

Preface

The *Maxima* computer algebra system is an open-source tool for conducting mathematical analysis using a computer. The analyst can use it to manipulate symbols, to derive numerical computations, and to graph relationships. Also, it provides a powerful programming language that allows the analyst to extend *Maxima*'s capabilities to address specific questions. *Maxima*'s symbolic and computational abilities allow one to go farther into a given problem and develop a deeper understanding of microeconomic principles than would be possible without such an aid.

Reviewing and Extending Textbook Analysis

This book shows how one can examine many of the economic relationships that form the core of microeconomic theory using this computer algebra system. It lets readers see how to set up the relevant analysis and how symbolic expressions, numerical computations, and graphical representations can be derived and combined. Once this knowledge is available, readers are in a position to extend the analysis, either by changing selected parameter values or by making more fundamental changes in the models. In particular, it facilitates comparative statics analysis.

The material developed in this book provides readers a way to gain a deeper understanding of a set of fundamental economics principles. It has two additional goals: to provide a foundation for readers who will pursue additional coursework in computational economics, and to help readers develop their ability to use a computer algebra system for more general purposes.

Computational Economics

Students who advance to courses in computational economics will build on and extend the material in this book. They will consider topics that are more advanced

than, but directly related to, the ones developed here. Likewise, they will move to powerful applications of *Maxima* that are briefly introduced in this book, specifically the use of its powerful and flexible programming language.

Beyond coursework, many students will find that mathematical analysis is part of their career. For these, *Maxima* can be an important part of their careers. It is possible, however, that institutions in which they are employed use *Mathematica* or other proprietary programs. In these cases, familiarity with *Maxima* makes mastery of the other programs a relatively direct matter.

Engaged Learning

The paragraphs above refer to students and readers, but students/readers (you) should be actively engaged. The web site <http://www.wxmaximaecon.com/> contains a set of *wxMaxima* workbooks that allow recreation of all of the input and output that appears in the book. (*wxMaxima* is the user interface form *Maxima* that we use throughout this book.) You should open the relevant file and work with it as you read the section. The text contains a few suggested exercises, but further experimentation will yield rewards (and, occasionally, will be fun). You won't break anything that cannot be replaced by a fresh download.

Also, do not be reluctant to go all the way back to look at Chap. 1 when working through the material in later chapters. Chapter 1 explains many basic techniques that can become confusing when you are working through advanced examples. You may find it surprisingly helpful to look at them again in a simpler context.

In addition to the workbooks that underpin the book, the web site contains exercise sets that extend the material in the text, and it contains other applications that do not relate directly to the text. Also, it contains links to sites that pertain directly to *Maxima*. These sites provide the information required to download and install *Maxima* on your computer and tips on *Maxima*'s use.

Readers who are already familiar with proprietary software such as *Mathematica* or *Maple* will see the similarities between these programs and *Maxima*. This similarity points to another source of insights into using *Maxima*: books and web sites that offer instruction in the use of these other programs.

Key to Textbooks

We have tried to make the material self-contained by sketching the theory on which the *Maxima* applications are based. Space precludes a complete development of the theory, however, so we provide the following key to some microeconomic theory textbooks.

The columns identify the textbooks that are listed below the table. The first column, labeled HM, refers to this book. Thus, each row identifies a chapter in this book and the related chapter(s) in the other textbooks. Brackets below correspond to the column labels.

HM	BB	BZ	McA	ML	MWG	NS	P	V1	V2
2	1,2	1,2	2	2,6	–	1,2	2,3	–	1
3	3	3	5	12	1	3	4	3	3,4
4	4	3	5	12	2	4	4	3	5
5	5	4	5	13	3	5,6	5	3	6–8,14
6	6	7	4	9	5	9	6	1	18–20
7	7	8	4	9	5	10	7	1	7
8	8	9	4	10	10	11	8	2	22–23
9	9	9	4	10	10	11	8	2	22–23
10	10	–	–	–	10	12	9	–	–
11	16	–	5	14	–	13	10	5	31–32
12	11	11,13	6	15	12	14	11	2	25
13	12	12	–	–	–	–	12	–	–
14	13,14	13	7	17	12	15	13,14	2	27
15	–	17	4	11	20	17	16	–	10

- BB Besanko D, Braeutigam R (2011) Microeconomics, 4th edn. Wiley, New York
- BZ Browning EK, Zupan MA (2011) Microeconomics: theory and applications, 11th edn. Wiley, New York
- McA McAfee RP (2009) Introduction to economic analysis. Available at www.mcafee.cc/Introecon/. The notes at the site indicate the differences between this text and the next one
- ML McAfee RP, Lewis TR (2009) Introduction to economic analysis. Available at catalog.flatworldknowledge.com/catalog/editions/mcafee-introduction-to-economic-analysis-1-0
- MWG Mas-Colell A, Whinston MD, Green JR (2005) Microeconomic theory. Oxford University Press, New York
- NS Nicholson W, Snyder C (2008) Microeconomic theory: basic principles and extensions, 11th edn. South-Western, Mason
- P Perloff JM (2012) Microeconomics with calculus, 2nd edn. Addison-Wesley, Boston
- V1 Varian HR (1992) Microeconomic analysis, 3rd edn. Norton, New York
- V2 Varian HR (2009) Intermediate microeconomics: a modern approach, 8th edn. Norton, New York

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Microeconomic Theory and Computation
Applying the Maxima Open-Source Computer Algebra
System

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2013, XIX, 385 p. 275 illus., 8 illus. in color., Hardcover

ISBN: 978-1-4614-9416-4