

# **ECONOMETRICS**

## **Training Program**



Objective of the course is to disseminate the knowledge about basic econometrics with practical examples in EViews. Prerequisite for this course is basic course in Statistics, micro & Macro economics.

**This Program is ideally suited to following individuals who are:**

- **Fresh University Graduates and like to get the knowledge of Basic Econometrics**
- **People who are working in the economic sector, Statistical Sector, forex, Stock and Banking Sector.**
- **Who want to be good and reputable jobs in the market and are like to enhance their skills in econometric sector.**

**Program is offered by: 3D Educators – Trainers & Consultants**

# Table of Contents

	Detail
	Inauguration
	Structure
	Topics & Time Allocation
	About the Program Designer & Instructor
	Syllabus

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Page # 2

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# Program Details

## Inauguration

The Training Program will be inaugurated by a senior member of 3DEducators

## Program Structure

Number of classes in a week	Two Class Per Week
Duration of each class	2-Hour
Total Duration	32 Hours

## Other Learning Activities:

Classroom Assignments	2
Presentations by Trainees	1

## About the Program Designer & Instructor

The “Econometrics” Program has been designed and will be conducted by PhD researchers and having the vast experience of training and consulting. He has worked with various large Government, National, and Multinational organizations in local and abroad.

The Trainers who are conducting this program are have on the position of the following:

- ✓ Senior Executive Vice President

They trainers are foreign qualified and having the degree of PhD from accredited university, and having the vast experience in the econometrics.

As Consultant & Senior Trainers the team of trainers having the vast experience from econometrics side! we **3D Educators – Trainers & Consultants** would not compromise on the faculty.

Page # 3

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# Program Syllabus

## **COURSE OUTLINE:**

### **Course Objective:**

Objective of the course is to disseminate the knowledge about basic econometrics with practical examples in EViews. Prerequisite for this course is basic course in Statistics, micro & Macro economics

### **Course Outline:**

- **Introduction**
  - What is econometrics?
  - The stages of applied econometric work

## **Part I Statistical Background and Basic Data Handling**

- **The Structure of Economic Data**
  - Cross-sectional data
  - Time series data
  - Panel data
- **Working with Data: Basic Data Handling**
  - Looking at raw data
  - Graphical analysis
    - Graphs in EViews
  - Summary statistics
    - Summary statistics in EViews
  - Components of a time series
  - Indices and base dates
    - Splicing two indices and changing the base date of an index
  - Data transformations
    - Changing the frequency of time series data
    - Nominal versus real data
    - Logs
    - Differencing
    - Growth rates

## **Part II The Classical Linear Regression Model**

- **Simple Regression**
  - Introduction to regression: the classical linear regression model (CLRM)
    - Why do we do regressions?
    - The classical linear regression model
  - The ordinary least squares (OLS) method of estimation
    - Alternative expressions for  $\hat{\beta}$
  - The assumptions of the CLRM
    - General
    - The assumptions
    - Violations of the assumptions
  - The assumptions of the OLS estimators

Page # 4

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- Linearity
  - Unbiasedness
  - Consistency
  - Efficiency and BLUEness
- The overall goodness of fit
  - Problems associated with  $R^2$
- Hypothesis testing and confidence intervals
  - Testing the significance of the OLS coefficients
  - Confidence intervals
- How to estimate a single regression in EViews
  - Simple regression in EViews
  - Reading the EViews simple regression results output
- Presentation on regression results
- Applications
  - Application 1: the demand function
  - Application 2: a production function
  - Application 3: Okun's Law
  - Application 4: the Keynesian consumption function
- Computer example: the Keynesian consumption function
  - Solution
- Questions and exercises
- **Multiple Regression**
  - Derivation of the multiple regression coefficients
    - The three-variable model
    - The k-variable case
    - Derivation of the coefficients with matrix algebra
    - The structure of the  $X'X$  and  $X'Y$  matrices
    - The assumptions of the multiple regression model
    - The variance-covariance matrix of the residuals
  - Properties of the multiple regression model OLS estimators
    - Linearity
    - Unbiasedness
    - Consistency
    - Efficiency and BLUEness
  - $R^2$  and adjusted  $R^2$
  - General criteria for model selection
  - Multiple regression estimation in EViews
    - Simple regression in EViews
    - Reading the EViews simple regression results output
  - Hypothesis testing
    - Testing individual coefficients
    - Testing linear restrictions
  - The Wald test
    - How to perform the Wald test in EViews
  - The  $\chi^2$  test
    - The  $\chi^2$  test in EViews
  - The  $t$  test
  - Testing the joint significance of the Xs
    - F-test for overall significance in EViews
  - Adding or deleting explanatory variables
    - Omitted and redundant variables test in EViews
  - Computer example: Wald, omitted and redundant variable tests

- A Wald test of coefficient restrictions
- A redundant variable test
- An Omitted variable test
- Questions and exercises
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## Part III Violating the Assumptions of the CLRM

- **Multicollinearity**
  - Perfect multicollinearity
  - Consequences of perfect multicollinearity
  - Imperfect multicollinearity
  - Consequences of imperfect multicollinearity
  - Detecting problematic multicollinearity
    - Simple correlation coefficient
    - $R^2$  from auxiliary regressions
  - Computer examples
    - Example 1: induced multicollinearity
    - Example 2: with the use of real economic data
  - Question and exercises
- **Heteroskedasticity**
  - Introduction: what is heteroskedasticity?
  - Consequences of heteroskedasticity on OLS estimators
    - A general approach
    - A mathematical approach
  - Detecting heteroskedasticity
    - The formal way
    - The Breusch-Pagan LM test
    - The Glesjer LM test
    - The Harvey-Godfrey LM test
    - The Park LM test
    - The Goldfeld-Quandt test
    - White's test
  - Computer example: heteroskedasticity tests
    - The Breusch-Pagan LM test
    - The Glesjer LM test
    - The Harvey-Godfrey LM test
    - The Park LM test
    - The Goldfeld-Quandt test
    - White's test
  - Resolving heteroskedasticity
    - Generalized (or weighted) least squares
  - Computer example: resolving heteroskedasticity
  - Questions and exercises
- **Autocorrelation**
  - Introduction: what is autocorrelation?
  - What causes autocorrelation
  - First and higher order autocorrelation
  - Consequences of autocorrelation on the OLS estimators
    - A general approach
    - A more mathematical approach
  - Detecting autocorrelation
    - The graphical methods
    - Example: detecting autocorrelation using the graphical method

- The Durbin-Waston test
    - Computer example of the DW test
    - The Breush-Godfrey LM test for serial correlation
    - Computer example of the Breush-Godfrey LM test
    - Durbin's  $h$  test in the presence of lagged dependent variables
    - Computer example of the Durbin's  $h$  test
    - Engle's ARCH test
    - Computer example of the Engle's ARCH test
  - Resolving autocorrelation
    - When  $\rho$  is known
    - Computer example of the generalized differencing approach
    - When  $\rho$  is unknown
    - Computer example of the iterative procedure
  - Questions and exercises
- **Misspecification: Wrong Regressors, Measurement Errors and Wrong Functional Forms**
  - Omitting influential or including non-influential explanatory variables
  - Various functional forms
  - Measurement errors
  - Test for misspecification
  - Example: the Box-Cox transformation in EViews
  - Approaches in choosing an appropriate model
  - Exercises

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Page # 7

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## Part IV Violating the Assumptions of the CLRM

- **Dummy Variables**
  - Introduction: the nature of qualitative information
  - The use of Dummy variables
  - Computer example of the use of dummy variables
  - Special cases of the use of Dummy variables
  - Computer example of dummy variables with multiple categories
  - Application: the January effect in emerging stock-markets
  - Test for structural stability
  - Questions and exercises
- **Dynamic Econometric Models**
  - Distributed lag models
  - Autoregressive models
  - Exercises
- **Simultaneous Equation Models**
  - Introduction: basic definitions
  - Consequences of ignoring simultaneity
  - The identification problem
  - Estimation of simultaneous equation models
  - Example: the IS-LM model

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Page # 8

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