

0 About the book

As you may have guessed, this book discusses data analysis, but most especially data analysis *using* Stata. We intend this to be an introduction to Stata, but at the same time it also explains, for beginners, the techniques used to analyze data.

Data Analysis Using Stata does not merely discuss Stata commands but demonstrates all the steps of data analysis on practical examples. The examples are related to public issues, such as income differences between men and women, and elections, or to personal issues, such as rent and living conditions. This allows us to avoid using social science theory in presenting the examples and to rely on common sense. We want to emphasize that these familiar examples are merely standing in for actual scientific theory, without which data analysis is not possible at all. We have found that this procedure makes it easier to teach the subject and use it across disciplines. Thus this book is equally suitable for biometricians, econometricians, psychometricians, and other “metricians”—in short, for all who are interested in analyzing data.

Our discussion of commands, options, and statistical techniques is in no way exhaustive but is intended to provide a fundamental understanding of Stata. Having read this book and solved the problems in it, the student should be able to solve all further problems to which Stata is applicable.

We strongly recommend to both beginners and advanced readers that they read this chapter and the first chapter (“*The first time*”) attentively. Both chapters serve as a guide throughout the whole book. Beginners should read the chapters in order while sitting in front of their computers and trying to reproduce our examples. If you are familiar with other statistical packages but new to Stata, you will find the short summary at the end of each chapter to be helpful. This could be used as a first orientation. More advanced users of Stata may benefit from the extensive index and may discover one or another useful trick when they look up a certain command. They may even throw themselves into programming their own commands. Those who do not (yet) have access to Stata are invited to read the chapters that focus on data analysis, to enjoy them, and maybe to translate one or another hint (e.g., about diagnostics) into the language of the statistical package they do have access to.

0.1 Structure

“*The first time*” (chapter 1) shows what a typical session of analyzing data could look like. To beginners this chapter conveys a sense of Stata and explains some basic concepts

such as variables, observations, and missing values. To advanced users who already have experience in other statistical packages, this chapter offers a quick entry into Stata. They will find many cross references within this chapter, which can therefore be viewed as an extended table of contents.

The rest of the book is divided into three parts:

Chapters 2–6 serve as an introduction to the basic tools of Stata. Throughout the subsequent chapters, these tools are used extensively. It is not possible to portray the basic Stata tools, however, without using some of the statistical techniques explained in the second part of the book. The techniques described in chapter 6 may not seem useful until you begin working with your own results, so you may want to skim chapter 6 now and read it more carefully when you need it.

Throughout chapters 7–9, we show examples of data analysis. In chapter 7, we present techniques for describing and comparing distributions. Chapter 8 introduces linear regression using Stata. It explains in general terms the technique itself and shows how to run a regression analysis using an example file. Afterwards, we discuss how to test the statistical assumptions of the model. We conclude the chapter with a discussion of sophisticated regression models and a quick overview of further techniques. Chapter 9, in which we describe regression models for categorical dependent variables, is structured in the same way as the previous chapter to emphasize the similarity between these techniques.

Chapters 10–12 deal with more advanced Stata topics that beginners may not need. In chapter 10, we explain how to read and write files that are not in the Stata format. At the beginning of chapter 11, we introduce some special tools to aid in writing do-files. You can use these tools to create your own Stata commands and then store them as ado-files, which are explained in the second part of the chapter. It is easy to write Stata commands, so many users have created a wide range of additional Stata commands that can be downloaded from the Internet. Chapter 12 discusses these and other resources.

0.2 Using this book: Materials and hints

The only way to learn how to analyze data is to do it. To help you learn by doing, we have provided data files (available on the Internet) that you can use with the commands we discuss in this book. You can access these files from within Stata or by downloading a zip archive.

Please do not hesitate to contact us if you have any trouble obtaining these data files and do-files.¹

1. If the machine you are using to run Stata is connected to the Internet, you can download the files from within Stata. To do this, type the following commands in the Stata Command window (see the beginning of chapter 1 for information about using Stata commands).

¹The data we provide and all commands we introduce assume that you use Stata 8 or higher. Please contact us if you have an older version of Stata.

```
. mkdir c:\data\kk
. cd c:\data\kk
. net from http://www.stata-press.com/data/kk/
. net get data
. mkdir kksoep
. cd kksoep
. net get kksoep
. cd ..
```

If you are using a Macintosh or Unix system, substitute a suitable directory name in the first two commands.

2. The files are also stored as a zip archive, which you can download by pointing your browser to <http://www.stata-press.com/data/kk/kk.zip>.

To extract the file `kk.zip`, create a new folder: `c:\data\kk`. To do so on a Windows system, use the Windows Explorer, move into the directory `c:\data`, select **File > New > Folder**, and insert `c:\data\kk`.

Afterwards copy `kk.zip` into this folder. Unzip the file `kkdata.zip` using any program that can unzip zip archives. Most computers have such a program already installed. If not, you can get one for free using the Internet.²

Throughout the book, we assume that your present working directory (folder) is the directory where you have stored our files. This is important if you want to reproduce our examples. At the beginning of chapter 1, we will explain how you can check where your current working directory is. Make sure that you do not replace our files with a modified version of the same file; avoid using the command `save, replace` while working with our files.

We cannot say it too often: the only way to learn how to analyze data is to analyze data yourself. We strongly recommend that you reproduce our examples in Stata as you read this book. A line that is written **in this font** and begins with a period represents a Stata command, and we encourage you to enter that command in Stata. Entering the commands and seeing the results or graphs will help you better understand the text, since we sometimes omit output to save space.

As you follow along with our examples, you must enter all commands shown, as they build on each other within a chapter. Some commands will only work if you have entered the previous commands. If you do not have time to work through a whole chapter at once, you can enter the command

```
. save mydata, replace
```

before you exit Stata. When you get back to your work later on, just type

```
. use mydata, clear
```

and you will be able to continue where you left off.

²For example “pkzip” is free for private use, developed by the company PKWARE. You can find it at <http://www.pkware.com>.

Most examples use a slightly modified version of the German Socioeconomic Panel, either on a single year (1997) or on the entire panel dataset from 1984 to 2002. In some sections, we use other data to explain specific tasks. At the beginning of these sections, you will see the command `preserve` and at their end the command `restore`. If you are working through such a sequence and you need to interrupt your work, type `restore` before you enter the command `save mydata, replace`.

This book contains a lot of graphs, only one of which is not generated with Stata. You can reproduce all other graphs from the analysis examples. For the more complicated graphs, we have included do-files in our file package so that you can reproduce these graphs (the name of the do-file needed for each graph is given in a footnote under the graph).

If you do not understand our explanation of a particular Stata command or just want to learn more about it, use the Stata `help` command, which we explain in chapter 1. Or you can see the printed manuals (to which the online help refers) for more details. For example, [R] `summarize` refers to the entry describing the `summarize` command in the *Stata Base Reference Manual*. [U] **18 Programming Stata** refers to chapter 18 of the *Stata User's Guide*. Note that when you see a reference to a keyword in one of the *Reference* manuals, you can use the online help (see section 1.3) to get information on that keyword.

0.3 Teaching with this manual

We have found this book to be useful for introductory courses in data analysis, as well as courses on regression and on the analysis of categorical data. We have used it in courses at universities in Germany and the United States. When developing your own course, you might find it helpful to use the following outline of a course of lectures of 90 minutes each, held in a computer lab.

To teach an introductory course in data analysis using Stata, we recommend that you begin with chapter 1, which is designed to be an introductory lecture of roughly 1.5 hours. You can give this first lecture interactively, asking the students substantive questions about the income difference between men and women. You can then answer them by entering Stata commands, explaining the commands as you go. Usually, the students name the independent variables used to examine the stability of the income difference between men and women. Thus you can do stepwise analysis as a question-and-answer game. At the end of the first session, the students should save their commands in a log file, and as a homework assignment, they should produce a commented do-file (it might be helpful to provide them with a template of a do-file).

The next two lectures should work with chapters 3 to 5 and can be taught a bit more conventionally than the introduction above. It will be clear that your students will need to learn the *language* of a program first. These two lectures need not be taught interactively but can be delivered section by section without interruption. At the end of each section, give the students time to retype the commands and ask questions. If time

is limited, you can skip over sections 3.3 and 5.6, whereas you should make time for a detailed discussion of sections 5.1.3 and 5.1.4 and the examples in them. Both sections contain concepts that will be unfamiliar to the student but are very powerful tools for the user of Stata.

One additional session should suffice for an overview of the commands and some interactive practice in the graphs chapter.

Two sessions can be scheduled for chapter 7. One example for a set of exercises to go along with this chapter is given by Donald Bentley and is described on the web page <http://www.amstat.org/publications/jse/v3n3/datasets.dawson.html>. The necessary files are included in our file package.

Three sessions should be scheduled for chapter 8. According to our experience, even with an introductory class, you can cover sections 8.1, 8.2, and 8.3 in one session each. We recommend that you let the students calculate the regressions of the Anscombe data (see page 199) as a homework assignment or an in-class activity before you start the session on regression diagnostics. Also we recommend that towards the end of the course, you spend two sessions on chapter 10 introducing data entry, management, and the like, before you end the class with chapter 12, which will point the students to further Stata resources.

In addition to using this book for a general introduction to data analysis, you can use it to develop a course on regression analysis (chapter 8) or categorical data analysis (chapter 9). As with the introductory courses, it is helpful to begin with chapter 1, which gives a good overview of working with Stata and solving problems using the online help. Chapter 12 makes a good summary for the last session of either course.