

INTERNATIONAL MANAGEMENT INSTITUTE, BHUBANESWAR
POST GRADUATE DIPLOMA IN MANAGEMENT
FINANCIAL ECONOMETRICS USING R (FN610)
CREDIT: 3 credits
SESSION DURATION: 60 Minutes

TERM: IV
YEAR: 2019-2020
BATCH: II (PGDM)

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Office hours: 9.30 am to 5.30 pm

Consulting hours: Can be decided based on prior appointment.

Course Introduction: This course aims at introducing the methods of econometrics and their application to economic and financial data. This course focuses on the empirical techniques which are mostly used in the analysis of financial markets and how they are applied to actual real-world data in standard computer packages like R. This course will cover the topics like classic linear regression model (with assumptions), univariate time series models and multivariate time series models like Vector Autoregressive models and Cointegration techniques.

Learning Outcomes: The specific learning outcomes of the course are:

- To acquaint students with the fundamentals of financial econometrics (**LO1** Subject Knowledge)
- To acquaint students with various econometric tools and techniques and linking it to various economic and financial problems (**LO2** Concept Application)
- To increase the students' ability to apply econometric techniques to economic and financial data (**LO3** Economic & Financial Application)
- To expose participants to practical orientation of building econometric models using R (**LO4** Software based analytical skills)

Course Pedagogy: The course will have a judicious mix of lectures and lab (*R* based) exercises.

Course Readings

Books:

1. Introductory econometrics for finance: Brooks C (2019): Cambridge University press. Second edition.

Additional readings:

2. Basic econometrics: Gujarati D N (2009): Tata McGraw-Hill Education. Fifth edition.
3. Analysis of financial time series: Tsay R S (2005) (Vol. 543): John Wiley & sons. Third edition.

Course Evaluation criteria:

The approach of assessment would be to test the candidate's:

(a) ability to use statistical techniques to formulate, estimate and draw inferences from simple statistical techniques; (b) understanding of the way in which those results can be given interpretations; and (c) ability to communicate with other statisticians, and with non-specialists, in a comprehensible and effective manner.

The overall course grade will be based on performance in quizzes (20%); lab exam (40%) and a project presentation (30%). For the term project presentation component in the course evaluation criteria participants must discuss and take prior approval of the instructor for their topics. The objective of this component is to make sure that participants have developed adequate understanding of financial econometric techniques and can model those techniques in R and draw meaningful inferences out of them.

Individual Component	Learning Outcomes	Group Component	Weightage (%)
Class Participation (Assessment to be done on the basis of a student's <i>cogent</i> contributions to class discussions. Simply rambling will not be sufficient)	LO1 LO2		10%
Announced Quizzes (Two announced quizzes (10 marks each) will be given during the duration of the course. These quizzes will be given in the physical form and will cover both theory and its application)	LO1 LO2		20%
Project Presentation (This component includes the term project presentation. It is expected that participants should be able to do empirical projects involving economic and financial time series on their own using R. For this component participants have to make presentation before the instructor on their empirical projects)	LO1 LO2 LO3 LO4		30%
Lab Exam (End term closed book in class exam where the instructor will give students an empirical exercise to be done in R)	LO1 LO2 LO3 LO4		40%
Total			100%

Plagiarism

We are committed to upholding the highest standards of academic integrity and honesty. Plagiarism is the use of or presentation of ideas, works that are not one's own and which are not common knowledge, without granting credit to the originator. You may refer the already available content just for your reference and to get the basic ideas. Only 20% of such content is acceptable, above that

comes under the definition of Plagiarism which is unacceptable in IMI and will be treated seriously. All such cases will be referred to the appropriate body of the Institute for suitable disciplinary action.

Session Plan:

Session No.	Topic		Learning Outcomes	Reading
	Topic	Objectives		
1.	Introduction	To understand what is econometrics To understand the difference between econometrics and financial econometrics	<ul style="list-style-type: none"> • LO1 	Textbook: Chap-1: Introduction (Brooks, C)
2.	Introduction	To understand the types of data To understand returns in financial modelling To understand formulation of econometric models	<ul style="list-style-type: none"> • LO1 	Textbook: Chap-1: Introduction (Brooks, C)
3-4	Classical Linear Regression Model (CLRM)	To understand regression and the difference between regression and correlation To understand and appreciate simple regression and the assumptions of the CLRM To understand properties of OLS estimator To understand precision and standard errors and statistical inference	<ul style="list-style-type: none"> • LO2 • LO3 • LO4 	Textbook: Chapter-2: A brief overview of the classical linear regression model (Brooks, C) Will involve empirical exercise in R.
5-6	Further development and analysis of CLRM	To understand multiple regression, parameters of regression analysis, F test and Good of fit statistics.	<ul style="list-style-type: none"> • LO2 • LO3 • LO4 	Textbook: Chap-3: Further development and analysis of CLRM (Brooks, C) Will involve empirical exercise in R.
7-10.	Understanding assumptions of CLRM and	To understand CLRM assumptions, multicollinearity,	<ul style="list-style-type: none"> • LO2 • LO3 • LO4 	Textbook: Chap-4: Classical linear regression model

	diagnostic testing	heteroscedasticity and autocorrelation. To understand and comprehend functional forms, misspecification and parameter stability tests.		assumptions and diagnostic tests (Brooks, C) Will involve empirical exercise in R.
11-14	Univariate time series modelling and forecasting	To understand stationary and non-stationary time series, autoregressive processes, moving average processes and partial autocorrelation function.	<ul style="list-style-type: none"> • L02 • L03 • L04 	Textbook: Chap-5: Univariate time series modelling and forecasting (Brooks, C) Will involve empirical exercise in R.
Quiz 1				
15-18	Univariate time series modelling and forecasting	Understanding ARMA, building of ARMA models in R and time series modelling in economics and finance. To gain insights into the concept of ARIMA in finance.	<ul style="list-style-type: none"> • L02 • L03 • L04 	Textbook: Chap-5: Univariate time series modelling and forecasting (Brooks, C) Will involve empirical exercise in R.
19-21	Multivariate Models	To understand Vector autoregressive models, impulse response function and variance decompositions.	<ul style="list-style-type: none"> • L02 • L03 • L04 	Textbook: Chap-6: Multivariate Models (Brooks, C) Will involve empirical exercise in R.
22-24	Modelling long run relationships in finance	Understanding cointegration and error correction models.	<ul style="list-style-type: none"> • L02 • L03 • L04 	Textbook: Chap-7: Modelling long run relationships in finance (Brooks, C) Will involve empirical exercise in R.
Quiz 2				
25-27	Modelling volatility in	To understand various models for volatility.	<ul style="list-style-type: none"> • L02 • L03 	Textbook: Chap-8: Modelling volatility

	finance	To understand and estimate ARCH and GARCH models.	<ul style="list-style-type: none"> • LO4 	<p>and correlation (Brooks, C)</p> <p>Will involve empirical exercise in R.</p>
28-30	Panel data models	To understand and estimate panel data models like fixed effects and random effects in R.	<ul style="list-style-type: none"> • LO2 • LO3 • LO4 	<p>Textbook: Chap-10: Panel Data (Brooks, C)</p> <p>Will involve empirical exercise in R.</p>
31-32	On the topics selected/assigned	Term Project Presentations		