

INTERMEDIATE MICROECONOMICS WITH MICROSOFT EXCEL

This unique text uses Microsoft Excel[®] workbooks to instruct students. In addition to explaining fundamental concepts in microeconomic theory, readers acquire a great deal of sophisticated Excel skills and gain the practical mathematics needed to succeed in advanced courses. Along with the innovative pedagogical approach, the book features explicitly repeated use of a single central methodology, the economic approach. Students learn how economists think and how to think like an economist. With concrete, numerical examples and novel, engaging applications, interest for readers remains high as live graphs and data respond to manipulation by the user. Finally, clear writing and active learning are features sure to appeal to modern practitioners and their students. The Web site accompanying the text is found at www.depauw.edu/learn/microexcel.

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Humberto Barreto

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HUMBERTO BARRETO

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Thanks to my friends and colleagues, Frank Howland and Kay Widdows.
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Contents

<i>Preface</i>	<i>page xi</i>
<i>User Guide</i>	xiii
Introduction	1
<i>Introduction.xls</i>	
PART I. THE THEORY OF CONSUMER BEHAVIOR	
1.1. Budget Constraint	
1.1.1. Budget Constraint	11
<i>BudgetConstraint.xls</i>	
1.2. Satisfaction	
1.2.1. Preferences	19
<i>Preferences.xls</i>	
1.2.2. Utility Functions	28
<i>Utility.xls</i>	
1.3. Optimal Choice	
1.3.1. Initial Solution for the Consumer Choice Problem	39
<i>OptimalChoice.xls</i>	
1.3.2. More Practice and Understanding Solver	52
<i>OptimalChoicePractice.xls</i>	
1.3.3. Food Stamps	62
<i>FoodStamp.xls</i>	
<i>USGovBudget.xls</i>	
1.3.4. Cigarette Taxes	76
<i>CigaretteTaxes.xls</i>	
<i>StateExciseTaxData.xls</i>	

1.4. Comparative Statics	
1.4.1. Engel Curves	91
<i>EngelCurves.xls</i>	
1.4.2. More Practice with Engel Curves	104
<i>EngelCurvesPractice.xls</i>	
1.4.3. Deriving an Individual Consumer's Demand Curve	110
<i>DemandCurves.xls</i>	
1.4.4. More Practice Deriving Demand Curves	118
<i>DemandCurvesPractice.xls</i>	
1.4.5. Giffen Goods	124
<i>GiffenGoods.xls</i>	
1.4.6. Income and Substitution Effects	131
<i>IncSubEffects.xls</i>	
1.4.7. More Practice with Income and Substitution Effects	144
<i>IncSubEffectsPractice.xls</i>	
1.4.8. A Tax/Rebate Proposal	149
<i>TaxRebate.xls</i>	
1.5. Endowment Model	
1.5.1. Introduction to the Endowment Model	157
<i>EndowmentIntro.xls</i>	
1.5.2. Intertemporal Consumer Choice	166
<i>IntertemporalChoice.xls</i>	
1.5.3. An Economic Analysis of Charitable Giving	176
<i>Charity.xls</i>	
1.5.4. An Economic Analysis of Insurance	185
<i>Insurance.xls</i>	
1.6. Bads	
1.6.1. Risk Versus Return: Optimal Portfolio Theory	197
<i>RiskReturn.xls</i>	
1.6.2. Automobile Safety Regulation	207
<i>LaborSupply.xls</i>	
<i>SafetyRegulation.xls</i>	
1.6.3. Labor Supply	217
1.7. Search Theory	
1.7.1. Fixed Sample Search	231
<i>FixedSampleSearch.xls</i>	
1.7.2. Sequential Search	241
<i>SequentialSearch.xls</i>	
1.8. Behavioral Economics	
1.8.1. Behavioral Economics	251
<i>Melioration.xls</i>	

PART II. THE THEORY OF THE FIRM

2.1. Production Function

- 2.1.1. Production Function 267
ProductionFunction.xls

2.2. Input Cost Minimization

- 2.2.1. Initial Solution for Input Cost Minimization 281
InputCostMin.xls
- 2.2.2. Enfield Arsenal 290
DerivingCostFunction.xls
- 2.2.3. Deriving the Cost Function 301
- 2.2.4. Cost Curves 309
CostCurves.xls

2.3. Output Profit Maximization

- 2.3.1. PCSR Output Initial Solution 323
OutputProfitMaxPCSR.xls
- 2.3.2. Deriving the Supply Curve 335
DerivingSupply.xls
- 2.3.3. Diffusion and Technical Change 341
DiffusionTechChange.xls

2.4. Input Profit Maximization

- 2.4.1. Initial Solution for Input Profit Maximization 357
InputProfitMax.xls
- 2.4.2. Deriving Demand for Labor 366
DerivingDemandL.xls

2.5. Consistency in the Theory of the Firm

- 2.5.1. Consistency in the Theory of the Firm 379
Consistency.xls

2.6. Monopoly

- 2.6.1. Monopoly 391
Monopoly.xls

2.7. Game Theory

- 2.7.1. Game Theory 409
GameTheory.xls
RockPaperScissors.xls

PART III. THE MARKET SYSTEM

3.1. Partial Equilibrium

- 3.1.1. Supply and Demand 427
NFLSalaryData.xls
SupplyDemand.xls

x	<i>Contents</i>	
	3.1.2. Consumers' and Producers' Surplus <i>CSPS.xls</i>	439
	3.1.3. Taxes: Incidence and Deadweight Loss <i>Taxes.xls</i>	451
	3.1.4. Inefficiency of Monopoly <i>MonopolyDWL.xls</i>	460
	3.1.5. Sugar Quota <i>SugarQuota.xls</i>	472
	3.1.6. Externality <i>Externality.xls</i>	482
	3.1.7. Cartels and Deadweight Loss <i>CartelDWL.xls</i>	494
	3.1.8. Signaling Theory <i>SignalingTheory.xls</i>	511
3.2.	General Equilibrium	
	3.2.1. The Edgeworth Box <i>EdgeworthBox.xls</i>	525
	3.2.2. General Equilibrium Market Allocation <i>EdgeworthBoxGE.xls</i>	532
	3.2.3. Pareto Optimality <i>EdgeworthBoxParetoOpt.xls</i>	541
	3.2.4. General Equilibrium Monopoly <i>EdgeworthBoxMonopoly.xls</i>	551
	Conclusion	557
	<i>Index</i>	565

Preface

In the competitive world of textbooks, different is definitely bad. Authors and publishers, like politicians, stay in the safe middle. Straying too far from the herd is almost a sure way to fail. Fear is strong, but it apparently can be overcome – after all, you are reading a spectacularly unconventional textbook.

The most obvious difference between this book and the usual fare is the use of Microsoft Excel to teach economic theory. This enables students to acquire a great deal of sophisticated, advanced Excel skills while learning economics. No other book does this.

The use of Excel drives other differences. Excel requires concrete, numerical problems instead of the abstract functions and graphs used by other books. Excel's Solver makes possible presentation of numerical methods for solving optimization problems and equilibrium models. No other book does this.

Because numerical solutions are readily available, this book is able to present and explain analytical methods that have been pushed to appendixes or completely ignored in mainstream texts. Problems are solved twice – once with Excel and once with equations, algebra, and, when needed, calculus. No other book does this.

Finally, this book is organized differently. It explicitly repeats a single central methodology, the economic approach, so students learn how economists think and how to think like an economist. Other books try to do this, but none brings the economic way of thinking explicitly to the surface, repeating the message in every application.

I wrote this book because I learned Visual Basic and quickly realized that enhancing a spreadsheet with macros made possible a whole new way of teaching economics. When my students loved this approach, I wanted to share it with others.

Because this book is so different, it probably will not challenge the top sellers. It will be the unusual professor who is willing to try something this new. It requires that the professor care enough about students and teaching to invest time and energy into mastering the material. Of course, I think the rate of return is quite high. My hope is that, though few in number, a committed, enthusiastic core of adopters will enable this book to survive.

Thank you for trying this unique entry into the competitive market for micro theory textbooks. I hope you find that the reward was worth the risk.

Thanks to Scott Parris and Cambridge University Press for supporting and promoting this work. Thanks also to Peggy Rote and Linda Smith for their excellent production and editorial assistance – you really improved the final product.

User Guide

This book is essentially a manual for how to actively work with and manipulate the material in Excel. This section explains how to properly configure Excel, provides instructions for downloading all of the materials and software, offers a few tips before you begin, and describes the organization of the files.

Minimum Requirements

This book presumes that you have access to and a working knowledge of Excel. In other words, you can open workbooks, write formulas that add cells together, create charts, and save files. As you will see, however, Excel is much more than a simple adding machine. It can be used to solve optimization problems and perform comparative statics analysis.

There are many versions of Excel. You will need Excel 1997 or better. In Excel 2007, be sure to save the workbooks in the special “Excel macro-enabled workbook” format, which carries the .xlsm extension. If you save the workbook as an Excel workbook with the .xlsx extension, the macros will not be saved and functionality will be lost.

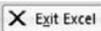
These materials were created and are optimized for use with Windows Excel, but they can be accessed with a Macintosh computer running older versions of Excel. Starting with Mac Excel 2008, Visual Basic is not supported. Modern Macs can run Windows programs with software such as Parallels or Boot Camp.

To make sure that Excel is able to run the Visual Basic macros in the workbooks and add-ins, security must be properly set. Please carefully follow the instructions that appear next before attempting to open the Excel files or add-ins that accompany this book.

Properly Configuring Excel

The procedure is different in Excel 2007 than in earlier versions of Excel. Instructions for Excel 2007 and earlier versions are provided in the following sections.

Excel 2007

Step Click the Office button  at the top left corner of the screen, and then click the Excel Options button  **Excel Options**  **Exit Excel** at the bottom of the dialog box.

Step In the *Excel Options* window, select the *Trust Center* heading, then click the Trust Center Settings... button as shown in Figure 1.

Step In the Trust Center, select the *Macro Settings* heading, choose the “Disable all macros with notification” option (this is often the default), and check the “Trust access to the VBA project object model” as shown in Figure 2.



Figure 1. Excel Options.

Disabling macros with notification means that you will be given the opportunity to run the macros embedded in an Excel workbook. Trusting access to the VBA project object model enables the add-ins to function properly and is a critical setting. Many problems with Excel add-ins are rooted in the failure to trust access. Please confirm that this crucial setting is correct before continuing.

Step Finish configuring Excel by clicking OK at the Trust Center and Excel Options dialog boxes.

Opening a Workbook

Figure 3 shows that, when opening a workbook with macros, Excel 2007 will alert you to their presence with a security warning under the ribbon (and right above the formula bar).

Click the Options button, then click “Enable this content” to allow the buttons and other controls in the workbook to function properly.

For workbooks not included with this book, do *not* enable macro functionality unless you are completely confident that the workbook is safe.

You may also receive the warning displayed in Figure 4 when opening a workbook with macros.

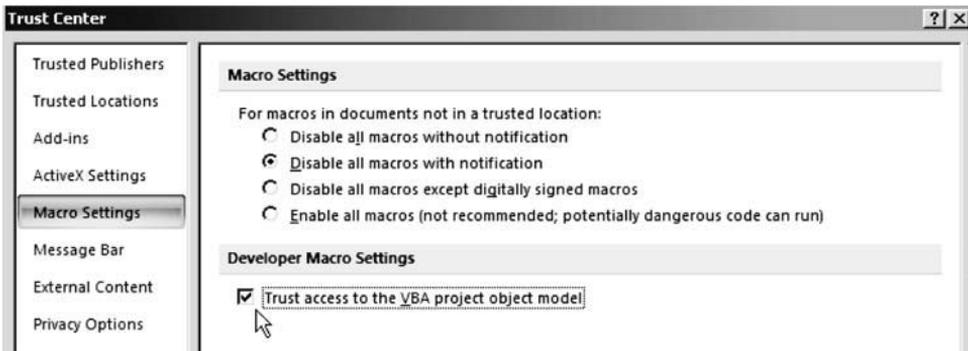


Figure 2. Trust Center.

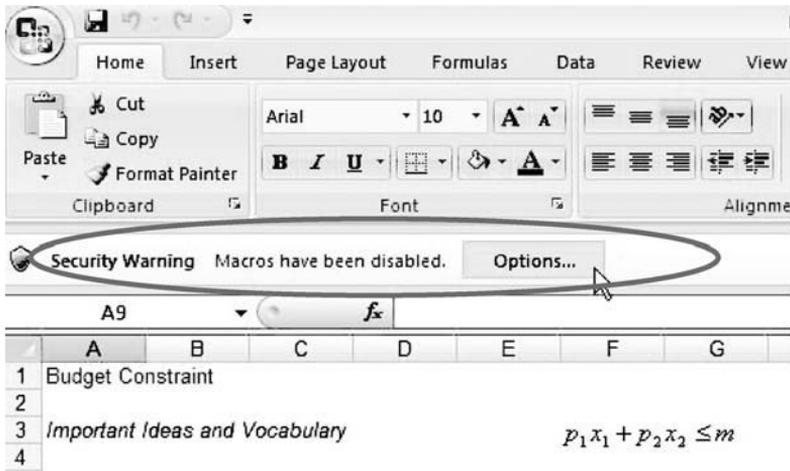


Figure 3. Opening a workbook with macros.

Click the Enable Macros button to have access to the features in the workbook, but do not enable macros if you are unsure of the source.

Older Versions of Excel (from 1997 to 2003)

Step From Excel, execute Tools: Macro: Security as shown in Figure 5.

Step At the Security Level tab, make sure that High is NOT selected. Medium will always give you a warning that the file you are about to open has macros, and then you can decide whether or not to run the macros (or open the file). Low is (quite reasonably) not recommended, since Excel will automatically run all macros with no warning or prompt. Choose the Medium security level as shown in Figure 6.

Step Click the Trusted Sources tab and make sure both boxes are checked so that installed add-ins have access to your Visual Basic projects (that is, your workbooks). See Figure 7.



Figure 4. Macros warning.

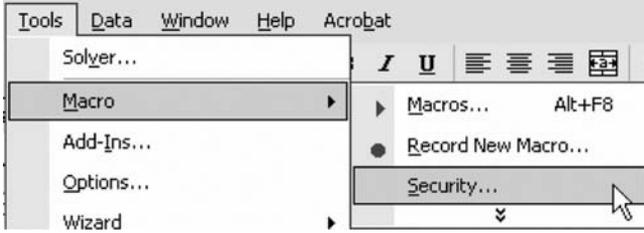


Figure 5. Accessing the Security dialog box.



Figure 6. Setting security level for opening workbooks.

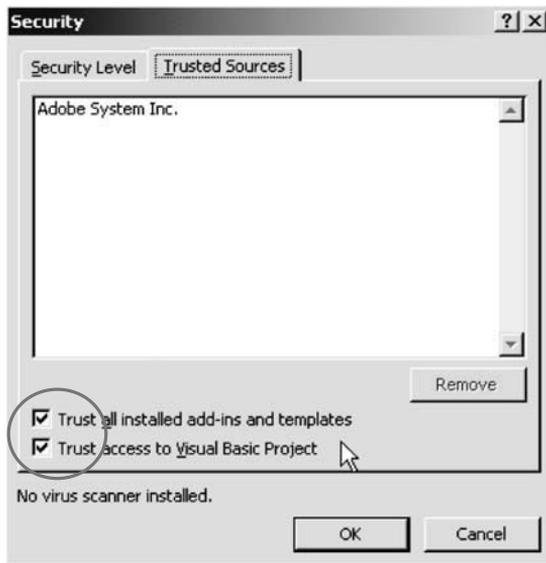


Figure 7. Setting security for add-ins.

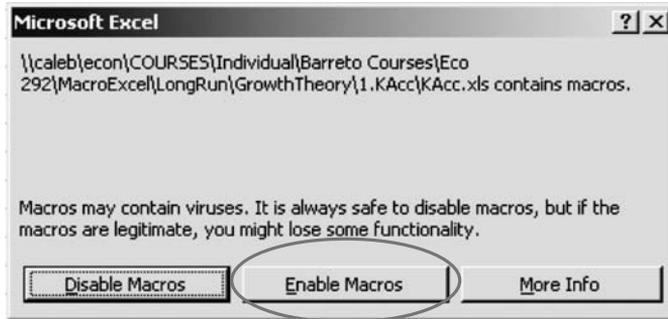


Figure 8. Click Enable Macros when opening a trusted workbook.

With Excel's security correctly configured, you are ready to open macro-enabled Excel workbooks and use the add-ins.

Step When opening an Intermediate Microeconomics with Microsoft Excel workbook, always click the Enable Macros option, as shown in Figure 8.

Aside: Using Excel with a Macintosh

Mac users with versions of Excel that support Visual Basic also need to set security. Both steps, trusting access to Visual Basic projects and enabling macros to run, are required. Excel's Help explains how to do this.

Mac users know that there can be problems working with Windows files, and Microsoft Excel does have some cross-platform compatibility issues. Fortunately, when opening the Windows-created workbooks that accompany this book, the content remains true. The display in Mac Excel, however, may not be optimal. Mac users may notice imperfections (such as text that is cut off in buttons). You can adjust the Zoom in Mac Excel to improve the display.

In addition, Solver in Mac Excel can be a bit temperamental. Make sure you run Excel's Solver before attempting to open a workbook that uses Solver. If you have trouble opening a workbook (e.g., you get an error message that says, "Can't find project or library"), always try the following simple fix: quit Excel, open Excel, execute Tools: Solver and click Close, then open the workbook.

If you have a modern Mac, a better approach to utilizing these files relies on software such as Parallels or Boot Camp to run Windows on the Macintosh computer. This will improve speed, display, and Solver performance.

Accessing and Using the Excel Files: **<www.depauw.edu/learn/microexcel>**

With Excel properly configured, you are ready to download the files that accompany this book. You may download all of the files (about 5 MB in a compressed, zip archive that expands to 15 MB) to your hard drive, but do not distribute these files without permission.

Step Launch your favorite browser and go to <www.depauw.edu/learn/microexcel>.

Step Click Excel Workbooks from the menu (on the top right corner of the page).

Step Click the MicroExcel.zip link and save the file on your desktop (or other location on your hard drive or network server).

Step Double-click the saved MicroExcel.zip archive and extract the files by simply dragging the MicroExcel folder out of its archive folder.

Having extracted the files, the MicroExcel.zip archive is no longer needed and may be deleted. You are free to move the MicroExcel folder to another location.

With Excel security properly configured and the files downloaded, you are almost ready to begin. Take a few minutes to review the remainder of this user guide, which includes troubleshooting, tips (including how to draw in Word), and information on using Solver and the organization of files.

Troubleshooting

At some point, something will go wrong while you are working with an Excel file. Your computer may freeze, or you will not be able to perform a particular task. The first step in overcoming difficulties is to simply start over. Often closing a workbook and reopening it is sufficient, but you may have to quit Excel or restart your computer.

You should revisit the instructions and read carefully to make sure you are following each step closely. For example, in newer versions of Excel, you need to run Solver before accessing macros that use Solver. The instructions point this out, but it is easy to overlook this step.

You may get an error message like that shown in Figure 9. If you click the End button, the message will disappear and you will return to where you were working in Excel. Clicking the Debug button takes you to Visual Basic and highlights the offending line of code, as displayed in Figure 10.

In some cases, you may be able to figure out how to fix the error. In Figure 10, an attempt to take the log of a negative number has triggered an error in the subroutine named test.

You are not expected to be proficient in the Visual Basic programming language, but you may be able to quickly diagnose and correct problems. An updated set of the latest versions of these workbooks and add-ins will be maintained at <www.depauw.edu/learn/microexcel>. If you have persistent problems with a workbook or add-in, please check the Web site for an updated, corrected version. You will also find contact information for technical support on the Web site.

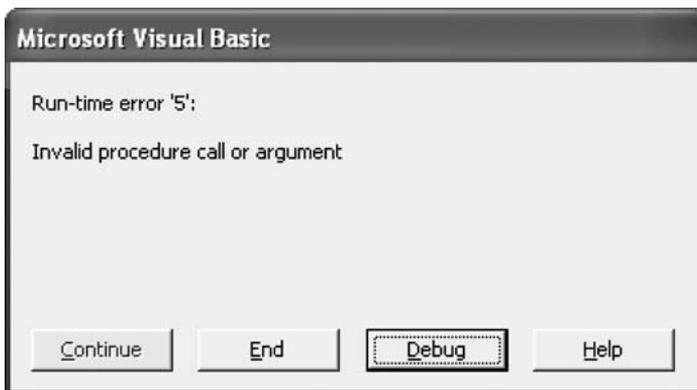


Figure 9. Example error message.

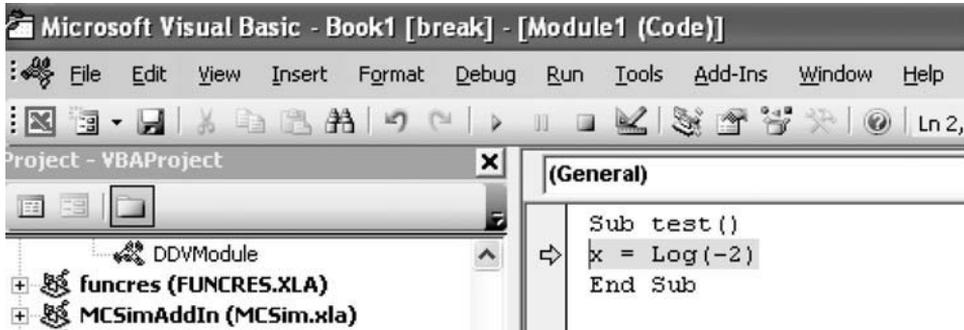


Figure 10. Debugging in Visual Basic.

Common Problems

If buttons or other controls do not work, check to make sure that you have enabled macros (as shown in Figure 3 for Excel 2007). If the Comparative Statics Wizard add-in does not work, check to make sure that you have trusted access to Visual Basic projects (as shown in Figure 2 for Excel 2007).

Visit the Web site at www.depauw.edu/learn/microexcel to see a list of other problems and solutions.

Tips and Conventions

In this book, the word *figure* refers to a variety of graphics, including charts and pictures of portions of a sheet (also known as a screenshot). A chart or range of cells is often displayed in this printed book as a figure, but you should look at the live version on your computer screen. Thus, in addition to a caption, many figures have a source line indicating their location in the Excel workbook.

The book follows Excel's naming convention for workbooks and sheets, [workbook-name]sheetname. If the caption of a figure says, "[FoodStamp.xls]BudgetConstraint," then you know the figure can be found in the FoodStamp.xls workbook in the *BudgetConstraint* sheet. Sheet names in the printed text are italicized to help you locate the proper sheet in a workbook.

Cells are referenced as [workbookname]sheetname!celladdress. So, for example, [RiskReturn.xls]OptimalChoice!B6 refers to cell B6 in the *OptimalChoice* sheet of the RiskReturn.xls workbook.

You may need to adjust your display or the objects in Excel. Use the Zoom button to magnify the display. You can also right-click objects such as buttons (Why Bias?) or scroll bars (◀ | | ▶) to select and move them. Once you open a workbook, you can save it to another location or name (by executing File: Save As...) and make whatever changes you wish. This is the same as underlining or writing in a conventional, printed book.

Drawing in Word

Q&A and Exercise questions often ask you to draw diagrams in Word. Here are a few tips and tricks to make this easier.

- Word 2007 has a completely new drawing interface. Click Insert on the ribbon, then Shapes (in the Illustrations group) to access line and arc tools. The Text Box tool is in the Text group.

After placing a text box on your graph (for labels or explanation), double-click its outline and use the Shape Fill and Shape Outline options on the ribbon to make the object transparent and remove the box.

- In earlier versions of Word, the first step is to access the Drawing Toolbar by executing View: Toolbars: Drawing. You should also execute Tools: Options: General and uncheck the “Automatically create a drawing canvas” option. Text box fill and outline can be removed by double-clicking the text box outline, then selecting the Colors and Lines tab and choosing no fill under Fills and no line under Colors. You should also remove the grid snap.

Installing Solver

Excel’s Solver is a numerical optimization add-in (an additional file that extends the capabilities of Excel). It is imperative that you successfully load and install the Solver add-in because without it, neither Solver nor the Comparative Statics Wizard will be available. The procedure is different in Excel 2007 than in earlier versions of Excel. Instructions for Excel 2007 and earlier versions are provided subsequently.

Excel 2007

Here are the instructions from Excel’s Help:

1. Click the Microsoft Office Button , and then click Excel Options.
2. Click Add-Ins. Then, in the Manage box, select Excel Add-ins.
3. Click Go.
4. In the Add-ins available box, select the Solver Add-in check box, and then click OK.
 Tip: If Solver Add-in is not listed in the Add-ins available box, click Browse to locate the add-in.
 If you get prompted that the Solver add-in is not currently installed on your computer, click Yes to install it.
5. After you load the Solver add-in, the Solver command is available in the Analysis group on the Data tab.

Older Versions of Excel (from 1997 to 2003)

Click on the Tools heading on the menu bar and select the *Solver...* item.

If Solver is not listed in the Tools menu, select *Add-Ins...* from the Tools menu bar. In the Add-Ins dialog box, scroll down and check the Solver add-in.

After selecting the Solver add-in and clicking the OK button, Excel takes a moment to call in the Solver file and adds it to the Tools menu.

If the Solver add-in is not listed in the Add-Ins dialog box, click on the Select or Browse button, navigate to the Solver add-in (called solver.xla in Windows and Solver on the MacOS), and open it. It should be in the Library directory in the folders in which Microsoft Office is installed.

If you cannot find the Solver add-in, try using the Mac’s Find File or Find in Windows to locate the file. Search for “solver.” Note the location of the file, return to the Add-Ins dialog box (by executing Tools: Add-Ins...), click Select or Browse, and open the Solver Add-In file.

Still can’t find it? Then it is likely that your installation of Excel failed to include the Solver add-in. Run your Excel or Office Setup again from the original CD-ROM and install the

Solver add-in. You should now be able to use Solver by clicking on the Tools heading on the menu bar and selecting the Solver item.

Although Solver is proprietary, you can download a trial version from Frontline Systems, the makers of Solver, at <www.solver.com>. In addition to the basic Solver add-in, this Web site provides information on other numerical optimization algorithms.

Organization of Files

Figure 11 shows the contents of all of the materials included with *Intermediate Microeconomics with Microsoft Excel*. These files may be downloaded from <www.depauw.edu/learn/microexcel> (as explained earlier in this user guide).

The Answers folder contains answers to questions posed in the Q&A sheets in each Excel workbook. Think of the Q&A material in the Excel workbooks as self-study questions.

There are also questions at the end of each chapter called Exercises. Readers do not have easy access to the answers to the exercise questions. To see these answers, you must be an instructor and register online at <www.depauw.edu/learn/microexcel>.

The SolverCompStaticsWizard folder contains files that use the Comparative Statics Wizard Excel add-in. When used in conjunction with Excel's own Solver add-in, these files enable numerical comparative statics analysis of optimization problems and equilibrium models.

Active Learning

There are many books devoted to microeconomics. This one is different because it is not meant to be simply read. A great deal of the value of this book lies in the Excel workbooks and additional materials. By reading the book and following instructions carefully, you will become a sophisticated user of Excel and learn a great deal of mathematics and, most importantly, economics.

Having properly configured Excel (especially trusting access to Visual Basic projects and enabling macros when opening a workbook) and downloaded the files from <www.depauw.edu/learn/microexcel>, you are ready to begin. Enjoy!

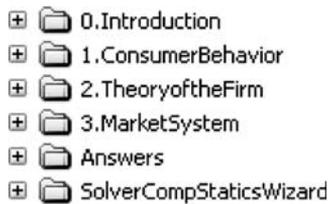


Figure 11. Organization of the supplementary materials.