The MCD Model Workbook

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Contents

Chapter 1

Model Updates

1.1 Different Versions of the MC Model

The MCA model on the website is the exact model in Fair (2004), *Estimating How the Macroeconomy Works*—see Chapter 2 and Appendices A and B. If you want to duplicate the results in Fair (2004), you should work with the MCA model. It has its own workbook: *The MCA Model Workbook, 2003*.

The MCB model on the website is the model used for the results in Fair (2005), "Policy Effects in the Post Boom U.S. Economy." It has its own Appendices A and B and its own workbook: *The MCB Model Workbook, October 29, 2004*. If you want to duplicate the results in this paper, you should work with the MCB model.

The MCC model is used for the results in Fair (2007a), "Evaluating Inflation Targeting Using a Macroeconometric Model" and in Fair (2007b), "A Comparison of Five Federal Reserve Chairmen: Was Greenspan the Best?" It has its own Appendices A and B and its own workbook: *The MCC Model Workbook, August 1, 2006*. If you want to duplicate the results in these two papers, you should work with the MCC model.

The MCD model is described in this workbook. It has its own Appendices A and B.

1.2 MCD Model

The MCD model on the website is the latest update of the MC model. It includes the March 1, 2009, update of the US model. The updating consists of collecting the latest data and then reestimating the equations through the end of the data. Some specification changes have been made in moving from the MC model in Fair (2004)—the MCA model—to the MCD model, and these are discussed below.

These changes are fairly modest in that the properties of the MCA and MCD models are similar. This can be seen by running the same experiment for each model.

You should read Chapter 2 in Fair (2004) before reading this workbook and before working with the MCD model. The following is a discussion of the changes than have been made from the model in Fair (2004). Unless otherwise noted, the changes discussed below are for countries other than the United States.

A number of the specification changes are concerned with simplifying the model slightly. First, the labor force variable, $L1$, is now the labor force of both men and women, and $POP1$ is the labor-force-age population of both men and women. The variables $L2$ and $POP2$ have been dropped. In addition, the armed forces variable, AF, has been dropped. These changes were dictated in part by data availability. Equation 14 now explains $L1$, and equation 15 has been dropped. The unemployment rate, UR, is now by definition $(L1-J)/L1$, where J is employment.

Second, the potential output variable, YS, is now obtained from peak-to-peak interpolations of $\log YS$ for each country. The demand pressure variable, ZZ, is then taken to be $\log Y - \log YS$, and it is used to replace DP in the price equation 5 and DW in the wage equation 12. In addition, UR is used to replace the labor constraint variable, Z, in the labor force equation 14. These changes mean that the variables JJ, JJP, JJS, and Z can be dropped.

The MCD model has 50 fewer stochastic equations than the model in Fair (2004) (312 versus 362). The equation changes are:

1. Equation 1: AR dropped, ST added.
2. Equation 2: AR dropped. Variable $[A/(PY \cdot YS)]_{-1}$ dropped for all equations.
3. Equation 3: NO, SA, VE, CO, JO, SY, MA, PH, TH, ME, PE dropped.
4. Equation 4: SW, GR, SP, MA dropped.
5. Equation 5: GR, ME dropped.
6. Equation 6: FR dropped.
7. Equation 7: KO dropped.
8. Equation 8: PA dropped.
9. Equation 9: SO, VE, JO dropped.
10. Equation 11: NO, GR, PO, SY, AR, CE, PE dropped.
11. Equation 12: CA, AS, SP dropped.

12. Equation 14: AU, GE, UK, DE dropped.

13. Equation 15: equation eliminated; 12 equations dropped.

After reestimation and further tests, these equations did not seem reliable, and so they were dropped.

No new explanatory variables have been introduced in any of the equations. In some cases a variable that was originally lagged once is now unlagged, and in some cases a variable that was originally unlagged is now lagged once. Also, in some cases a variable that was originally excluded from the equation is now included and vice versa. These are all minor changes. If you want to see exactly the changes, you can compare Table B.4 in Fair (2004, pp. 252–282) with Table B.4 in Appendix B of the MCD model. In a few cases an equation that was originally estimated by 2SLS is now estimated by OLS. The equations that are estimated by 2SLS are the ones in Table B.4 in which the overidentification test is performed. Finally, in the MCD model the base year is 2000 rather than 1995 in the original model. All variables that had “95” in their name now have “00” instead.

1.3 Trade Share Equations

There are 1,071 estimated trade share equations in the MCD model. a_{ijt} is the fraction of country i's exports imported from j in quarter t. For each i, j trade share equation, the left hand side variable is $\log(a_{ijt} + .00001)$. The three right hand side variables are the constant, $\log(a_{ijt-1} + .00001)$, and $PX\$_{it}/(\sum_{k=1}^{58} a_{kjt-1} PX\$_{kt})$. The summation for the third variable excludes the oil exporting countries, which are SA, VE, NI, AL, IA, IN, IQ, KU, LI, UA. Also, an element in the summation is skipped if $k = j$. Trade share equations are not estimated (i.e., trade shares are taken to be exogenous) for the exports of oil exporting countries. See Fair (2004, pp. 57–58) for further discussion of the trade share equations.

1.4 US Model Changes Since 2004

The following are the specification changes that have been made to the US model since the forecast dated October 31, 2005. Prior to this forecast the model used for the forecasts was the version in Fair (2004) (except for reestimation each quarter).

1. In equation 9, which explains MH, the time trend T has been replaced by a time trend $T951Z$ that begins in 1995:1, with zero values prior to 1995:1, and the equation is estimated under the assumption of no serial correlation of the error term. Also, the dummy variable $D981$ has been dropped.

2. In equation 14, which explains HF, the time trend T has been added.

3. In equation 17, which explains MF, the interest rate variable is unlagged rather than lagged once. Also, the dummy variable $D981$ has been dropped.

4. In equation 20, which explains IVA, dummy variables have been added to account for the large changes in IVA since the fourth quarter of 2007.

5. In equation 21, which explains CCF, some of the dummy variables have been changed and some new dummy variables have been added to try to account for different tax law changes.

6. In equation 22, which explains BO, dummy variables have been added to account for the large increases in bank borrowing from the Fed since the fourth quarter of 2007.

7. Equation 27, which explains IM, is estimated under the assumption of no serial correlation of the error term.

8. Three new exogenous variables have been added to reflect NIPA data changes, $TAXFR$, $TRFG$, and $TRFS$. The three new exogenous variables required changes to the identities 67, 68, 69, 74, 76, 78, 105, and 112.

9. Beginning with the March 1, 2009, forecast, variables PKH and $PSI14$ have been added, and in the definition of the wealth variable, AA, PIH has been replaced with PKH. $PKH \cdot KH$ is a better measure of housing wealth than is $PIH \cdot KH$.

These changes are all minor. They do not change the properties of the model in any important way.

Chapter 2

The MCD Model on the Website

This chapter discusses practical things you should know when working with the MCD model. It relies on Chapter 2 in Fair (2004) and on the MCD model Appendices A and B on the website. If you are planning to work with the MCD model, it may be helpful to have hardcopies of these items available for ease of reference. In what follows all references to chapters and tables are to those in Fair (2004) or in the MCD model Appendices A and B on the website.

2.1 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.)

2.2 Solution Options

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

1. The prediction period, where the default is 2009-2012.

2. Whether you want the entire MCD 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 MCD 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 2008:1 and to the predicted values in the base dataset (MCDBASE) from 2008:1 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 MCD model is discussed in Section 2.1 in Chapter 2 in Fair (2004), and the way in which the model is solved is discussed in Section B.6 in Appendix B. Because the MCD model (unlike the US model alone) is not iterated until convergence (because LIMITA and LIMITB above are fixed), it may be the case that after the program finishes 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. Another check is that if the predicted values are either extremely large or extremely small, then the model is unlikely to have solved. If this is true, you have probably made extreme changes to one or more exogenous variables or coefficients.

2.3 Changing Stochastic Equations

There are four changes you can make to any of the 312 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 2009:2 when the basic prediction period is 2009-2012.

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 1422 coefficients in the equations. Unlike for the US model alone, however, you cannot add variables to the equations.

2.4 Creating Base Datasets

If you ask the program to solve the MCD model for any period beginning 2009 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 MCDBASE. If, on the other hand, you ask the program to solve the model for a period beginning earlier than 2009, where at least some actual data exist, the solution values will not be the same as the values in MCDBASE 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 MCDBASE when you make no changes to the exogenous variables and coefficients is when you are solving beginning 2009 or later.

If you want to work with the MCD 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.

2.5 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 3

Experiments in Fair (2004)

If you do the following experiments using the MCA model on the website, you will exactly duplicate the results in Fair (2004), *Estimating How the Macroeconomy Works*. This is not true, of course, for the MCD model since the MCA and MCD models differ somewhat. If, however, you compare the results using the two models, you will see that the properties of the two are quite similar.

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

This section explains how to perform the "no stock market boom" experiment in Chapter 6 in Fair (2004). It assumes that Chapter 6 has been read. The following are the steps for this experiment.

1. Click "Solve" under "MCD Model" in the left menu and copy MCDBASE 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. You can, for example, compare the results to those in Chapter 6, which use the MCA model.

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.

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

This section explains how to perform the inflation shock experiment in Chapter 7 in Fair (2004). It assumes that Chapter 7 has been read. The following are the steps for this experiment.

1. Click "Solve" under "MCD Model" in the left menu and copy MCDBASE 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, the PF equation, for the United States. Then add .005 to the third coefficient in the equation (the constant term). 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. You can, for example, compare the results to those in Table 7.1 in Chapter 7, which use the MCA model.

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.

3.3 Estimated European Inflation Costs from Expansionary Policies (Chapter 8)

This section explains how to perform the German monetary policy experiment in Chapter 8 in Fair (2004). It assumes that Chapter 8 has been read. The following are the steps for this experiment.

1. Click “Solve” under “MCD Model” in the left menu and copy MCDBASE 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. You can, for example, compare the results to those in Table 8.1 in Chapter 8, which use the MCA model.

This is a nice example for learning some of the features of the MCD 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.

3.4 Evaluating Policy Rules (Chapter 11)

This section explains how to perform the interest rate experiment in Table 11.1 in Chapter 11 in Fair (2004). It assumes that Chapter 11 has been read. The following are the steps for this experiment.

1. Click “Solve” under “MCD Model” in the left menu and copy MCDBASE 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. You can, for example, compare the results to those in Table 11.1 in Chapter 11, which use the MCA model.

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 4

Experiments in Fair (2005)

This chapter presents the seven experiments in Fair (2005), "Policy Effects in the Post Boom U.S. Economy." If you do the following experiments using the MCB model on the website, you will exactly duplicate the results in Fair (2005). This is not true, of course, for the MCD model since the MCB and MCD models differ somewhat. If, however, you compare the results using the two models, you will see that the properties of the two are quite similar.

4.1 Experiment 1: No Tax Cuts

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

2. Click "Set prediction period" and set the period to be 2000 through 2004.

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) and the RS equation (equation 30).

5. Click "Change exogenous variables" and ask to change $D1G$ for the United States. Change the first quarter of the prediction period to be 20004 (not 20001). Then ask to replace each existing value with 0.0791281. (This is the value of $D1G$ in 2000:3.) 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".

The model will be solved for the entire 2000:1–2004:4 period, but the period of interest is only 2000:4–2004:3. You can ignore the first three quarters of 2000 (there are no changes here anyway) and the last quarter of 2004. Once the model is solved you can examine the results for any variable in the model.

4.2 Experiment 2: No G Increase

1. Click “Solve” under “MCD Model” in the left menu and copy MCDBASE to a dataset you have named.
2. Click “Set prediction period” and set the period to be 2000 through 2004.
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) and the RS equation (equation 30).
5. Click “Change exogenous variables” and ask to change COG for the United States. Then type in the following values (the first four digits are enough): (Make sure to save the changes once you are done.)

	COG
2000.4	66.13431
2001.1	66.14027
2001.2	66.15815
2001.3	66.06781
2001.4	66.15363
2002.1	66.26016
2002.2	66.09412
2002.3	66.14111
2002.4	66.23896
2003.1	66.38132
2003.2	66.40543
2003.3	67.09458
2003.4	67.75031
2004.1	68.22073
2004.2	68.85384
2004.3	69.51472
2004.4	70.16139

6. Click “Solve the model and examine the results”.

(The COG values equal .03013 times potential output, YS, where .03013 is the ratio of COG to YS in 2000:3.)

The model will be solved for the entire 2000:1–2004:4 period, but the period of interest is only 2000:4–2004:3. You can ignore the first three quarters of 2000 (there are no changes here anyway) and the last quarter of 2004. Once the model is solved you can examine the results for any variable in the model.

4.3 Experiment 3: No RS Decrease

1. Click "Solve" under "MCD Model" in the left menu and copy MCDBASE to a dataset you have named.
2. Click "Set prediction period" and set the period to be 2000 through 2004.
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) and the RS equation (equation 30).
5. Click "Change exogenous variables" and ask to change RS for the United States. Change the first quarter of the prediction period to be 20004 (not 20001). Then ask to replace each existing value with 6.017. (6.017 is the value of RS in 2000:3.) 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".

The model will be solved for the entire 2000:1–2004:4 period, but the period of interest is only 2000:4–2004:3. You can ignore the first three quarters of 2000 (there are no changes here anyway) and the last quarter of 2004. Once the model is solved you can examine the results for any variable in the model.

4.4 Experiment 4: No Stimulus—Experiments 1, 2, and 3

Combine experiments 1, 2, and 3, i.e., change $D1G$, COG, and RS.

4.5 Experiment 5: No Stimulus and No Stock Market Decline

Do the set up for experiment 4 and then do the following extra steps:

1. Click "Change exogenous variables" and ask to change CG for the United States. Then type in the following values (the first three digits are enough): (Make sure to save the changes once you are done.)

	CG
2000.4	239.6968
2001.1	242.8530
2001.2	246.6969
2001.3	250.6456
2001.4	252.6329
2002.1	255.7220
2002.2	258.5323
2002.3	260.8754
2002.4	263.5824
2003.1	267.3247
2003.2	271.3791
2003.3	274.3896
2003.4	277.8864
2004.1	281.4873
2004.2	285.1876
2004.3	290.4179
2004.4	293.7721

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

(These are the exact values of CG used in the original paper.)

4.6 Experiment 6: No Stimulus and No Export Decline

Do the set up for experiment 4 and then do the following extra steps:

1. Click "Change exogenous variables" and ask to change $USXS$ for the United States. Then type the following values:

	USXS
2000.4	167644.1
2001.1	161782.5
2001.2	164079.3
2001.3	167545.6
2001.4	170164.8
2002.1	173647.4
2002.2	168835.1
2002.3	171586.1
2002.4	175615.9
2003.1	179059.9
2003.2	181178.9
2003.3	183736.8
2003.4	188002.8
2004.1	190141.2
2004.2	191354.5
2004.3	196392.1
2004.4	206412.9

2. Click “Solve the model and examine the results”.

This experiment is designed to keep U.S. exports, EX, equal to .12778 times potential output, YS. .12778 is the ratio of EX to YS in 2000:3. In the original paper this was done by exogenous changes in other countries’ demands for U.S. goods. It is, however, easier just to change $USXS$ in the manner above, which has been done here.

4.7 Experiment 7: Experiments 5 and 6 Combined

Combine experiments 5 and 6.

Chapter 5

Experiments in Fair (2007a)

This chapter presents five experiments in Fair (2007a), "Evaluating Inflation Targeting Using a Macroeconometric Model." If you do the following experiments using the MCC model on the website, you will exactly duplicate the results in Fair (2007a). This is not true, of course, for the MCD model since the MCC and MCD models differ somewhat. If, however, you compare the results using the two models, you will see that the properties of the two are quite similar.

5.1 Experiment 1: Effects of a Decrease in RS

1. Click "Solve" under "MCD Model" in the left menu and copy MCDBASE 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 for the United States drop the RS equation (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. These results should be close to those in Table 5 in Fair (2007a).

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.

5.2 Experiment 2: Effects of a Positive Price Shock: RS Exogenous

This is Case 1 in Table 6 Fair (2007a).

1. Click “Solve” under “MCD Model” in the left menu and copy MCDBASE 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 for the United States drop the RS equation (equation 30).
5. Click “Modify equation coefficients,” then the United States, and then equation 10, the PF equation. Change the constant term in this equation by adding 0.005 to it. 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. These results should be close to those in Case 1 in Table 6 in Fair (2007a).

5.3 Experiment 3: Effects of a Positive Price Shock: RS Endogenous

This is Case 2 in Table 6 in Fair (2007a).

1. Click “Solve” under “MCD Model” in the left menu and copy MCDBASE 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 “Modify equation coefficients,” then the United States, and then equation 10, the PF equation. Change the constant term in this equation by adding 0.005 to it. Be sure to save the changes once you are done.

5. Click “Solve the model and examine the results”.

Once the model is solved you can examine the results. These results should be close to those in Case 2 in Table 6 in Fair (2007a).

5.4 Experiment 4: Effects of a Positive Demand Shock: RS Exogenous

This is Case 1 in Table 7 in Fair (2007a).

1. Click “Solve” under “MCD Model” in the left menu and copy MCDBASE 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 for the United States drop the RS equation (equation 30).

5. Click “Modify equation coefficients,” then the United States, and then equation 1, the CS equation. Change the constant term in this equation by adding 0.005 to it. Be sure to save the changes once you are done. Then click the United States and then equation 2, the CN equation. Change the constant term in this equation by adding 0.005 to it. 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. These results should be close to those in Case 1 in Table 7 in Fair (2007a).

5.5 Experiment 4: Effects of a Positive Demand Shock: RS Endogenous

This is Case 2 in Table 7 in Fair (2007a).

1. Click “Solve” under “MCD Model” in the left menu and copy MCDBASE 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 “Modify equation coefficients,” then the United States, and then equation 1, the CS equation. Change the constant term in this equation by adding 0.005 to it. Be sure to save the changes once you are done. Then click the United States and then equation 2, the CN equation. Change the constant term in this equation by adding 0.005 to it. Be sure to save the changes once you are done.

5. Click “Solve the model and examine the results”.

Once the model is solved you can examine the results. These results should be close to those in Case 1 in Table 7 in Fair (2007a).

Chapter 6

Causes of the 2008–2009 Recession

This chapter discusses how to duplicate the results in Fair (2009), "Using a Macroeconometric Model to Analyze the 2008–2009 Recession and Thoughts on Macroeconomic Forecastability." There are five experiments in this paper plus one experiment that combines all five.

6.1 Experiment 1: Setting Four Consumption Residuals to Zero

1. Click "Solve" under "MCD Model" in the left menu and copy MCDBASE to a dataset you have named.
2. Click "Set prediction period" and set the period to be 2008 through 2008.
3. Click "Set multicountry link option" and set the option to have no links amoung countries.
4. Click "Use historical errors" and set the option to use the historical errors.
5. Click "Drop or add equations" and for the United States drop the CG equation (equation 25).
6. Click "Modify equations by the use of add factors." Ask to modify the CN equation for the United States. Then enter .016063 in the 20083 new square and .018471 in the 20084 new square. Click " Commit to Changes." Then ask to modify the CD equation and enter .0366807 in the 20083 new square and .0646228 in the 20084 new square. Click "Commit to Changes."

7. Click “Solve the model and examine the results”.

Once the model is solved you can examine the results. These results should duplicate the results in row 1) in Table 2 in Fair (2009). This experiment uses the US model alone, which is indicated above by setting the multicounry link option to have no links among countries. This is true of all the experiments below as well.

6.2 Experiment 2: No Decrease in Equity Values

1. Click “Solve” under “MCD Model” in the left menu and copy MCDBASE to a dataset you have named.
2. Click “Set prediction period” and set the period to be 2008 through 2008.
3. Click “Set multicountry link option” and set the option to have no links amoung countries.
4. Click “Use historical errors” and set the option to use the historical errors.
5. Click “Drop or add equations” and for the United States drop the CG equation (equation 25).
6. Click “Change exogenous variables” and ask to change CG for the United States. Ask to replace each existing value with 351. Hit the enter key and then click “Commit to Changes.”
7. Click “Solve the model and examine the results”.

Once the model is solved you can examine the results. These results should duplicate the results in row 2) in Table 2 in Fair (2009).

6.3 Experiment 3: No Decrease in Housing Values

1. Click “Solve” under “MCD Model” in the left menu and copy MCDBASE to a dataset you have named.
2. Click “Set prediction period” and set the period to be 2008 through 2008.
3. Click “Set multicountry link option” and set the option to have no links amoung countries.
4. Click “Use historical errors” and set the option to use the historical errors.

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

6. Click "Change exogenous variables" and ask to change $PSI14$ for the United States. Ask to replace each existing value with 1.975. Hit the enter key and then click "Commit to Changes."

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

Once the model is solved you can examine the results. These results should duplicate the results in row 3) in Table 2 in Fair (2009).

6.4 Experiment 4: No Price Shocks

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

2. Click "Set prediction period" and set the period to be 2008 through 2008.

3. Click "Set multicountry link option" and set the option to have no links amoung countries.

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

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

6. Click "Change exogenous variables" and ask to change $DEL4$ for the United States. Enter in the new boxes beginning with 20081 and ending with 20084: .992800, .995253, .997708, 1.000000. Then ask to change $USPSI2$ for the United States, and enter in the new boxes beginning with 20081 and ending with 20084: .9124190, .9146696, .9169250, .9191870. Then ask to change $USPMP$ for the United States, and enter in the new boxes beginning with 20081 and ending with 20084: 1.389228, 1.392654, 1.396089, 1.399532. Then click "Commit to Changes."

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

Once the model is solved you can examine the results. These results should duplicate the results in row 4) in Table 2 in Fair (2009).

This experiment corresponds to changing variable PIM by 3 percent at an annual rate in 2008. PIM is exogenous in the US model alone but endogenous in the MCD model. In the MCD model PIM equals $DEL4 \cdot USPSI2 \cdot USPMP$, and the above changes in $DEL4$, $USPSI2$, and $USPMP$ correspond to PIM growing at an annual rate of 3 percent in 2008.

6.5 Experiment 5: Normal Growth of Exports

1. Click "Solve" under "MCD Model" in the left menu and copy MCDBASE to a dataset you have named.
2. Click "Set prediction period" and set the period to be 2008 through 2008.
3. Click "Set multicountry link option" and set the option to have no links amoung countries.
4. Click "Use historical errors" and set the option to use the historical errors.
5. Click "Drop or add equations" and for the United States drop the CG equation (equation 25).
6. Click "Change exogenous variables" and ask to change $USXS$ for the United States. Enter in the new boxes beginning with 20081 and ending with 20084: 273649., 265801., 275056., 312588. Then click "Commit to Changes."
7. Click "Solve the model and examine the results".

Once the model is solved you can examine the results. These results should duplicate the results in row 5) in Table 2 in Fair (2009).

This experiment corresponds to changing variable EX by 8 percent at an annual rate in 2008. EX is exogenous in the US model alone but endogenous in the MCD model. In the MCD model EX equals $(USX00\$ + USXS + USEXDS)/1000.$, and the above changes in $USXS$ correspond to EX growing at an annual rate of 8 percent in 2008.

6.6 Experiment 6: All Together

Combine experiments 1, 2, 3, 4, and 5.

These results should duplicate the results in the "all" row in Table 2 in Fair (2009).

Chapter 7

Estimating the Effects of the 2009 Stimulus Bill

The estimated effects of the 2009 stimulus bill are discussed on the website in "MCD Forecast Memo." To duplicate these results you do the following:

7.1 Stimulus Experiment

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

2. Click "Change exogenous variables" and ask to change $TRGH$ for the United States. Then type in the following values in the appropriate boxes:

	TRGH
2009.2	436.85
2009.3	454.70
2009.4	460.01
2010.1	465.40
2010.2	470.88
2010.3	476.43
2010.4	415.29
2011.1	421.01
2011.2	426.81
2011.3	432.69
2011.4	415.87
2012.1	421.92
2012.2	428.07
2012.3	434.31
2012.4	440.49

Then ask to change COG for the United States. Then type in the following values in the appropriate boxes:

	COG
2009.2	121.21
2009.3	123.44
2009.4	123.97
2010.1	124.56
2010.2	125.11
2010.3	125.66
2010.4	126.62
2011.1	127.17
2011.2	127.73
2011.3	128.28
2011.4	127.52
2012.1	128.10
2012.2	128.67
2012.3	129.23
2012.4	128.44

Then click “Commit to Changes.”

3. Click “Solve the model and examine the results”.

The differences between the new forecast values and the base values are the estimated effects of the stimulus bill. The following is a repeat of the “MCD

Forecast Memo" on the site (in tex rather than html).

7.2 MCD Forecast: March 1, 2009

The MCD model forecasts are contained in the dataset MCDBASE (sometimes called MCD2BASE). The forecast period is 2009:1–2012:4. You can examine any of the forecasts by copying MCDBASE to your dataset and then examining the output. The discussion below concerns the forecasts for the United States. The forecasts for the other countries are discussed in *ROW Forecasts*.

Data

The forecast is based on the national income and product accounts (NIPA) data that were released on February 27, 2009.

The Latest Version of the US Model

For purposes of this forecast the US model has been reestimated through 2008:4. These estimates and the complete specification of the model are presented in *Appendix A: The US Part of the MCD Model: March 1, 2009*, which is an update of Appendix A in Fair (2004).

Beginning with the forecast dated October 31, 2005, a few minor specification changes have been made to the US model from the version in Fair (2004). These are explained in Section 1.4 of this workbook.

Assumptions Behind the Forecast

At the time of this writing the stimulus bill has been passed. In order to analyse the effects of the stimulus bill, I have made two forecasts: a baseline forecast and then a forecast with the stimulus effects added.

The baseline assumptions are as follows. The table below gives the growth rates that were assumed for the baseline forecast for the key exogenous variables in the US model along with the actual growth rates between 1993:3 and 2008:4.

Growth Rates (annual rates)		
	Baseline Forecast Assumptions	Actual 2008:4-1993.3
TRGH	6.0	5.9
COG	2.0	4.0
JG	0.0	-0.7
TRGS	5.0	6.0
TRSH	2.0	5.6
COS	-3.0/1.0	3.6
JS	-2.0/0.0	1.4

These variables are the main government policy variables in the US model aside from tax rates. $TRGH$ is nominal federal government transfer payments to households, COG is real federal government purchases of goods, JG is federal government civilian employment, $TRGS$ is nominal federal government transfer payments to state and local governments, $TRSH$ is nominal state and local government transfer payments to households, COS is real state and local government purchases of goods, and JS is state and local government employment.

-3.0/1.0 for COS means that COS was assumed to fall at a 3 percent annual rate for the first four quarters, 2009:1–2009:4, and then to grow at an annual rate of 1.0 percent after that. -2.0/0.0 for JS means that JS was assumed to fall at an annual rate of 2.0 percent for the first four quarters and then to remain unchanged after that. All tax rates for the baseline forecast were taken to remain unchanged from their 2008:4 values.

The above assumptions have state and local governments contracting some for 2009 and then returning to normal. For the federal government everything is business as usual—no stimulus, etc. Again, this is for the baseline forecast.

No assumption is needed about monetary policy for the forecast because monetary policy is endogenous. Monetary policy is determined by equation 30, an estimated interest rate reaction function or rule.

The Baseline Forecast

The baseline forecast results can be seen by clicking "Solve" after "The MCD Model," creating a data set, and then going immediately to "Examine the results without solving the model." You can then examine any variable in the model.

Real GDP Growth and the Unemployment Rate

The baseline forecast has real GDP falling by 2.7 percent in 2009:1, 1.7 percent in 2009:2, and 0.9 percent in 2009:3;. It then grows at 0.1 percent in 2009:4 (essentially no change) and then 2.0 percent in 2010:1. (All growth rates in this memo are at annual rates.) The unemployment rate rises to 9.5 percent by 2009:4. It begins falling in the middle of 2010. The jobs variable, JF, shows jobs falling by 3.11 million in 2009.

Inflation

Inflation as measured by the growth of the GDP deflator ($GDPD$) is predicted to be about 2.5 percent in 2009 and 2.0 percent in 2010. The model, however, has been overpredicting inflation for the past few quarters, and so the current predictions should be interpreted with some caution. (For the past forecasting record of the US model, see *The Forecasting Record of the US Model*.

Monetary Policy

The estimated interest rate rule (equation 30) is predicting that the three month bill rate (RS) will be essentially zero in the next two years. It then rises gradually to 1.4 percent by the end of 2012.

Other Variables

The federal government budget deficit, variable SGP, is predicted to be between about $150 and $175 billion (at a quarterly rate) for the next four years. This leads the federal government debt, variable AG, to be $9.128 trillion by the end of 2012, which compares to $5.786 trillion at the end of 2008. Interest payments of the federal government, variable $INTG$, rise from $58.7 billion at the end of 2008 to $103.3 billion (at a quarterly rate) at the end of 2012.

The U.S. current account deficit, variable SR, is forecast to be between about $150 and $175 billion (at a quarterly rate) in the next two years.

Comments on the Baseline Forecast and Possible Experiments to Run

One of the reasons the model is predicting negative growth in the first half of 2009 is the negative wealth effect from the fall in stock prices and housing prices. There is also a large inventory correction predicted for 2009:1 because of past inventory buildups.

Why is the economy predicted to be no worse? Why no predicted huge decreases in GDP and increases in the unemployment rate? The answer is roughly as follows. There are two equations in the US model that have large negative residuals for the last two quarters, 2008:3 and 2008:4, the nondurable consumption (CN) equation and the durable consumption equation (CD). Otherwise, the residuals for the other 28 equations are all within what would appear normal. The error terms in the CN and CD equations are not assumed to be serially correlated, and so when a forecast is made, the future residuals are set to zero. In the model the error terms are random shocks with means zero, and so zero is used for the future values. In order for the model to predict a much worse economy, one would have to put in some large future negative shocks, like the observed shocks to the CN and CD equations in the last two quarters, which has not been done. It may be, of course, that there will be large negative shocks, due, say, to financial issues that are not in the model. The model, for example, does not account for possible credit rationing on consumers and investors from the financial distress. If there are large future negative shocks, the current baseline forecast will turn out to be too optimistic. If you have views about the size of possible shocks to some of the equations, you can put these shocks into the model and examine the results. The following are other experiments that might also be of interest.

If you think housing prices will fall further, you can decrease $PSI14$, which will lower PKH. This will affect consumption through the wealth variable AA (equation 89 and equations 1, 2, and 3).

Regarding the stock market, each change in the S&P 500 index of 10 points is a change in CG, the capital gains variable in the model, of about $100 billion. At the time of this writing the S&P 500 index is about 870. If you think that the index will fall, say, 100 points, you should drop the equation for CG and change CG by about -$1,000 billion at a quarterly rate (-$4,000 billion at an annual rate). See the discussion in Section 7.2 of *The US Model Workbook*. This will have a negative effect on real output growth because of a negative wealth effect.

A Stimulus Experiment (STIMUL with password of BASE)

The Congressional Budget Office (CBO) issued a report on March 2, 2009, which analyzed the stimulus bill ("American Recovery and Reinvestment Act of 2009," Public Law 111-5). The numbers that I have used for the present experiment are based (roughly) on the numbers in this report.

The stimulus bill has tax cuts, transfer payment increases, and increases in government purchases of goods and services. Some of the transfers are to state and local governments and some are directly to households. In the model is makes no difference whether the federal government makes transfer payments directly to households (variable $TRGH$) or makes them to state and local governments (variable $TRGS$) if the state and local governments in turn pass on the transfer payments to households (variable $TRSH$). To keep matters simple in the present experiment, all transfer payment increases are put into $TRGH$. Again, it would not matter if instead $TRGS$ was increased and then $TRSH$ increased by the same amount. In addition, tax cuts are taken to be increases in TRGH rather than decreases in the personal income tax rate $D1G$. Most of the tax cuts do not involve cutting tax rates, and so it seems better to put them in $TRGH$. All increases in purchases of goods and services are put in COG, federal government purchases of goods. Therefore, only two variables are changed for the stimulus experiment, $TRGH$ and COG.

The timing of expenditures is a major issue in trying to capture the effects of any stimulus package. I have roughly followed the CBO timing for the present experiment. I have assumed that $TRGH$ is $172 billion larger in fiscal 2009, $370 billion larger in fiscal 2010, $103 billion larger in fiscal 2011, $12 billion larger in fiscal 2012, and $11 billion larger (at an annual rate) in 2012:4. I have roughly spread these increases evenly within the four quarters of the fiscal year. For nominal government spending on goods (PG*COG) I have assumed it to be $21 billion larger at an annual rate in 2009:2, $29 billion larger at an annual rate in 2009:3, $29 billion larger in fiscal 2010, $31 billion larger is fiscal 2011, $24 billion larger in fiscal 2012, and $17 billion larger at an annual rate in 2012:4. No changes in $TRGH$ and COG were made in 2009:1. To get the increases for COG, which is in real terms, I have divided the above increases by predicted values of PG from the baseline forecast. The total nominal increase over the four-year period of the forecast is $762 billion, of which $660 billion is in transfer payments and $102 billion is in purchases of goods.

The data set that contains this experiment is called STIMUL with a password of BASE, and you can examine this data set on the site. You can do this as follows. First, click "Solve" after "The MCD Model." Second, name your data set and create a password (say, STIMULA with a password of STIM). Third, use option 2 ("Copy another existing dataset") and enter dataset STIMUL with a password of BASE. Fourth, proceed and select option 12 ("Examine the results without solving the model"). Fifth, on the output page select MCDBASE for the comparison dataset. Then you can list and display variables for comparison. The difference between the predictions in your dataset (say STIMULA) and in MCDBASE (sometimes called MCD2BASE) are the estimated effects of the stimulus. At the end of this memo is a list of some of the results for this experiment.

It is important to note that one can have more confidince in the differences in the predictions between STIMUL and MCDBASE than in, say, the predictions in STIMUL. It could be, for example, as discussed above, that the baseline forecast is too optimistic—that some of the residuals that have been set to zero will in fact turn out to be negative and large in absolute value. However, this kind of error affects both the predictions in MCDBASE and those in STIMUL, so they cancel out when looking at differences. Put another way, estimated standard errors of multipliers are usually much smaller than estimated standard errors of forecasts.

The output below presents some of the main variables in the US model. Presented first are $TRGH$ and COG to see the exact changes that were made. These two variables are, of course, exogenous. Presented next is real GDP and its percentage change ($GDPR$ and $PCGDPR$). The peak difference in $GDPR$ is in 2010:3, \$103 billion or 3.5 percent of the baseline value. (All flow variables are at quarterly rates.) Between 2009:2 and 2010:1 the growth rates (PCGDPR) are between 2.3 and 3.9 percentage points larger. (All growth rates are at annual rates.) Presented next are the unemployment rate and the jobs variable (UR and JF). The peak difference is in 2010:3, where the unemployment rate is 1.8 percentage points lower. The peak difference in jobs is in 2010:4 at 3.85 million jobs.

Presented next are the GDP deflator and its percentage change ($GDPD$ and $PCGDPD$). The largest difference in the inflation rate is in 2010:4, where $PCGDPD$ is 0.95 percentage points higher. Presented next are the federal government deficit (SGP) and the federal government debt (AG). The deficit difference peaks at \$87 billion in 2009:3. The debt by the end of 2012 is \$566 billion larger. This increase is less than the \$762 billion stimulus increase because of the increased tax collections. Offsetting this somewhat is that fact that interest payments of the federal government are larger. The short term interest rate (RS) and federal government interest payments ($INTG$) are present next (and last). Interest payments are \$8 billion larger by the end of 2012. The short term interest rate, RS, has a peak difference of 0.9 percentage points in 2010:4. The Fed is predicted to raise interest rates somewhat in the more expansive economy.

An interesting feature of the results is that in 2011 and 2012 real GDP growth rates are larger in the baseline case than in the stimulus case. As the stimulus measures wear down, the growth of the economy is negatively affected. There are also in the stimulus case in 2011 and 2012 negative stock effects (durable stock, housing stock, and capital stock), negative effects from the higher price level, and negative effects from higher interest rates, which are the result of the more expansionary economy in 2009 and 2010. By the end of 2012 the number of jobs (JF) is slightly lower in the stimulus case than in the baseline case.

Other Stimulus Experiments to Run

It is easy to run alternative stimulus experiments on the site. The simplest thing to do, as discussed above, is to put all the changes in $TRGH$ and COG. Remember that $TRGH$ is in nominal terms and COG is in real terms.

There are also two other changes that might be of interest to make. One is to raise tax rates in 2011 and 2012, say the federal personal income tax rate $D1G$. There is current discussion that some taxes will have to be raised in 2011 and 2012 to keep the federal government deficit under control

Another change is to try to account for the bailout bill. If, say, the various bailouts result in a loss of $200 billion to the federal government, this is probably best accounted for by changing exogenous variable $TRFG$ in the model. $TRFG$ is the level of transfer payments from firms to the federal government. In 2008:4 this level was $9.35 billion at an quarterly rate, and it has been assumed to remain at this level throughout the forecast period. If there is a $200 billion loss, say spread evenly throughout 2010, then TRFG for each quarter of 2010 should be changed to -40.65, which is 9.35 less 50.0. The federal government loss is essentially a negative tax to corporations, which can be accounted for by changing $TRFG$. Decreasing $TRFG$ increases cororate profits, which increases dividends, which increases household disposable income. This effect is, however, quite modest in the model because dividends respond slowly to profit changes. If you run this experiment you will see that it has a modest effect on real GDP. It mostly just increases the federal government deficit in 2010 (variable SGP) and the federal government debt (variable AG) from 2010 on. Federal interest payments are larger from 2010 on because of the larger federal debt.

Dataset: **STIMUL1**
Comparison dataset: **MCD2BASE**

Qtr		**TRGH**			**COG**	
	STIMUL1	MCD2BASE	1 - 2	STIMUL1	MCD2BASE	1 - 2
2009.1	351.78742	351.78742	0.00000	116.50033	116.50033	0.00000
2009.2	436.85000	356.94950	79.90050	121.21000	117.07851	4.13149
2009.3	454.70000	362.18732	92.51268	123.44000	117.65956	5.78044
2009.4	460.01000	367.50200	92.50800	123.97000	118.24350	5.72650
2010.1	465.40000	372.89467	92.50533	124.56000	118.83033	5.72967
2010.2	470.88000	378.36647	92.51353	125.11000	119.42008	5.68992
2010.3	476.43000	383.91856	92.51144	125.66000	120.01276	5.64724
2010.4	415.29000	389.55212	25.73788	126.62000	120.60837	6.01163
2011.1	421.01000	395.26835	25.74165	127.17000	121.20694	5.96306
2011.2	426.81000	401.06845	25.74155	127.73000	121.80848	5.92152
2011.3	432.69000	406.95367	25.73633	128.28000	122.41301	5.86699
2011.4	415.87000	412.92525	2.94475	127.52000	123.02054	4.49946

Qtr		**GDPR**			**PCGDPD**	
	STIMUL1	MCD2BASE	1 - 2	STIMUL1	MCD2BASE	1 - 2
2009.1	2861.52530	2861.45560	0.06970	2.70326	2.70215	0.00111
2009.2	2870.91790	2848.95430	21.96360	2.22518	2.33244	-0.10726
2009.3	2892.13290	2842.52080	49.61210	2.50137	2.18809	0.31328
2009.4	2915.58530	2843.12150	72.46380	2.55738	1.96488	0.59250
2010.1	2946.87020	2857.33270	89.53750	2.50938	1.78859	0.72079
2010.2	2979.89250	2880.18360	99.70890	2.75104	1.90722	0.84382
2010.3	3010.23800	2907.24780	102.99020	2.97068	2.07349	0.89719
2010.4	3023.12470	2936.10710	87.01760	3.19930	2.24477	0.95454
2011.1	3033.94420	2968.92740	65.01680	2.97770	2.36844	0.60926
2011.2	3046.20460	3002.53180	43.67280	2.99540	2.62263	0.37277
2011.3	3060.45140	3034.90900	25.54240	3.01086	2.84522	0.16565
2011.4	3070.92920	3065.24980	5.67940	3.02777	3.02876	-0.00099

Qtr		**UR**			**JF**	
	STIMUL1	MCD2BASE	1 - 2	STIMUL1	MCD2BASE	1 - 2
2009.1	0.07891	0.07891	-0.00001	127.88956	127.88860	0.00096
2009.2	0.08437	0.08611	-0.00174	127.32721	127.02526	0.30195
2009.3	0.08620	0.09125	-0.00505	127.31794	126.42069	0.89725
2009.4	0.08583	0.09480	-0.00897	127.66799	126.02784	1.64015
2010.1	0.08328	0.09602	-0.01274	128.31646	125.90630	2.41016
2010.2	0.07985	0.09567	-0.01582	129.16779	126.06155	3.10624
2010.3	0.07629	0.09414	-0.01785	130.10389	126.44747	3.65642
2010.4	0.07416	0.09185	-0.01769	130.85074	127.00510	3.84564
2011.1	0.07328	0.08890	-0.01562	131.41508	127.72485	3.69023
2011.2	0.07320	0.08560	-0.01241	131.85263	128.56118	3.29145
2011.3	0.07353	0.08229	-0.00876	132.21470	129.45706	2.75764
2011.4	0.07443	0.07923	-0.00479	132.46555	130.36219	2.10336

Qtr		**GDPD**			**PCGDPD**	
	STIMUL1	MCD2BASE	1 - 2	STIMUL1	MCD2BASE	1 - 2
2009.1	1.24050	1.24050	0.00000	2.70326	2.70215	0.00111
2009.2	1.24734	1.24767	-0.00032	2.22518	2.33244	-0.10726
2009.3	1.25507	1.25444	0.00063	2.50137	2.18809	0.31328
2009.4	1.26302	1.26056	0.00247	2.55738	1.96488	0.59250
2010.1	1.27087	1.26615	0.00472	2.50938	1.78859	0.72079
2010.2	1.27952	1.27215	0.00737	2.75104	1.90722	0.84382
2010.3	1.28892	1.27869	0.01023	2.97068	2.07349	0.89719
2010.4	1.29911	1.28581	0.01330	3.19930	2.24477	0.95454
2011.1	1.30867	1.29336	0.01532	2.97770	2.36844	0.60926
2011.2	1.31837	1.30175	0.01661	2.99540	2.62263	0.37277
2011.3	1.32818	1.31092	0.01726	3.01086	2.84522	0.16565
2011.4	1.33812	1.32073	0.01739	3.02777	3.02876	-0.00099

Qtr		**SGP**			**AG**	
	STIMUL1	MCD2BASE	1 - 2	STIMUL1	MCD2BASE	1 - 2
2009.1	-141.10250	-141.12120	0.01870	-5968.70200	-5968.72300	0.02100
2009.2	-232.69240	-152.67600	-80.01640	-6248.49200	-6168.99700	-79.49500
2009.3	-249.49910	-162.41440	-87.08470	-6545.58100	-6379.90300	-165.67800
2009.4	-250.23240	-170.34840	-79.88400	-6843.46500	-6599.12500	-244.34000
2010.1	-248.61240	-174.59620	-74.01620	-7139.72200	-6822.45400	-317.26800
2010.2	-245.76550	-175.91370	-69.85180	-7433.30800	-7046.81700	-386.49100
2010.3	-243.09660	-175.43040	-67.66620	-7724.27000	-7270.34800	-453.92200
2010.4	-178.10140	-173.85140	-4.25000	-7950.13900	-7491.98600	-458.15300
2011.1	-180.66080	-170.68740	-9.97340	-8178.01300	-7710.31100	-467.70200
2011.2	-183.01380	-166.63720	-16.37660	-8407.75500	-7924.55200	-483.20300
2011.3	-184.82820	-162.39460	-22.43360	-8638.96400	-8134.45200	-504.51200
2011.4	-162.97900	-158.33620	-4.64280	-8848.05000	-8340.08000	-507.97000

Qtr		**RS**			**INTG**	
	STIMUL1	MCD2BASE	1 - 2	STIMUL1	MCD2BASE	1 - 2
2009.1	0.00000	0.00000	0.00000	61.85601	61.85622	-0.00021
2009.2	0.00000	0.00000	0.00000	65.97310	65.13377	0.83933
2009.3	0.00000	0.00000	0.00000	70.23591	68.45813	1.77778
2009.4	0.00000	0.00000	0.00000	74.46181	71.80321	2.65860
2010.1	0.15030	0.00000	0.15030	78.65154	75.10925	3.54229
2010.2	0.45020	0.00000	0.45020	82.81047	78.30918	4.50129
2010.3	0.78048	0.00000	0.78048	86.93216	81.35680	5.57535
2010.4	0.96613	0.02674	0.93939	90.22790	84.21296	6.01494
2011.1	1.00318	0.15570	0.84748	93.40238	86.89880	6.50357
2011.2	0.99089	0.37248	0.61841	96.45373	89.45261	7.00112
2011.3	0.97970	0.61428	0.36542	99.39836	91.90361	7.49474
2011.4	0.92950	0.84153	0.08797	101.96842	94.27219	7.69623

Chapter 8

Estimated Features of the Economy

This chapter brings together some of the features of the economy that have been estimated by the MCD model. It is essentially a laundry list of results.

8.1 Positive Price Shocks are Contractionary

Positive price shocks are contractionary even if the Fed keeps the nominal interest rate unchanged. See Section 3.2. This feature has important implications for monetary policy.

8.2 "New Economy" in the Last Half of the 1990s

See Section 3.1.

8.3 Slowdown in 2001-2004

See Chapter 4.

8.4 2008–2009 Recession

See Chapter 6.

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