
Book Review

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Damodar N. Gujarati and Dawn C. Porter, *Basic Econometrics. Fifth edition.* 2009. New York, NY: McGraw Hill/Irvin, 946 pp.

'Basic Econometrics' by Damodar N. Gujarati and Dawn C. Porter offers a simple yet thorough introduction to econometrics without using advanced statistics, mathematics, or matrix algebra. The fifth edition of *Basic Econometrics* maintains the book's tradition of fusing current research with econometric principles. It uses logical and instructive examples and statistics to demonstrate key ideas. The text's examples and illustrations help to explain econometric concepts and applications in a way that is understandable to the readers.

The first edition of this book was released in 1978 by Gujarati, the original author. After 30 years, Porter was included as a co-author on the fifth edition, which was published in 2009. It clearly speaks about the longevity and the popularity of this book.

The writers have provided helpful concrete applications and extended the topics in the fifth edition. A few of the book's inherently technical subject materials were provided in the appendix in a condensed version. The authors have revised the information for about two dozen of the examples and more than 20 exercises from the previous edition in addition to adding roughly 15 new examples for illustration and over thirty new chapter end exercises.

The book is useful to the students and researchers of economics, management-finance and other disciplines/fields. The book and the author's advice on how to structure the course will be helpful to those who want to teach econometrics concepts and have flexibility in choosing topics that are appropriate for the target students.

The authors described the greater scope of econometrics, the need for a separate field of study and the eight phases in econometric methodology/technique in the introductory chapter while defining 'What is Econometrics?' and explaining 'Why and How of Econometrics?'

The book is divided into two parts. The part I of the book introduces single-equation regression models. In these models, there are two categories of variables, that is, independent and dependent variables. One or more independent variable/s are expressed as a linear function of the other (dependent) variable. In such models, it is implicitly supposed that any causal links between the explanatory and dependent variables, if any, run in just one direction, that is to say from the explanatory variables to the dependent variable.

The authors addressed both the historical and contemporary/modern meanings of the term 'regression' in Chapter 1 and used several examples from economics and other disciplines to highlight the differences between the two meanings.

In Chapter 2, they introduced some basic concepts of regression analysis with the help of the two variables linear regression model. In this model, only one explanatory variable is used to explain the dependent variable as a linear function.

The authors continued to discuss about the two-variable model in Chapter 3 and introduced the so-called Classical Linear Regression Model (CLRM), which is a model that relies on a few simplified assumptions. In order to estimate the parameters of the two-variable regression model, they introduced the Ordinary Least Square (OLS) approach. Although OLS approach is easy to employ, it has some extremely desirable statistical properties. Further, Chapter 3 clearly distinguishes between random and fixed regressors (explanatory variables).

In Chapter 4, the authors have introduced the (two variables) Classical Normal Linear Regression Model. This model assumes that the random dependent variable follows the normal probability distribution. Under this assumption, the OLS estimators generated in Chapter 3 have a few stronger statistical properties than those of the non-normal CLRM. These statistical properties allow for statistical inference, or hypothesis testing.

The topic of hypothesis testing is covered in Chapter 5. In this chapter, they try to determine whether the calculated regression coefficients are consistent with the hypothesised values for these coefficients, which are based on previous theoretical and/or empirical research.

A few extensions of the two variables regression model are discussed in Chapter 6. This chapter discusses topics such as regression through the origin, scaling and units of measurement and functional forms of regression models such as double-log, semi-log and reciprocal models.

The authors have discussed the multiple regression model, a model with more than one explanatory variables in Chapter 7 and have demonstrated how the OLS method may be expanded to estimate the parameters of such models.

In Chapter 8, they expanded the ideas presented in Chapter 5 to the multiple regression model and pointed out some of the difficulties brought on by the inclusion of numerous explanatory variables.

Part I of the text concludes by Chapter 9, which discusses dummy or qualitative explanatory variables. The importance of not all explanatory variables having to be quantitative (i.e., ratio scale) is underlined in this chapter. Although variables such as religion, race, gender, nationality and area of residence cannot be quantitatively measured, they are important in understanding many economic phenomena.

The classical normal linear regression model was the main emphasis of Part I of the book. It also demonstrates how it might be employed to address the twin statistical inference problems of estimation, hypothesis testing and the problem of prediction. But this model is based on a few simplifying assumptions. Some of the assumptions are discussed more critically in the book's Part II.

Chapter 10 discusses one of the assumptions of the CLRM, that is, there is no multi-collinearity among the regressors included in the regression model by getting answers to the following questions: (a) What is multi-collinearity nature? (b) Is multi-collinearity really a problem? Does multi-collinearity actually pose a threat? (c) What are its practical implications? (d) How can one find it? (e) What corrective actions can be taken to reduce the problem of multi-collinearity?

Further, Chapter 10 also discusses another two assumptions of the CLRM, namely that (a) the number of regressors must be lesser than the number of observations in the sample (Arthur Goldberger termed this as the problem of micro-numerosity. It simply means small sample size.) and (b) there must be sufficient variability in the values of the regressors, for they are intimately related to the assumption of no multi-collinearity. The values of the regressors must be sufficiently variable because they are directly related to the assumption of no multi-collinearity. 'Heteroscedasticity' is the topic of Chapter 11. This Chapter discusses another important assumption of the CLRM, that is, the disturbances/the error term appearing in the population regression function are homoscedastic; that is, they all have the same variance. This chapter seeks answers to the following questions: (a) What is the nature of heteroscedasticity? (b) What are its consequences? (c) How does one detect it? (d) What are the remedial measures?

Chapter 12 discusses a key assumption of CLRM, that is, there is no auto-correlation in the error term in the regression model by elucidating answers to the following questions: (a) What is autocorrelation nature? (b) What are the theoretical and practical implications of autocorrelation? (c) How to determine the presence of autocorrelation in any given situation? (d) What are corrective actions to autocorrelation problem?

The regression model employed in the analysis is 'correctly' specified is one of the assumptions of CLRM. If the model is not 'correctly' specified, one will face the problem of specification error or model specification bias. The model specification and diagnostic testing are covered in Chapter 13. This chapter also discusses non-normal error term, missing data and random or stochastic regressors.

The authors introduced a few selected yet often used econometric approaches in Part III. In particular, the topics discussed in this part of the book include (a) non-linear-in-the-parametric regression models, (b) qualitative response regression models, (c) panel data regression models, and (d) dynamic econometric models.

A non-linear regression model is covered in Chapter 14. The authors have considered models that are intrinsically non-linear in the parameters. This chapter explains how such models are estimated and interpreted using appropriate examples. Regression models with qualitative dependent variables were taken into consideration in Chapter 15. Consequently, this chapter is a supplement to Chapter 9, which explained models with qualitative explanatory variables. The main focus of this Chapter is on creating models in which the regressand is of the 'Yes' or the 'No' nature.

Since estimating models using OLSs method, presents a number of issues, numerous other methods have been proposed. In Chapter 15, the authors considered two options, namely, the logit model and the probit model. This chapter also discusses a few variants of the qualitative response models such as the Tobit model and the Poisson regression model. Additionally, a few extensions of the qualitative response models, including the ordered probit, ordered logit and multinomial logit are briefly explained in this Chapter.

Chapter 16 focuses on panel data regression models. Such models combine time series and cross section observations. Although combining such observations increases the sample size, panel data regression models pose several estimation

challenges. In this chapter, authors have discussed only the essentials of such models and guided the readers to the appropriate references for further study.

In Chapter 17, regression models that take into account the lagged value(s) of the dependent variable as one of the explanatory factors as well as models that take into account both the current and past or lagged values of the explanatory variables were both taken into consideration. These models are called autoregressive and distributed lag models, respectively. Despite the fact that such models are quite helpful in empirical econometrics, they present some unique estimating issues because they don't follow one or more fundamental premises of the Classical Regression Model. While addressing these unique issues, the adaptive-expectations (AE) and partial-adjustment models were taken into consideration by the authors. They also take note of the criticism the proponents of the so-called rational expectations model have levied at the AE model.

The authors gave a very basic, often heuristic overview to the intricate topic of simultaneous equation models in the Part IV. In Chapter 18, the authors provided a few examples of simultaneous equation models and demonstrated the reason for the characteristic inappropriateness of the OLSs method for estimating the parameters of each equation in the model.

They considered so-called identification problem in Chapter 19. In a system of simultaneous equation containing two or more equations, it is not possible to obtain numerical values of each parameter in each equation because equations are observationally indistinguishable or look too much like one another, then there will be identification problem. Because the equations in a system of simultaneous equations containing two or more equations are either observationally indistinguishable or have an excessive resemblance to one another, there will be identification problem. It is impossible to determine the numerical values of each parameter in each equation.

Before moving on to the estimation, it is crucial to overcome the identification problem since estimation is worthless without understanding what is being estimated. The identification problem, nature, importance, principles for identification and numerous approaches to solve it are covered in this chapter.

In Chapter 20, the authors considered a few estimation methods that designed precisely for estimating the simultaneous equation models and considered their advantages and restrictions.

The authors covered some basic concepts in econometrics time series analysis in Chapter 21.

Chapter 22 discusses two methods of forecasting that have become quite prominent (a) Auto Regressive Integrated Moving Average commonly referred as the Box-Jenkins methodology and (b) Vector Auto-regression.

About one-third of the text is devoted to the linear model in terms of coverage, while another quarter is devoted to breaches of the assumptions underlying that model. The remainder of the text deals with varied topics including models for non-linear regression, qualitative response data, panel data, time series data and simultaneous equations. The book is especially good when it comes to its treatment of violations of the assumptions underlying the linear model. In the book, Gujarati and Porter first deconstruct the various violations, making explicit the implications

of each violations for the qualities of the estimators. They then offered a selection of diagnostic procedures and ways to deal with those violations.

For understanding the text of 'Basic Econometrics' by Damodar N. Gujarati and Dawn C. Porter, some fundamental college-level algebra and a reasonable foundation in basic probability are the prerequisites. However, the book includes a very little information about probability perse. An essential value-added component of a text of this nature is a well-written glossary. However, this book does not include glossaries. A Subject-Index presented at the end of the book is very useful, but this cannot substitute the glossary.

Overall, the book is an excellent text on the subject. The special feature of this book is it helps the beginners to understand 'Econometrics' without much difficulty. The text is quite useful for researchers as well because it aims to teach the content by highlighting the prospects and challenges of econometrics via the prism of applied research.

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