though in the Michaelmas term only 20 are officially allotted. You can find online the precise week-by-week schedule for our lectures. At the end of each lecture, I will remind you as to when the next lecture will take place.

There is also one class per week throughout the year. Class group allocation takes place at the start of this term. Exercises are provided each week and are discussed in the classes. In order to have any chance of completing the course successfully, these exercises must be attempted.

## Examination Arrangements:

There is a three-hour formal examination in the Summer Term.

The format will be similar to last year's. There will be approximately seven questions, the first of which will be compulsory and account for 60% of the marks. Two other questions have to be answered and these will be similar to those in other years. The compulsory question will have seven short problems.

For practice, there will be a midterm test at the end of the Michaelmas Term and a mock examination at the beginning of the Summer Term.

## Textbooks:

There are two alternate textbooks for the course: J. Johnston and J. DiNardo, *Econometric Methods*, Fourth Edition, McGraw Hill (henceforth *EM4*), and W.H. Greene, *Econometric Analysis*, Sixth Edition, Prentice-Hall (henceforth *EA6*)<sup>1</sup>. Greene is the more modern and comprehensive text, but Johnston&Dinardo is more concise and may appeal to some students depending on their background.

There also exists an older edition of Johnston (henceforth *EM3*), which I think is more successful than the newer edition on certain topics, e.g., Asymptotic theory.

None of these texts is adequate for the Lent Term material for which supplementary material will be provided by MS and DQ.

## Main Course Outline:

### Michaelmas Term (VH)

This part covers the linear simple and multiple regression model. The main issues discussed are: fixed and stochastic regressors; dummy variables and transformations; hypothesis testing; the partitioned model; omitted and added variables; misspecification; multicollinearity; asymptotic theory; measurement error, simultaneity, and instrumental variables; heteroskedasticity, serial correlation, and generalized least squares; maximum likelihood, method of moments, and minimum distance estimation.

### MEI Lent Term (MS and DQ)

This part of the course covers problems in the estimation of microeconomic (MS) and time series (DQ) models. Readings will be provided in due course.

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<sup>1</sup>or the slightly older, but perfectly satisfactory Third (*EA3*), Fourth (*EA4*), and Fifth (*EA5*) Editions.

## Michaelmas Term Outline/Reading List:

1. Introduction. Regression models with fixed regressors. The simple regression model: least squares, estimation, inference, and goodness of fit. EM3 2.1–2.5; EM4 1.1–1.4; EA3 6.1–6.6; EA4 1.1–1.3, 6.1–6.3; EA5 Chapters 1-2; EA6 Chapters 1-2.
2. Matrix Algebra EM3 Chapter 4; EM4 Appendix A; EA3 Chapter 2; EA4 2.1–2.3, 2.6–2.9; EA5 Appendix A.1-A.2, A.5-A.8, Appendix B.11; EA6 Appendix A.1-A.4, A.6-A.7.
3. Regression model with fixed regressors. The multiple regression model: least squares, estimation, exact multicollinearity, inference, and goodness of fit. Prediction. Handouts; EM3 5; EM4 3.1–3.4; EA3 7.1–7.5; EA4 6.1–6.7; EA5 3.1-3.2, 3.5, 4.1-4.9, 6.6, 6.1-6.5; EA6: 3.1-3.2, 3.5-3.6.
4. Maximum likelihood, Method of moments, and their relation to least squares. EM3 7.3; EM4 5.1–5.2; EA3 4.5, 4.7, Handouts; EA4 4.5, 4.7, 6.3.6; EA5 17.1-17.3; EA6: 4.1-4.4, 4.6-4.8, 14.1-14.2, 15.1-15.3, 16.1-16.3.
5. Extension of the fixed regressor, multiple regression model. Regression models with stochastic regressors. Handouts; EM3, pp. 281–5; EA3 6.4.2., 6.5.3; EA4 6.6; EA5 5.1-5.3; EA6: 4.5, 4.9 (skim).
6. Dummy variables and transformations. EM3 6.3, 3.1–3.3; EM4 4.5–4.6; EA3 8.1–8.3; EA4 8.2; EA5 7.1-7.3; EA6: 6.2-6.3.
7. Examples of regression and hypothesis testing using experimental data. Tests of Structural Change. EA3 7.5–7.8; EA4 7.1–7.2, 7.4–7.6; EA5 7.4-7.5; EA6: Chapter 5, 6.4-6.5.
8. The partitioned regression model, omitted and added variables, misspecification. Inexact multicollinearity. EM3 6.6, 6.5, pp. 245–50; EA3 8.1–8.4, 9.2; EA4 2.6, 6.4; EA5 3.3-3.4, 8.1-8.2; EA6: 3.3-3.4.
9. Two famous examples of the omitted variable problems: (a) brain weight and gender and (b) the omission of ability in the determination of the rate of return to schooling.
10. Asymptotic theory and its application to the regression model. EM3 7.1–2, 7.4; EA3 4.4, 10.1–10.3; EA4 9.4–9.6; EA5 5.1-5.3; EA6: 4.9-4.10; Handouts.
11. Generalized least squares. EM3 8.1–8.4; EM4 5.4; EA3 11.1–11.4; EA4 11.1–11.5, 12, 13.1–13.7, 14.2; EA5 10.1-10.2, 11.1-11.2, 11.4-11.6, 12.1-12.5; EA6: Chapter 8, 9.6.
12. Measurement error, simultaneity, and instrumental variables. EM3 10.6, also pp. 363–6; EM4 5.5; EA3 9.5; EA4 16.1–16.5; EA5 5.4-5.6; EA6: 7.1-7.2, 12.1-12.3, 12.5, 12.9, 13.3-13.4.