DSE 4: FINANCIAL ECONOMETRICS

CREDIT DISTRIBUTION, ELIGIBILITY AND PRE-REQUISITES OF THE COURSE

Course title & Code	Credits	Credit distribution of the course			Eligibility criteria	Pre-requisite of the course (if any)
		Lecture	Tutorial	Practical/ Practice		
Financial Econometrics DSE-4	**4**	**3**	**1**	**0**	**Class XII**	**Basic Econometrics**

Course Objectives: We define financial econometrics as 'the application of statistical techniques to problems in finance'. Although econometrics is often associated with analysing economics problems such as economic growth, consumption and investment, the applications in the areas of finance have grown rapidly in the last few decades.

Prerequisites: Before starting this course, we recommend that you first complete the course Basic Econometrics.

Learning Outcomes:

By the end of this course, you will be able to:

- Understand the properties of financial returns.
- Formulate models and analyse the properties of models using matrix notation.
- Understand the principles of autoregressive time series models and evaluate their ability to forecast financial variables.
- Understand the principles of maximum likelihood, and use maximum likelihood estimation and hypothesis testing.
- Understand ARCH and GARCH models and be able to apply them to financial time series which display volatility clustering and asymmetry.
- Estimate Vector Autoregressive (VAR) models and interpret the results.
- Apply limited dependent variable methods.

Course Contents:

Unit 1: Statistical Properties of Financial Returns & Univariate Time Series and Applications to Finance (15 hours)

Introduction Asset Returns, Calculation of Asset Returns (Continuous and discreate both), Compare Continuous return with non-Continuous return and explain its benefits. Facts about Financial Returns, Distribution of Asset Returns, Time Dependency, Linear Dependency across Asset Returns.

Introduction to Univariate Time Series, The Lag Operator, Properties of AR Processes, Properties of Moving Average Processes, Autoregressive Moving Average (ARMA) Processes, The Box-Jenkins Approach.

Unit 2: Modelling Volatility – Conditional Heteroscedastic Models (9 hours)

Introduction to Modelling Volatility, ARCH Models, GARCH Models, Estimation of GARCH Models, Forecasting with GARCH Model.

Unit 3: Modelling Volatility and Correlations – Multivariate GARCH Models (9 hours)

Introduction to Modelling Volatility and Correlations, Multivariate GARCH Models, The VECH Model, The Diagonal VECH Model, The BEKK Model, Estimation of a Multivariate Model

Unit 4: Vector Autoregressive Models (VAR), Granger Causality Test (GCT) and Johansen Cointegration Test (JCT) (12 **hours)**

Introduction to VAR, Deep understanding of VAR, Issues in VAR, Hypothesis Testing in VAR.
Introduction to GCT, Deep understanding of GCT, Issues in GCT, Hypothesis Testing in GCT
Introduction to JCT, Deep understanding of JCT, Issues in JCT, Hypothesis Testing in JCT.

Essential Readings:

1. Christopher Dougherty. Introductory Econometrics. Oxford University Press.
2. Gujarati, N. Damodar. Basic Econometrics. New Delhi: McGraw Hill.
3. Gujarati, N. Damodar. Econometrics by Examples. New Delhi: McGraw Hill.

Additional Readings:

1. Chris, Brooks (2019). Introductory Econometrics for Finance. Cambridge University Press.
2. Pindyck, Robert S. and Daniel L. Rubinfeld Econometric Models and Economic Forecasts. Singapore: McGraw Hill.
3. Ramanathan, Ramu (2002). Introductory Econometrics with Applications (5th ed.). Thomson South Western

Examination scheme and mode:

Evaluation scheme and mode will be as per the guidelines notified by the University of Delhi.