The MCA Model Workbook

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Chapter 1

The MCA Model on the Website

This workbook is not a substitute for the material in *Estimating How the Macroeconomy Works*, which presents the complete MCA model, and this book should be read (or at least skimmed) first. Also, you should have familiarity working with the US model before you begin working with the MCA model.

This chapter discusses practical things you should know when working with the MCA model. It relies on Chapter 2 and Appendices A and B in *Estimating How the Macroeconomy Works*. If you are planning to work with the MC model, it may be helpful to have a hardcopy of this book available for ease of reference. In what follows all references to chapters, appendices, and tables are to those in this book. The MCA model that is on the website is the exact model in the book, both the model for the United States (called the "US" model) and the model for the other countries (called the "ROW" model).

1.1 Notation

The notation for the variables in the ROW model is presented in Tables B.1 and B.2 in Appendix B. Two letters denote the country (CA for Canada, JA for Japan, etc.), and the abbreviations are given in Table B.1. Up to five letters denote the variable (C for consumption, I for investment, etc.), and the names are given in Table B.2 in alphabetical order. The complete name of a variable for a country consists of the country abbreviation plus the variable name, such as CAC for Canadian consumption, JAI for Japanese investment, etc. The two letters EU denote the European countries in the model that are part of the EMU. These are: AU, FR, GE, IT, NE, FI, BE, GR, IR, PO, SP. (Luxembourg, which is also part of the EMU, is not in the model.) (GR joined January 1, 2001.)

1.2   Solution Options

There are five choices you can make regarding the solution of the MCA model.

1. The prediction period, where the default is 2003-2006.

2. Whether you want the entire MCA model solved or just the individual country models by themselves. If you choose the latter, none of the variables in one country affect the variables in any other country. Each individual country model stands alone, and all foreign-sector variables in an individual country model are taken to be exogenous. The default is to solve the entire MCA model.

3. Whether or not you want the trade share equations used. If you do not want the trade share equations used, the trade shares are taken to be exogenous and equal to the actual values prior to 2002:1 and to the predicted values in the base dataset (MCABASE) from 2002:1 on. This trade share option is not relevant if you choose to have the individual country models solved by themselves since in this case the output from the trade share calculations does not affect any individual country model. The default is to use the trade share equations.

4. The number of within country iterations (denoted LIMITA) and the number of across country iterations (denoted LIMITB). The defaults are 10 for LIMITA and 10 for LIMITB. As discussed below, these options are useful for checking if the model has successfully solved.

5. Whether or not you want to use the historical errors. The default is to set all the error terms equal to zero. If you use the historical errors and make no changes to any of the exogenous variables and coefficients, then the solution values of the endogenous variables will be the actual values—a perfect tracking solution—aside from rounding error. This option can be useful for multiplier experiments, as discussed below.

The size of the MCA model is discussed in Section 2.1 in Chapter 2, and the way in which the model is solved is discussed in Section B.6 in Appendix B. If you ask to solve the MCA model and the model does not solve, you will get an error message to that effect. When this happens your dataset will not have been changed. You will need to make less extreme changes and try again. The model has not been solved when there is an abnormal abort, which usually means that the program has tried to take the log of a negative number.

Because the MCA model (unlike the US model) is not iterated until convergence (because LIMITA and LIMITB above are fixed), it may be the case that the program finishes normally (no abnormal abort) but that the model did not really solve. If you are concerned about this, there is one check that you can perform, which is to increase LIMITA and LIMITB. If the model has correctly solved, it should be the case the increasing LIMITA and LIMITB has a very small effect on the solution values. You can thus increase LIMITA and LIMITB and see if the output values change much. If they do not, then you can have considerable confidence that the model has been solved correctly. The maximum values of LIMITA and LIMITB that you are allowed are 15 and 15, respectively.

1.3 Changing Stochastic Equations

There are four changes you can make to any of the 362 stochastic equations:

1. Drop (or add back in) an equation. When an equation is dropped, the variable determined by the equation is taken to be exogenous, and it can be changed if desired. The default values for the variable are the historical values when they exist and forecast values from the base dataset otherwise.

2. Take an equation to begin after the beginning of the basic prediction period. When an equation begins later than the basic prediction period, the variable determined by the equation is taken to be exogenous for the earlier period, and it can be changed if desired. The default values for the variable are the historical values when they exist and forecast values from the base dataset otherwise. For quarterly countries the period that you want the equation to begin is a quarter, not a year. You can, for example, have an equation begin in 2000:3 when the basic prediction period is 2000-2006.

3. Add factor an equation, where the add factors can differ for different periods. For quarterly countries the add factors are for individual quarters, not years.

4. Change any of the 1646 coefficients in the equations. Unlike for the US model alone, however, you cannot add variables to the equations.

1.4 Creating Base Datasets

If you ask the program to solve the MCA model for any period beginning 2003 or later *and* you make no changes to the coefficients and exogenous variables, the solution values for the endogenous variables will simply be the values that are

already in MCABASE. If, on the other hand, you ask the program to solve the model for a period beginning earlier than 2003, where at least some actual data exist, the solution values will not be the same as the values in MCABASE because the model does not predict perfectly (the solution values of the endogenous variables are not in general equal to the actual values). It is thus very important to realize that the only time the solution values will be the same as the values in MCABASE when you make no changes to the exogenous variables and coefficients is when you are solving beginning 2003 or later.

If you want to work with the MCA model for a period for which actual data exist, you will probably want to use the historical errors (i.e., set the errors equal to their estimated values and take them to be exogenous). If for any period you use the historical errors and solve the model with no changes in the exogenous variables and coefficients, you will get a perfect tracking solution. This is usually a good base to perform various experiments.

1.5   Treatment of the EMU Regime

As noted above, there are 10 countries in the model that are part of the EMU beginning January 1, 1999: AU, FR, GE, IT, NE, FI, BE, IR, PO, and SP. GR joined January 1, 2001. EU denotes these countries. Prior to 1999 each of these countries has an estimated interest rate reaction function (equation 7), and each country except FI, SP, and GR has an estimated long term interest rate equation (equation 8). In addition, GE has an estimated exchange rate equation where the exchange rate explained is the DM/$ rate, and each of the other countries has an estimated exchange rate equation where the exchange rate explained is the local currency/DM rate (equation 9).

For the EMU regime, which begins in 1999:1 for 10 countries and 2001:1 for GR, equations 7, 8, and 9 for the individual EMU countries are dropped from the model. EU equations 7, 8, and 9 are added beginning in 1999:1.

The software allows you to change the EU interest rate and exchange rate equations. The "country" that you will click is EU. Remember that these equations are only relevant from 1999:1 on. Also remember that the equations that have been dropped for the individual EMU countries from 1999:1 on are not part of the model from 1999:1 on. They only matter prior to 1999:1. For GR the switch date is 2001:1.

There is one special features of the online software regarding the EMU regime, which pertains to equations 7 and 8 explaining RS and RB. As mentioned above, for the EMU countries these equations end in 1998:4 (2000:4 for GR). If you are working with a period prior to 1999:1 and you drop equation 7, you can then change

the RS values using the "Change exogenous variables" option. The variable you change, however, is not RS but RSA. For Germany (GE), for example, you change GERSA, not GERS, after you have dropped equation 7 for GE. Similarly, if you drop equation 8, you change RBA, not RB. These changes pertain only to the EMU countries; for all other countries RS and RB are changed. When you click "Change exogenous variables," for a non EMU country, ignore RSA and RBA and use RS and RB.

Chapter 2

Testing for a New Economy in the 1990s (Chapter 6)

The chapter explains how to perform the "no stock market boom" experiment in Chapter 6 in *Estimating How the Macroeconomy Works*. It assumes that Chapter 6 has been read. The following are the steps necessary to duplicate this experiment.

1. Click "Solve" under "MCA Model" in the left menu and copy MCABASE to a dataset you have named.

2. Click "Set prediction period" and set the period to be 1995 through 2002.

3. Click "Use historical errors" and set the option to use the historical errors.

4. Click "Drop or add equations" and for the United States drop the CG equation (equation 25).

5. Click "Change exogenous variables" and ask to change CG for the United States. Ask to replace each existing value with 131.2. Hit the enter key and then be sure to save the changes once you are done.

6. Click "Solve the model and examine the results".

Once the model is solved you can examine the results. If you have done the experiment correctly, your comparisons (between your dataset and MCABASE) will match the comparisons in Chapter 6, subject to slight rounding error. You can, of course, examine many more variables than are presented in the chapter.

Note that the use of the historical errors is important. This allows the perfect tracking solution to be the base path, from which changes can then be made. If

you did not use the historical errors, you would have to first create a base path of predicted values, which the new predicted path (after the interest rate changes) would be compared. See Section 2.6 of *The US Model Workbook* for more discussion of this.

Chapter 3

Evaluating a 'Modern' View of Macroeconomics (Chapter 7)

The chapter explains how to perform the inflation shock experiment in Chapter 7 in *Estimating How the Macroeconomy Works*. It assumes that Chapter 7 has been read. The following are the steps necessary to duplicate this experiment.

1. Click "Solve" under "MCA Model" in the left menu and copy MCABASE to a dataset you have named.

2. Click "Set prediction period" and set the period to be 1994 through 1998.

3. Click "Use historical errors" and set the option to use the historical errors.

4. Click "Drop or add equations" and drop the RS equation for the United States (equation 30).

5. Click "Modify equation coefficients" and ask to modify equation 10 for the United States. Then change the third coefficient in the equation (the constant term) to -.0186792564. Be sure to save the changes once you are done.

6. Click "Solve the model and examine the results".

Once the model is solved you can examine the results. If you have done the experiment correctly, your comparisons (between your dataset and MCABASE) will match the comparisons in Table 7.1 in Chapter 7, subject to slight rounding error. You can, of course, examine many more variables than are presented in the table.

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you did not use the historical errors, you would have to first create a base path of predicted values, which the new predicted path (after the interest rate changes) would be compared. See Section 2.6 of *The US Model Workbook* for more discussion of this.

Chapter 4

Estimated European Inflation Costs from Expansionary Policies (Chapter 8)

The chapter explains how to perform the German monetary policy experiment in Chapter 8 in *Estimating How the Macroeconomy Works*. It assumes that Chapter 8 has been read. The following are the steps necessary to duplicate this experiment.

1. Click "Solve" under "MCA Model" in the left menu and copy MCABASE to a dataset you have named.

2. Click "Set prediction period" and set the period to be 1982 through 1990.

3. Click "Use historical errors" and set the option to use the historical errors.

4. Click "Drop or add equations" and for the Germany drop the RS equation (equation 7).

5. Click "Change exogenous variables" and ask to change GERSA for Germany. (NOTE: This is GERSA, not GERS. See the discussion in Chapter 1, Section 1.5, of this workbook.) Then add -1.0 for 19821-19834, add -.75 for 19841-19854, add -.5 for 19861-19874, and add -.25 for 19881-19904. Be sure to save the changes once you are done.

6. Click "Solve the model and examine the results".

Once the model is solved you can examine the results. If you have done the experiment correctly, your comparisons (between your dataset and MCABASE)

will match the comparisons in Table 8.1 in Chapter 8, subject to slight rounding error. You can, of course, examine many more variables than are presented in the table.

This is a nice example for learning some of the features of the MCA model and for learning how to work with it. Once you have mastered this experiment, you may want to perform others to examine what else macro policies might have done in the 1980s to reduce European unemployment and at what price level and inflation costs.

Note that the use of the historical errors is important. This allows the perfect tracking solution to be the base path, from which changes can then be made. If you did not use the historical errors, you would have to first create a base path of predicted values, which the new predicted path (after the interest rate changes) would be compared. See Section 2.6 of *The US Model Workbook* for more discussion of this.

Chapter 5

Evaluating Policy Rules (Chapter 11)

The chapter explains how to perform the interest rate experiment in Table 11.1 in Chapter 11 in *Estimating How the Macroeconomy Works*. It assumes that Chapter 11 has been read. The following are the steps necessary to duplicate this experiment.

1. Click "Solve" under "MCA Model" in the left menu and copy MCABASE to a dataset you have named.

2. Click "Set prediction period" and set the period to be 1994 through 1998.

3. Click "Use historical errors" and set the option to use the historical errors.

4. Click "Drop or add equations" and drop the RS equation for the United States (equation 30).

5. Click "Change exogenous variables" and ask to change RS for the United States. Then add -1.0 to all the values. Be sure to save the changes once you are done.

6. Click "Solve the model and examine the results".

Once the model is solved you can examine the results. If you have done the experiment correctly, your comparisons (between your dataset and MCABASE) will match the comparisons in Table 11.1 in Chapter 11, subject to slight rounding error. You can, of course, examine many more variables than are presented in the table.

Note that the use of the historical errors is important. This allows the perfect tracking solution to be the base path, from which changes can then be made. If

you did not use the historical errors, you would have to first create a base path of predicted values, which the new predicted path (after the interest rate changes) would be compared. See Section 2.6 of *The US Model Workbook* for more discussion of this.