



Indian Institute of Management Indore

INTEGRATED PROGRAMME IN MANAGEMENT (IPM) AY2018-19 BATCH – IPM2017-22 TERM: V

TITLE OF THE COURSE: ECONOMETRICS

CREDITS: 4

Name of the Faculty	Faculty Block/ Room No.	Email	Telephone Number
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CONSULTATION TIME FOR STUDENTS: Thursdays 2 – 4 PM or by appointment

COURSE DESCRIPTION: This is an undergraduate level econometrics course offered to the IPM students. The course is designed to provide a general introduction to econometric theory and application. The ‘application’ aspect entails becoming familiar with Stata[®] which is a general-purpose statistical software package used widely by data scientists and business analysts.

COURSE OBJECTIVES

- 1) Students will understand the importance of the assumptions underlying the Simple Linear Regression (SLR) Model and Multiple Linear Regression (MLR) Model.
- 2) Students will demonstrate an understanding of the mechanics of SLR and MLR, their finite and asymptotic properties, and should be able to conduct proper inference and hypothesis testing after using these models.
- 3) Students will understand the consequences for OLS when assumptions of the SLR and MLR are violated, including when the data are measured with error or when there is omitted variable bias.
- 4) Students will demonstrate knowledge of how instrumental variables estimation works and its finite and asymptotic properties.
- 5) Students will understand how to work with pooled cross-section data and develop basic competency to handle difference-in-differences (DID) models
- 6) Students will understand how to handle panel data, and the different types of panel data models.
- 7) Students will develop and prove competency in Stata[®] in order to apply the econometric techniques learned.

LEARNING OUTCOMES

Expected Learning Outcomes and Associated Measures

At the end of the course student is expected to accomplish the following learning outcomes (CLO). Alignment of CLO with the Programme Level Goals & Objectives and Assessment of the learning outcomes of the course is presented below.

Course Learning Outcome	Program Level Goals/	Assessment Tool(s)
1. Students would demonstrate understanding of the core concepts of econometrics and how these concepts relate to economic issues especially in public policy and business studies.	(Goals) Demonstrates knowledge of basic foundations of Management Studies (LG3)	Embedded questions in quizzes, practice examinations, mid-term and end term examinations
2. Students would develop the analytic rigor required to apply the core econometric concepts and solve theoretical econometric problems. 3. Students would demonstrate a strong competency in Stata [®] and would be able to use the software package to analyze large scale survey/experimental data.	(Objectives) 1. Acquires analytical rigor through Mathematics and Statistics 2. Understands fundamentals of core disciplines such as Economics, Sociology, Psychology, Political Science, Philosophy and other courses in Humanities and Social Sciences on which the study of management is based	Embedded questions in practice examinations, mid-term and end term examinations

PEDAGOGY/TEACHING METHOD:

This is primarily a lecture-based course. To demonstrate the key concepts covered, we will examine various large-scale datasets and use Stata[®] extensively in class. Active participation during class discussions is strongly encouraged.

TEXT BOOK FOR THE COURSE

Wooldridge, J. (2013). *Introductory Econometrics: A Modern Approach*, 5th edition, Cengage Learning, India.

EVALUATION

Individual Component	Group Component	Weightage
Quizzes		20
Mid-Term Examination		30
End-Term Examination		50
Total		100%

ACADEMIC DISHONESTY

IIM Indore believes in Academic honesty.

Academic dishonesty or misconduct is cheating that relates to an academic activity. It is a violation of trust between the Institute and its stakeholders. Plagiarism, fabrication, deception, cheating and sabotage are examples of unacceptable academic conduct. Please consult the Programme manual for the section on academic dishonesty.

SCHEDULE OF SESSIONS

Module I Introduction to Econometrics and the Simple Regression Model

Module Objective: To introduce students to the basic themes of econometrics, types of economic data, and to provide a complete understanding of the simple regression model.

<p>Session 1</p> <p>Objective:</p> <p>Reading:</p> <p>Stata® Applications:</p>	<p><i>The Nature of Econometrics and Economic Data</i></p> <p>Understanding the notion and scope of econometrics, types of economic data, and the distinction between causality and correlation.</p> <p>Wooldridge, J. (2013), <i>Introductory Econometrics: A Modern Approach</i>, 5th edition, Cengage Learning, Chapter 1.</p> <ul style="list-style-type: none"> • Visualizing different types of data
<p>Sessions 2, 3</p> <p>Objective:</p> <p>Reading:</p> <p>Stata® Applications:</p>	<p><i>The Simple Regression Model</i></p> <p>Understanding the definition of the simple regression model, derivation and properties of ordinary least square (OLS), units of measurement and functional forms.</p> <p>Wooldridge, J. (2013), <i>Introductory Econometrics: A Modern Approach</i>, 5th edition, Cengage Learning, Chapter 2 (Sections 2.1 – 2.4).</p> <ul style="list-style-type: none"> • Effects of education on hourly wage / “Returns to education” • Effects of campaign spending on voting outcomes • Effects of return on equity on CEO salary
<p>Session 4</p> <p>Objective:</p> <p>Reading:</p> <p>Stata® Applications:</p>	<p><i>More on the Simple Regression Model</i></p> <p>To be able to derive the expectation and variance of the OLS estimators.</p> <p>Wooldridge, J. (2013), <i>Introductory Econometrics: A Modern Approach</i>, 5th edition, Cengage Learning, Chapter 2 (Section 2.5).</p> <ul style="list-style-type: none"> • Data simulation to understand the concept of unbiasedness • Effects of expenditure per pupil on student performance

Module II Multiple Regression Analysis

Module Objective: To expose students to the core foundations of multiple regression analysis and enable them to carry out estimation and inference in a multivariate regression framework.

<p>Session 5</p> <p>Objective:</p> <p>Reading:</p> <p>Stata® Applications:</p>	<p><i>Introduction to Multiple Regression</i></p> <p>To understand the motivation behind multiple regression analysis, and get a detailed idea about the mechanics and interpretation of OLS in multivariate regression model</p> <p>Wooldridge, J. (2013), <i>Introductory Econometrics: A Modern Approach</i>, 5th edition, Cengage Learning, Chapter 3 (Sections 3.1 – 3.2).</p> <ul style="list-style-type: none"> • Estimation of wage equation
<p>Session 6</p> <p>Objective:</p> <p>Reading:</p> <p>Stata® Applications:</p>	<p><i>Estimation in Multiple Regression Model</i></p> <p>To grasp the concepts of expectation and variance of parameters in relation to multiple regression model, and to understand the idea of efficiency of OLS and prove the Gauss-Markov Theorem.</p> <p>Wooldridge, J. (2013), <i>Introductory Econometrics: A Modern Approach</i>, 5th edition, Cengage Learning, Chapter 3 (Sections 3.3 – 3.5).</p> <ul style="list-style-type: none"> • Analysis of campaign spending on voting behavior on voting outcomes to understand the problem of multicollinearity • Revisiting the wage equation estimation
<p>Sessions 7, 8</p> <p>Objective:</p> <p>Reading:</p> <p>Stata® Applications</p>	<p><i>Inference in Multiple Regression Model</i></p> <p>To understand sampling distributions of the OLS estimators, and to be able to carry out testing of hypotheses about a single population parameter, a single linear combination of parameters and multiple linear restrictions.</p> <p>Wooldridge, J. (2013), <i>Introductory Econometrics: A Modern Approach</i>, 5th edition, Cengage Learning, Chapter 4 (Sections 4.1 – 4.5).</p> <ul style="list-style-type: none"> • Hypothesis testing based on: <ul style="list-style-type: none"> ○ Wage equation/returns to education framework ○ The impact of enrollment on crime on college campuses ○ Determinants of NBA salaries
<p>Session 9</p>	<p><i>Tutorial/ Review Session</i></p>

Module III Multiple Regression Model: Further Issues

Module Objective: To familiarize students with the usage of binary explanatory variables in multivariate regression framework and provide a formal treatment of heteroskedasticity. Additionally, this module also is designed to provide an overview of OLS Asymptotics.

<p>Session 10</p> <p>Objective:</p> <p>Reading:</p> <p>Stata® Applications:</p>	<p><i>Multiple Regression Analysis with Qualitative Information: The Case of Binary Variables</i></p> <p>To learn how to describe qualitative information using dummy (binary) variables and use these variables as regressors in a regression framework.</p> <p>Wooldridge, J. (2013), <i>Introductory Econometrics: A Modern Approach</i>, 5th edition, Cengage Learning, Chapter 7 (Sections 7.1 – 7.4).</p> <ul style="list-style-type: none"> • Analysis of gender wage gap • Analysis of ‘Marriage Premium’ for males • Analysis of the relationship between physical looks and labor market earnings
<p>Session 11</p> <p>Objective:</p> <p>Reading:</p> <p>Stata® Applications:</p>	<p><i>Heteroskedasticity</i></p> <p>To understand the consequences of heteroskedasticity, heteroskedasticity-robust inference after OLS estimation, the method of weighted least squares (WLS), and the procedure for testing heteroskedasticity.</p> <p>Wooldridge, J. (2013), <i>Introductory Econometrics: A Modern Approach</i>, 5th edition, Cengage Learning, Chapter 7 (Sections 8.1 – 8.4).</p> <ul style="list-style-type: none"> • Examining the determinants of demand for apples • Analyzing heteroskedasticity in the wage equation • Applying WLS to the savings-income regression model
<p>Session 12</p> <p>Objective:</p> <p>Reading:</p> <p>Stata® Applications:</p>	<p><i>OLS Asymptotics</i></p> <p>To understand the ideas of consistency of OLS, asymptotic and large sample inference.</p> <p>Wooldridge, J. (2013), <i>Introductory Econometrics: A Modern Approach</i>, 5th edition, Cengage Learning, Chapter 7 (Sections 5.1 – 5.2).</p> <ul style="list-style-type: none"> • Using data on apple demand and data on employee participation in pension plan to show failure of normality

Module IV Data Issues, Instrumental Variable Regression and Two Stage Least Squares

Module Objective: To provide a formal treatment of selected data issues like those involved in usage of proxy variables and the problem of measurement error. Additionally, this module seeks to provide a detailed analysis of Instrumental Variable Estimation and Two Stage Least Squares as a potential solution to the problem of endogeneity due to omitted variable bias and/or measurement error.

<p>Sessions 13, 14</p> <p>Objective:</p> <p>Reading:</p> <p>Stata® Applications:</p>	<p><i>Data Issues</i></p> <p>Understanding the concept of proxy variables and using such variables for unobserved explanatory variables, to get a thorough understanding the issue of measurement error and the related problem of endogeneity, and to provide a brief overview of non-random sampling.</p> <p>Wooldridge, J. (2013), <i>Introductory Econometrics: A Modern Approach</i>, 5th edition, Cengage Learning, Chapter 7 (Sections 9.2 – 9.5).</p> <ul style="list-style-type: none"> • Using proxy variable in the wage equation • Understanding endogenous sampling by examining hourly wage data for working women
<p>Sessions 15, 16</p> <p>Objective:</p> <p>Reading:</p> <p>Stata® Applications:</p>	<p><i>Instrumental Variables Estimation and Two Stage Least Squares</i></p> <p>To acquire a thorough understanding of the concept of instrumental variables (IV) and Two Stage Least Squares (TSLS) Estimation. Also learn how to test whether a variable is endogenous.</p> <p>Wooldridge, J. (2013), <i>Introductory Econometrics: A Modern Approach</i>, 5th edition, Cengage Learning, Chapter 7 (Sections 15.1 – 15.5).</p> <ul style="list-style-type: none"> • Illustrating the concept of IVs using data from Angrist and Evans (1998, <i>American Economic Review</i>) • Estimating returns to education treating education as endogenous using data from Card (1995, in Louis N. Christofides, Kenneth E. Grant, and Robert Swidinsky, eds., <i>Aspects of Labour Market Behaviour: Essays in Honour of John Vanderkamp</i>, Toronto: University of Toronto Press)

Module V Advanced Topics in Econometrics

Module Objective: To expose students to selected advanced topics in econometrics which are likely to be useful for policy analysis.

<p>Session 17</p> <p>Objective:</p> <p>Reading:</p> <p>Stata® Applications:</p>	<p><i>Pooled Cross-Section & Difference-in-Differences Analysis</i></p> <p>To understand and be able to work with Pooled Cross Section, to analyze pooled cross section data including time effects, and gain a thorough working knowledge of the method of difference-in-differences (DID) with two groups and two time periods.</p> <p>Wooldridge, J. (2013), <i>Introductory Econometrics: A Modern Approach</i>, 5th edition, Cengage Learning, Chapter 7 (Sections 13.1 – 13.2).</p> <ul style="list-style-type: none"> • Analyzing US women’s fertility 1974-84 • Using DID to examine the effect of attendance monitoring on student attendance
<p>Sessions 18, 19</p> <p>Objective:</p> <p>Reading:</p> <p>Stata® Applications:</p>	<p><i>Panel Data Methods</i></p> <p>To understand the structure and formats of panel data, and to be able to carry out analysis of empirical issues using multiple periods of panel data using the methods of pooled OLS (POLS), first differencing (FD) and fixed effects (FE).</p> <p>Wooldridge, J. (2013), <i>Introductory Econometrics: A Modern Approach</i>, 5th edition, Cengage Learning, Chapter 7 (Sections 13.3 – 13.5, 14.1).</p> <ul style="list-style-type: none"> • Visualizing “long” and “wide” forms of panel data • Understanding the mechanics of various panel data methods by empirically examining <ul style="list-style-type: none"> ○ The effects of job training grants on scrap rates in Michigan ○ In-season GPA effects on student-athletes
<p>Session 20</p>	<p><i>Tutorial/Review Session</i></p>

Please indicate the changes made in the course outline based on the measurement of assurance of learning (closing the loop)/student feedback:

N/A

Please give the details of the book if students need to buy the book

<u>Author</u>	<u>Title</u>	<u>Publisher</u>	<u>Edition</u>	<u>Remarks, if any</u>
Wooldridge, J.	Introductory Econometrics: A Modern Approach	Cengage Learning, India	5 th edition	N/A

Additional Readings

The following books are recommended for supplementary reading:

- Kennedy, P. (2008). *A Guide to Econometrics*, 6th edition, Wiley-Blackwell, United States.
- Cameron, A.C., and Trivedi, P. (2010). *Microeconometrics using Stata* (Revised Edition), Stata Press, United States.
