Chapter Six

# The Dynamic Properties of the Model

## 6.1 THE COMPLETE SET OF EQUATIONS FOR THE MODEL

The complete set of equations for the condensed model is presented in Table 6-2, and the complete set of equations for the non-condensed model is presented in the Appendix in Table A-2. For ease of reference, the complete notation for the condensed model is presented in alphabetic order in Table 6-1, and the complete notation for the non-condensed model is presented in alphabetic order in Table A-1. Attention will be concentrated in this chapter on the condensed model.

The equations in Table 6-2 are listed in the order in which the model is solved. At the end of period $t-1$ the bond dealer determines the bill rate, the bond rate, and the stock price for period $t$ (Equation (1)). Equations (2) through (12) then refer to the decisions made at the beginning of period $t$ before any transactions take place. In Equation (2) the government sets the values of the tax parameters ($d_1$, $d_2$, $d_3$, $YG$, $g_2$) and the value of the reserve reserve requirement ratio ($g_1$) and decides on the number of goods to purchase ($XG_t$), the number of worker hours to pay for ($HPG_t$), the value of bills to issue ($VBILLG_t$), and the number of bonds to have outstanding ($BONDG_t$). The decisions regarding these variables are treated as exogenous in the model.

In Equation (3) the bank sector determines the loan rate ($RL_t$), the value of bills and bonds to purchase ($VBB_t$), and the maximum amount of money to lend in the period ($LBMAX_t$). As can be seen from Table 2-4 (Chapter Two), the important determinants of these variables are the expected level of funds for the current period ($FUNDS_t^e$), the loan rate of the previous period

**Table 6-1. The Complete Notation for the Condensed Model in Alphabetic Order**

Subscript $t$ denotes variable for period $t$. Superscripts $p$ and $pp$ in the text denote a planned value of the variable, and superscript $e$ denotes an expected value of the variable.

| | |
|---|---|
| $BONDB_t$ | = number of bonds held by the bank sector |
| $BONDD_t$ | = number of bonds held by the bond dealer |
| $BONDG_t$ | = number of bonds issued by the government |
| $BR_t$ | = actual reserves of the bank sector |
| $BR_t^*$ | = required reserves of the bank sector $[g_1 DDB_t]$ |
| $BR_t^{**}$ | = desired reserves of the bank sector $[g_1(DDB_t - EMAXDD) + EMAXDD + EMAXSD]$ |
| $CF_t$ | = cash flow before taxes and dividends of the firm sector |
| $\overline{CF}_t$ | = cash flow net of taxes and dividends of the firm sector |
| $CG_t$ | = capital gains or losses on stocks of household 1 |
| $CGB_t$ | = capital gains or losses on bonds of the bank sector $[BONDB_t/R_{t+1} - BONDB_t/R_t]$ |
| $CGD_t$ | = capital gains or losses on bonds of the bond dealer $[BONDD_t/R_{t+1} - BONDD_t/R_t]$ |
| $d_1$ | = profit tax rate |
| $d_2$ | = penalty tax rate on the composition of banks' portfolios |
| $d_3$ | = personal tax rate |
| $DDB_t$ | = demand deposits of the bank sector |
| $DDD_t$ | = demand deposits of the bond dealer |
| $DDF_t$ | = actual demand deposits of the firm sector |
| $DDF_{1t}$ | = demand deposits set aside by the firm sector for transactions purposes |
| $DDF_2$ | = demand deposits set aside by the firm sector to be used as a buffer to meet unexpected decreases in cash flow |
| $DDH_{it}$ | = demand deposits of household $i.(i=1,2)$ |
| $DEP_t$ | = depreciation of the firm sector |
| $DIV_t$ | = total dividends paid and received in the economy |
| $DIVB_t$ | = dividends paid by the bank sector |
| $DIVD_t$ | = dividends paid by the bond dealer |
| $DIVF_t$ | = dividends paid by the firm sector |
| $EMAXDD$ | = largest error the bank sector expects to make in overestimating its demand deposits for any period |
| $EMAXHP$ | = largest error the firm sector expects to make in overestimating the supply of labor available to it for any period |
| $EMAXMH$ | = largest error the firm sector expects to make in underestimating its worker hour requirements for any period |
| $EMAXSD$ | = largest error the bank sector expects to make in overestimating its savings deposits for any period |
| $EXBB_t$ | = excess supply of bills and bonds $[(VBILLG_t + BONDG_t/R_t) - (VBB_t + VBD^*)]$ |
| $FUNDS_t^e$ | = amount that the bank sector knows it will have available to lend to households and firms and to buy bills and bonds even if it overestimates its demand and savings deposits by the maximum amounts |

**Table 6-1. (continued)**

| | |
|---|---|
| $g_1$ | = reserve requirement ratio |
| $g_2$ | = no-tax proportion of banks' portfolio held in bills and bonds |
| $\bar{H}$ | = maximum number of hours that each machine can be used each period |
| $HP_t$ | = total number of worker hours paid for in the economy |
| $HPF_t$ | = number of worker hours paid for by the firm sector |
| $HPFMAX_t$ | = maximum number of worker hours that the firm sector will pay for |
| $HPFMAXUN_t$ | = maximum number of worker hours that the firm sector would pay for if it were not constrained |
| $HPG_t$ | = number of worker hours paid for by the government |
| $HPH_{it}$ | = number of hours that household $i$ is paid for ($i=1,2$) |
| $HPHMAX_{it}$ | = unconstrained supply of hours of household $i$ ($i=1,2$) |
| $HPUN_t$ | = total unconstrained supply of hours in the economy |
| $INV_t$ | = number of goods purchased by the firm sector for investment purposes (one good = one machine) |
| $INVUN_t$ | = unconstrained investment demand of the firm sector |
| $K_t^a$ | = actual number of machines held by the firm sector |
| $KH_t$ | = number of machine hours worked |
| $KMIN_t$ | = minimum number of machines required to produce $Y_t$ |
| $L_t$ | = total value of loans of the bank sector |
| $LBMAX_t$ | = maximum value of loans that the bank sector will make |
| $LF_t$ | = value of loans taken out by the firm sector |
| $LFMAX_t$ | = maximum value of loans that the firm sector can take out |
| $LFUN_t$ | = unconstrained demand for loans of the firm sector |
| $LH_t$ | = value of loans taken out by household 2 |
| $LHMAX_t$ | = maximum value of loans that household 2 can take out |
| $LHUN_t$ | = unconstrained demand for loans of household 2 |
| $LUN_t$ | = total unconstrained demand for loans |
| $m$ | = length of life of one machine |
| $MH_{1t}$ | = number of worker hours worked on the machines |
| $MH_{3t}$ | = number of worker hours required to handle deviations of inventories from $\beta_1$ times sales |
| $MH_{4t}$ | = number of worker hours required to handle fluctuations in sales |
| $MH_{5t}$ | = number of worker hours required to handle fluctuations in worker hours paid for |
| $MH_{6t}$ | = number of worker hours required to handle fluctuations in net investment |
| $MH_t$ | = total number of worker hours required |
| $P_t$ | = price level |
| $PS_t$ | = price of the aggregate share of stock |
| $PUN_t$ | = price level that the firm sector would set if it were not constrained |
| $r_t$ | = bill rate |
| $R_t$ | = bond rate |
| $RL_t$ | = loan rate of the bank sector |
| $SAV_{it}$ | = savings net of capital gains or losses of household $i$ ($i=1,2$) |
| $SD_t$ | = savings deposits of household 1 (and of the bank sector) |
| $SDUN_t$ | = unconstrained savings deposits of household 1 (corresponding to $HPHUN_{1t}$ and $XHUN_{1t}$) |

**Table 6-1. (continued)**

| | |
|---|---|
| $TAX_t$ | = total taxes paid |
| $TAXB_t$ | = taxes paid by the bank sector |
| $TAXD_t$ | = taxes paid by the bond dealer |
| $TAXF_t$ | = taxes paid by the firm sector |
| $TAXH_{it}$ | = taxes paid by household $i$ ($i$=1,2) |
| $V_t$ | = stock of inventories of the firm sector |
| $VBB_t$ | = value of bills and bonds that the bank sector chooses to purchase $[VBILLB_t + BONDB_t/R_t]$ |
| $VBD^*$ | = value of bills and bonds that the bond dealer desires to hold |
| $VBILLB_t$ | = value of bills held by the bank sector |
| $VBILLD_t$ | = value of bills held by the bond dealer |
| $VBILLG_t$ | = value of bills issued by the government |
| $W_t$ | = wage rate |
| $WUN_t$ | = wage rate that the firm sector would set if it were not constrained |
| $X_t$ | = total number of goods sold in the economy |
| $XFMAX_t$ | = maximum number of goods that the firm sector will sell |
| $XG_t$ | = number of goods purchased by the government |
| $XH_{it}$ | = number of goods purchased by household $i$ ($i$=1,2) |
| $XHMAX_{it}$ | = maximum number of goods that household $i$ can purchase ($i$=1,2) |
| $XHUN_{it}$ | = unconstrained demand for goods of household $i$ ($i$=1,2) |
| $XUN_t$ | = total unconstrained demand for goods |
| $Y_t$ | = total number of goods produced |
| $YG$ | = minimum guaranteed level of income (also can be thought of as the level of transfer payments to each household) |
| $YH_{it}$ | = before-tax income excluding capital gains or losses of household $i$ ($i$=1,2) |
| $Y^pUN_t$ | = number of goods that the firm sector would plan to produce it it were not constrained |
| $\lambda_1$ | = amount of output produced per worker hour |
| $\mu_1$ | = amount of output produced per machine hour |
| $\Pi B_t$ | = before-tax profits of the bank sector |
| $\Pi D_t$ | = before-tax profits of the bond dealer |
| $\Pi F_t$ | = before-tax profits of the firm sector |

**Table 6-2. The Complete Set of Equations for the Condensed Model**

(1) $r_t$, $R_t$, and $PS_t$ are determined by the bond dealer at the end of period $t-1$. See (42) and (62) below for the determination of the values for period $t+1$.

(2) The government sets $d_1$, $d_2$, $d_3$, $YG$, $g_1$, $g_2$, $XG_t$, $HPG_t$, $VBILLG_t$, and $BONDG_t$.

(3) The bank variables $RL_t$, $VBB_t$, and $LBMAX_t$ are determined as in Table 2-4.

(4) $LHMAX_t = \left(\frac{LHUN_{t-1}}{LHUN_{t-1}+LFUN_{t-1}}\right) LBMAX_t$. [allocation of the aggregate loan constraint to household 2 and the firm sector]

**Table 6–2. (continued)**

(5) $LFMAX_t = LBMAX_t - LHMAX_t$.

(6) The firm variables $P_t$, $INV_t$, $Y_t^p$, $W_t$, $LF_t$, $HPFMAX_t$, $XFMAX_t$, $INVUN_t$, and $LFUN_t$ are determined as in Table 3–4.

(7) The variables $HPHUN_{1t}$ and $XHUN_{1t}$ for household 1 and the variables $HPHUN_{2t}$, $XHUN_{2t}$, and $LHUN_t$ for household 2 are determined as in Table 4–6.

(8) $HPHMAX_{1t} = \left(\frac{HPHUN_{1t}}{HPHUN_{1t}+HPHUN_{2t}}\right)(HPFMAX_t + HPG_t)$. [allocation of the aggregate hours constraint to households 1 and 2]

(9) $HPHMAX_{2t} = (HPFMAX_t + HPG_t) - HPHMAX_{1t}$.

(10) $XHMAX_{1t} = \left(\frac{XHUN_{1t}}{XHUN_{1t}+XHUN_{2t}}\right)(XFMAX_t - INV_t - XG_t)$. [allocation of the aggregate goods constraint to households 1 and 2]

(11) $XHMAX_{2t} = (XFMAX_t - INV_t - XG_t) - XHMAX_{1t}$.

(12) The variables $HPH_{1t}$ are $XH_{1t}$ for household 1 and the variables $HPH_{2t}$, $XH_{2t}$, $LH_t$ for household 2 are determined as in Table 4–6.

(13) $XUN_t = XHUN_{1t} + XHUN_{2t} + INVUN_t + XG_t$. [aggregate unconstrained demand for goods]

(14) $LUN_t = LFUN_t + LHUN_t$. [aggregate unconstrained demand for loans]

(15) $HPUN_t = HPHUN_{1t} + HPHUN_{2t}$. [aggregate unconstrained supply of labor]

(16) $X_t = XH_{1t} + XH_{2t} + INV_t + XG_t$. [aggregate number of goods sold]

(17) $L_t = LF_t + LH_t$. [aggregate value of loans]

(18) $HP_t = HPH_{1t} + HPH_{2t}$. [total number of worker hours paid for]

(19) $HPF_t = HP_t - HPG_t$. [number of worker hours allocated to the firm sector]

(20) $K_t^a = K_{t-1}^a + INV_t - INV_{t-m}$. [actual number of machines on hand]

(21) $V_t = V_{t-1} + Y_t^p - X_t$. [Equations (21) – (29) are concerned with the determination of output and inventories.]

(22) $MH_{1t}^p = \frac{Y_t^p}{\lambda_1}$.

(23) $MH_{3t}^p = \beta_2(V_t \;\; - \beta_1 X_t)^2$.

(24) $MH_{4t} = \beta_3(X_t - X_{t-1})^2$.

(25) $MH_{5t} = \beta_4(HPF_{t-1} - HPF_{t-2})^2$.

**Table 6-2. (continued)**

(26) $MH_{6t} = \beta_5(K_t^a - K_{t-1}^a)^2$.

(27) $MH_t^p = MH_{1t}^p + MH_{3t}^p + MH_{4t} + MH_{5t} + MH_{6t}$.

(28) If $MH_t^p \leqslant HPF_t$, then $Y_t = Y_t^p$, $V_t = V_t$, and $MH_t = MH_t^p$.

(29) If $MH_t^p > HPF_t$, then $MH_t = HPF_t$; $Y_t$ = maximum amount that can be produced given $K_t^a$, $X_t$ and $MH_t$; and $V_t = V_{t-1} + Y_t - X_t$.

(30) $KMIN_t = \dfrac{Y_t}{\mu_1 \bar{H}}$. [minimum number of machines needed to produce $Y_t$]

(31) $DEP_t = \dfrac{1}{m}(P_t INV_t + \ldots + P_{t-m+1} INV_{t-m+1})$. [depreciation]

(32) $\Pi F_t = P_t Y_t - W_t HPF_t - DEP_t - RL_t LF_t + (P_t - P_{t-1})V_{t-1}$. [before-tax profits of the firm sector]

(33) $TAXF_t = d_1\ \Pi F_t$. [taxes of the firm sector]

(34) $DIVF_t = \Pi F_t - TAXF_t$. [dividends of the firm sector]

(35) $CF_t = P_t X_t - W_t HPF_t - P_t INV_t - RL_t LF_t$. [gross cash flow of the firm sector]

(36) $\overline{CF}_t = CF_t - TAXF_t - DIVF_t$

$= DEP_t - P_t INV_t + P_{t-1} V_{t-1} - P_t V_t$. [cash flow net of taxes and dividends of the firm sector]

(37) $DDF_t = DDF_{t-1} + LF_t - LF_{t-1} + \overline{CF}_t$. [demand deposits of the firm sector]

(38) $VBILLD_t = 0$. [value of bills held by the bond dealer]

(39) $VBILLB_t = VBILLG_t$. [value of bills held by the bank sector]

(40) $BONDB_t = R_t\,(VBB_t - VBILLB_t)$. [number of bonds held by the bank sector]

(41) $BONDD_t = BONDG_t - BONDB_t$. [number of bonds held by the bond dealer]

(42) The bond dealer determines $r_{t+1}$ and $R_{t+1}$ as in equations (2) and (3) (led one period) in Table 5-2.

(43) $\Pi D_t = BONDD_t + \left(\dfrac{BONDD_t}{R_{t+1}} - \dfrac{BONDD_t}{R_t}\right)$. [before-tax profits of the bond dealer]

(44) $TAXD_t = d_1 \Pi D_t$. [taxes of the bond dealer]

(45) $DIVD_t = \Pi D_t - TAXD_t$. [dividends of the bond dealer]

(46) $DDD_t = DDD_{t-1} - \left(\dfrac{BONDD_t}{R_{t+1}} - \dfrac{BONDD_t}{R_t}\right)$. [demand deposits of the bond dealer]

(47) $DDH_{1t} = \gamma_1 P_t XH_{1t}$. [demand deposits of household 1]

**Table 6-2. (continued)**

(48) $DDH_{2t} = \gamma_1 P_t XH_{2t}$. [demand deposits of household 2]

(49) $DDB_t = DDF_t + DDD_t + DDH_{1t} + DDH_{2t}$. [total value of demand deposits]

(50) $YH_{2t} = W_t HPH_{2t}$. [before-tax income of household 2]

(51) $TAXH_{2t} = d_3 (YH_{2t} - RL_t LH_t) - YG$. [taxes of household 2]

(52) $SAV_{2t} = YH_{2t} - TAXH_{2t} - P_t XH_{2t} - RL_t LH_t$. [savings of household 2]

[Equations (53) – (62) are solved simultaneously]

(53) $CG_t = PS_{t+1} - PS_t$. [capital gains or losses of household 1]

(54) $YH_{1t} = W_t HPH_{1t} + r_t SD_t + DIV_t$. [income net of capital gains or losses of household 1]

(55) $TAXH_{1t} = d_3(YH_{1t} + CG_t) - YG$. [taxes of household 1]

(56) $SAV_{1t} = YH_{1t} - TAXH_{1t} - P_t XH_{1t}$. [savings net of capital gains or losses of household 1]

(57) $SD_t = SD_{t-1} - (DDH_{1t} - DDH_{1t-1}) + SAV_{1t}$. [savings deposits of household 1]

(58) $$\Pi B_t = RL_t L_t + r_t VBILLB_t + BONDB_t - r_t SD_t + \left(\frac{BONDB_t}{R_{t+1}} - \frac{BONDB_t}{R_t}\right).$$
[before-tax profits of the bank sector]

(59) $TAXB_t = d_1 \Pi B_t + d_2 [VBB_t - g_2(VBB_t + L_t)]^2$. [taxes of the bank sector]

(60) $DIVB_t = \Pi B_t - TAXB_t$. [dividends of the bank sector]

(61) $DIV_t = DIVF_t + DIVD_t + DIVB_t$. [total value of dividends].

(62) $$PS_{t+1} = \frac{\frac{1}{5}(DIV_t + DIV_{t-1} + DIV_{t-2} + DIV_{t-3} + DIV_{t-4})}{r_{t+1}}.$$
[stock price for period t]

(63) $TAX_t = TAXH_{1t} + TAXH_{2t} + TAXF_t + TAXD_t + TAXB_t$. [total value of taxes]

(64) $$BR_t = DDB_t + SD_t - L_t - VBILLB_t - \frac{BONDB_t}{R_{t+1}}$$ [bank reserves]

$$= BR_{t-1} + P_t XG_t + W_t HPG_t + r_t VBILLG_t + BONDG_t - TAX_t - (VBILLG_t - VBILLG_{t-1}) - \left(\frac{BONDG_t - BONDG_{t-1}}{R_t}\right).$$

[government budget constraint]

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$(RL_{t-1})$, the bill rate for the current period $(r_t)$—the bill rate for the current period having already been set by the bond dealer—the unconstrained demand for loans of the previous period $(LUN_{t-1})$, and the no-tax proportion $(g_2)$ of bills and bonds. The expected level of funds for the current period is a function of the reserve requirement ratio and of the level of demand deposits and savings deposits of the previous period $[FUNDS_t^e = (1-g_1)(DDB_{t-1} - EMAXDD) + (SD_{t-1} - EMAXSD)]$.

In equations (4) and (5) the loan constraint from the bank sector is allocated to the household ($LHMAX_t$) and firm ($LFMAX_t$) sectors. The allocation is based on the ratio of the sector's unconstrained demand for loans of the previous period to the total unconstrained demand for loans of the previous period. These two equations are new and have not been discussed in the previous chapters.

In Equation (6) the firm sector determines the price of goods ($P_t$), the number of goods to purchase for investment purposes ($INV_t$), the planned level of production ($Y_t^p$), the wage rate ($W_t$), the amount of money to borrow ($LF_t$), the maximum number of worker hours to pay for in the period ($HPFMAX_t$), and the maximum number of goods to sell in the period ($XFMAX_t$). The unconstrained demands for investment goods ($INVUN_t$) and for loans ($LFUN_t$) are also by-products of the decisions of the firm sector. Two of the important determinants of the decision variables of the firm sector are the current loan rate ($RL_t$) and the current loan constraint ($LFMAX_t$), both of which are available from the bank sector's decisions. As can be seen from Table 3-4 (Chapter Three), other important determinants of the decision variables are the lagged values of the price level ($P_{t-1}$), the inventory-sales ratio ($V_{t-1}/\beta_1 X_{t-1}$), the sales level ($X_{t-1}$), the amounts of excess labor ($HPF_{t-1}/MH_{t-1}$) and excess capital ($K_{t-1}^a/KMIN_{t-1}$) on hand, the wage rate ($W_{t-1}$), and the aggregate unconstrained ($HPUN_{t-1}$) and constrained ($HP_{t-1}$) supplies of labor.

In Equation (7) the household sector determines the unconstrained supply of labor ($HPHUN_{1t}$ and $HPHUN_{2t}$), the unconstrained demand for goods ($XHUN_{1t}$ and $XHUN_{2t}$), and the unconstrained demand for loans ($LHUN_t$). In equations (8) and (9) the hours constraint is allocated to households 1 and 2 ($HPHMAX_{1t}$ and $HPHMAX_{2t}$). The allocation is based on the ratio of the household's unconstrained supply of labor for the current period to the total unconstrained supply of labor for the current period. The total number of hours to be allocated is the sum of the maximum number from the firm sector and the number the government chooses to pay for.

In Equations (10) and (11) the goods constraint is allocated to households 1 and 2 ($XHMAX_{1t}$ and $XHMAX_{2t}$). The allocation is based on the ratio of the household's unconstrained demand for goods for the current period to the total unconstrained demand for goods from the household sector for the current period. The total number of goods to be allocated is the maximum number the firm sector will sell, less the number of goods the firm sector chooses to purchase for investment purposes and the number the government chooses to purchase. As mentioned in Section 1.2 (Chapter One), the firm sector and the government are assumed to get all the goods that they want to purchase, and the household sector is the one that is assumed to be subject to a goods constraint. Equations (8) – (11) are new and have not been discussed in previous chapters.

In Equation (12) the household sector determines the constrained supply of labor ($HPH_{1t}$ and $HPH_{2t}$), the constrained demand for goods ($XH_{1t}$ and $XH_{2t}$), and the constrained demand for loans ($LH_t$). The loan, hours, and goods constraints for the current period are important determinants of the decision variables of the household sector, all the information on the constraints being available from the prior decisions of the bank and firm sectors and the government. As can be seen from Table 4-6 (Chapter Four), other variables that may be important determinants of the decision variables, depending on the degree to which the constraints are binding, are the proportional tax parameter ($d_3$), the minimum guaranteed level of income ($YG$), the previous period's savings deposits ($SD_{t-1}$) and loans ($LH_{t-1}$), and the current period's price of goods ($P_t$), wage rate ($W_t$), bill rate ($r_t$), loan rate ($RL_t$), and stock price ($PS_t$).

After the household sector makes its decisions in Equation (12), transactions take place. Equations (13) through (64) refer to these transactions and complete the determination of all the variables in the model. Equations (13)-(15) define the aggregate unconstrained demand for goods, demand for loans, and supply of labor, respectively, and Equations (16)-(18) do likewise for the total constrained quantities. The constrained quantities are the actual quantities traded in the period. Equation (19) determines the actual number of worker hours that the firm sector receives, which is the difference between the total number of hours supplied and the number purchased by the government. The government receives all the labor that it wants in the period, and the firm sector receives the rest. Equation (20) defines the actual number of machines on hand in the current period.

Equations (21)-(29) determine the output and inventory levels of the firm sector. Equation (21) defines the level of inventories that would exist if the firm sector produced the amount planned. Equations (22)-(27) determine the level of worker hour requirements for the planned output. If this level is less than the number of worker hours on hand, then the actual values of production and inventories are the planned values (Equation (28)). If the level is greater than the number of worker hours on hand, then the firm sector must produce less than originally planned. In this case the firm sector produces the maximum amount it can with the number of worker hours that it has on hand (Equation (29)). The computation of output ($Y_t$) in Equation (29) requires the solution of a quadratic equation in output.[a] Equation (30) then defines the minimum number of machines required to produce the output of the period.

Equations (31)-(37) determine the financial variables of the firm sector: depreciation, before-tax profits, taxes, dividends, total cash flow, cash flow net of taxes and dividends, and demand deposits. These equations have all been discussed in Chapter Three, and the only difference between the equations in Table 6-2 and the equations in Chapter Three is the change of notation for the condensed model.

Equations (38)-(41) determine the allocation of bills and bonds to the bank sector and the bond dealer. The bond dealer is assumed to hold no bills

(Equation (38)), so that all the government bills are allocated to the bank sector (Equation (39)). The bank sector holds the rest of its demand for bills and bonds in bonds (Equation (40)), and the bond dealer absorbs the difference between the supply of bonds from the government and the demand from the bank sector (Equation (41)). Since the bank sector is indifferent between holding bills or bonds, the allocation of $VBB_t$ between bills and bonds can be done in any arbitrary way. The choice here was merely to assume that the bond dealer never held any bills, so that the bank sector always held all of the bills issued by the government. The rest of $VBB_t$ was then allocated to bonds. This procedure assumes, of course, that $VBB_t$ is always greater than $VBILLG_t$, which it was for the simulation results below.

Enough information on bills and bonds is now available for the bond dealer to be able to determine the value of the bill rate and the value of the bond rate for the next period (Equation (42)). Equations (43)-(46) determine the other variables of the bond dealer: before-tax profits, taxes, dividends, and demand deposits. These equations are the same as the equations in Chapter Five.

Equations (47) and (48) determine the demand deposits of the household sector, and Equation (49) determines the total level of demand deposits of the bank sector. Equations (50)-(52) determine the before-tax income, taxes, and savings of household 2. Equations (47)-(48) and (50)-(52) are the same as in Chapter Four, with the appropriate change of notation.

Equations (53)-(62) form a system of ten linear simultaneous equations. The simultaneity comes about for two reasons. One reason is that the level of savings deposits of household 1 is a function of the level of dividends, while the level of dividends from the bank sector is a function of the level of savings deposits. The other reason is that the bond dealer needs to know the level of dividends for period $t$ in order to set the stock price for period $t+1$, and yet the stock price for period $t+1$ is needed to compute the capital gains or losses of household 1 for period $t$. The level of capital gains or losses has an effect on the level of the savings deposits of household 1 and thus on the level of dividends of the bank sector. The level of capital gains has an effect on household 1's savings deposits because household 1 pays taxes on its capital gains, and the level of taxes has an effect on household 1's savings in the period. Capital losses, of course, have the opposite effect from capital gains. Since the level of dividends of the bank sector (which is the cause of both simultaneity problems) is small, the degree of simultaneity in the model is not very important, and no attempt was made to eliminate the simultaneity by specifying a more recursive structure.

Equations (53)-(57) define the variables for household 1: capital gains or losses, before-tax income, taxes, savings net of capital gains or losses, and the level of savings deposits. These equations are the same as in Chapter Four, with the appropriate change of notation. Equations (58)-(60) define the variables for the bank sector: before-tax profits, taxes, and dividends. These equations are likewise the same as in Chapter Two, with the appropriate change of notation. Equation (61) defines the total level of dividends in the economy, and Equation (62) defines the stock price for the next period as set by the bond dealer.

Equation (63) determines the total value of taxes collected by the government. Equation (64) determines the level of bank reserves. Because of the government budget constraint, the level of bank reserves can be determined in two ways: one way using the equation for the government budget constraint, and one way using the definition of bank reserves as the sum of demand and savings deposits less the sum of loans and bills and bonds held. A good test that the model has been programmed correctly is to compute the level of bank reserves both ways in Equation (64) and check to see if both answers are the same.

Once the value of bank reserves for period $t$ has been computed in Equation (64), enough information is available for the model to be solved for period $t+1$, starting with equation (2). The values computed for period $t$ obviously have an important effect on the values for period $t+1$. The aggregate unconstrained demand for loans in Equation (14), for example, has a positive effect on the loan rate for the next period (Equation (2) in Table 2-4), and the aggregate unconstrained supply of labor in Equation (15) has a negative effect on the wage rate for the next period (statements [15] and [36] in Table 3-4). The aggregate unconstrained demand for goods in Equation (13) does not, however, have any effect on next period's values. As discussed in Chapter Three, the firm sector is assumed not to observe this demand. The unconstrained demand is computed in Equation (13) because values for it are presented in Table 6-6 below. The difference between the unconstrained and constrained demands for goods is one measure of the disequilibrium nature of the economy.

There are many links in the model between the financial variables and the real variables. Interest rates, for example, have an important influence on the decisions of the firm and household sectors, as does the loan constraint from the bank sector. The stock price also influences the decisions of household 1. The savings behavior of household 1, on the other hand, influences the decisions of the bank sector with a lag of one period. The borrowing behavior of the firm sector and household 2 also influences the decisions of the bank sector with a lag of one period.

One important property of the model, as stressed before, is that all of the flows of funds between the behavioral units have been accounted for. Accounting for these flows already provides important links between the real and financial sectors even without considering interest rate effects. In order to see the flow of funds constraints in the model more explicitly, the model has been translated in terms of the flow-of-funds accounts in Table 6-3. Except for the value of common stocks, which is an asset of the household sector, but not a liability of the bank, firm, and bond-dealer sectors, the total stock of assets in

**Table 6–3. Flow-of-Funds Accounts for the Condensed Model: Stocks of Assets and Liabilities**

| | *Household Sector* | | *Firm Sector* | | *Bank Sector* | | *Bond Dealer* | | *Government* | |
|---|---|---|---|---|---|---|---|---|---|---|
| | *A* | *L* | *A* | *L* | *A* | *L* | *A* | *L* | *A* | *L* |
| 1. Demand Deposits | $\sum_{i=1}^{2} DDH_{it}$ | – | $DDF_t$ | – | – | $DDB_t$ | $DDD_t$ | – | – | – |
| 2. Bank Reserves | – | – | – | – | $BR_t$ | – | – | – | – | $BR_t$ |
| 3. Savings Deposits | $SD_t$ | – | – | – | – | $SD_t$ | – | – | – | – |
| 4. Bank Loans | – | $LH_t$ | – | $LF_t$ | $LB_t$ | – | – | – | – | – |
| 5. Government Bills | – | – | – | – | $VBILLB_t$ | – | $VBILLD_t$ | – | – | $VBILLG_t$ |
| 6. Government Bonds | – | – | – | – | $VBONDB_t$ | – | $VBONDD_t$ | – | – | $VBONDG_t$ |
| 7. Common Stocks | $PS_t$ | – | – | – | – | – | – | – | – | – |

*Note:* Total Assets $- PS_t =$ Total Liabilities

$$VBONDG_t = \frac{BONDG_t}{R_t};\ VBONDB_t = \frac{BONDB_t}{R_t};\ VBONDD_t = \frac{BONDD_t}{R_t}$$

Table 6-3 must equal the total stock of liabilities. This is another useful restriction that can be used to test whether the model has been programmed correctly.

The model can also be translated in terms of the national income accounts, and this is done in Table 6-4. On the income side, the capital gains or losses of the bank sector and the bond dealer must be subtracted from profits in the computation of the national income accounts definition of profits. Also, the national income accounts definition of profits must be adjusted for inventory valuation before being added to wages, capital consumption allowances, and net interest to compute gross national product on the income side. Another good test that the model has been programmed correctly is to compute gross national product in the three ways in Table 6-4 and check to see if all three answers are the same.

A natural definition of the unemployment rate in the model, denoted as $UR_t$, is

$$UR_t = 1 - \frac{HP_t}{HPUN_t}, \tag{6.1}$$

where, as above, $HP_t$ is the aggregate constrained supply of labor (and the actual amount traded) and $HPUN_t$ is the aggregate unconstrained supply of labor. On this definition it is possible for the unemployment rate to be negative. If household 2 is constrained in its borrowing behavior, but not in the number of hours that it can work, then, as described in statement [10] in Table 4-6, the household chooses to work more. This means that the unconstrained supply of labor of household 2 in this case is less than the constrained supply, which, depending on the values for household 1, can cause the aggregate unemployment rate to be negative. There is, of course, no frictional unemployment in the model, so that "full employment" corresponds to a zero unemployment rate. The fact that there is no frictional unemployment in the model is a consequence of not treating search as a decision variable of the households.

The only important exogenous variables in the model are the government values presented in Equation (2) in Table 6-2. One useful way of analyzing the properties of the model is to see how the model responds to various changes in these variables, and the purpose of the next section is to carry out such an analysis. Because of the complexity of even the condensed version of the model, the properties of the model cannot be shown in any convenient graphical way. The condensed model consists of a set of difference equations along with algorithms for determining some of the key variables of the model. The non-condensed model consists of a set of difference equations along with a set of optimal control problems that are solved each period to determine some

**Table 6-4. National Income Accounts for the Condensed Model**

*Expenditure Side*

(1) Consumption (real) = $XH_{1t} + XH_{2t}$
(2) Consumption (money) = $P_t(XH_{1t} + XH_{2t})$
(3) Fixed Investment (real) = $INV_t$
(4) Fixed Investment (money) = $P_t INV_t$
(5) Government Expenditures on Goods (real) = $XG_t$
(6) Government Expenditures on Goods (money) = $P_t XG_t$
(7) Government Expenditures on Labor (real) = $HPG_t$
(8) Government Expenditures on Labor (money) = $W_t HPG_t$
(9) Inventory Investment (real) = $V_t - V_{t-1}$
(10) Inventory Investment (money) = $P_t(V_t - V_{t-1})$
Gross National Product (real) = (1) + (3) + (5) + (7) + (9)
Gross National Product (money) = (2) + (4) + (6) + (8) + (10)

*Income Side*

(1) Wages = $W_t(HPH_{1t} + HPH_{2t})$
(2) Before-Tax Profits Net of Capital Gains and Losses =

$$\Pi B_t - \left(\frac{BONDB_t}{R_{t+1}} - \frac{BONDB_t}{R_t}\right) + \Pi F_t + \Pi D_t - \left(\frac{BONDD_t}{R_{t+1}} - \frac{BONDD_t}{R_t}\right)$$

(3) Inventory Valuation Adjustment = $-(P_t - P_{t-1})V_{t-1}$
(4) Profits and Inventory Valuation Adjustment = (2) + (3)
(5) Capital Consumption Allowances = $DEP_t$
(6) Net Interest = $r_t SD_t - RL_t LH_t - BONDG_t - r_t VBILLG_t$
Gross National Product (money) = (1) + (4) + (5) + (6)

*Production Side*

(1) Production of Goods (real) = $Y_t$
(2) Production of Goods (money) = $P_t Y_t$
(3) Government Expenditures on Labor (real) = $HPG_t$
(4) Government Expenditures on Labor (money) = $W_t HPG_t$
Gross National Product (real) = (1) + (3)
Gross National Product (money) = (2) + (4)

of the key variables. Since neither of these versions is open to any convenient graphical analysis, one must resort to analyzing the properties of the model by means of computer simulation, as is done in the next section.

## 6.2 THE RESPONSE OF THE MODEL TO SHOCKS FROM A POSITION OF EQUILIBRIUM

In this section the results of twelve experiments will be described. Each of the experiments corresponds to changing one or two government values for period $t$. The twelve experiments are:

1. A decrease in the number of goods purchased by the government in period $t$ ($XG_t$: $-5.0$).

2. An increase in the value of bills issued in period $t$ ($VBILLG_t$: +5.0).
3. An increase in the number of goods purchased by the government in period $t$ ($XG_t$: +5.0).
4. A decrease in the value of bills issued in period $t$ ($VBILLG_t$: −5.0).
5. A combination of experiments 1 and 4 ($XG_t$: −5.0 and $VBILLG_t$: −5.0).
6. A combination of experiments 2 and 3 ($XG_t$: +5.0 and $VBILLG_t$: +5.0).
7. An increase in the personal income tax parameter in period $t$ ($d_3$: +0.00554 in period $t$).
8. A decrease in the personal income tax parameter in period $t$ ($d_3$: −0.00554 in period $t$).
9. A decrease in the minimum guaranteed level of income in period $t$ ($YG$: −2.5 in period $t$).
10. An increase in the minimum guaranteed level of income in period $t$ ($YG$: +2.5 in period $t$).
11. A decrease in the number of worker hours paid for by the government in period $t$ ($HPG_t$: −5.0).
12. An increase in the number of worker hours paid for by the government in period $t$ ($HPG_t$: +5.0).

For all the experiments only the government values for period $t$ were changed. The values for periods $t+1$ and beyond were changed back to the original values. It should be noted, however, that when the tax parameters $d_3$ and $YG$ were changed in period $t$, the households were assumed to expect in period $t$ that the change would be permanent. Then in period $t+l$, when the original value was returned to, the households were assumed to expect that the original value would be permanent.

It is also important to note that except for experiments 5 and 6, only one government variable was changed at a time. When, for example, the number of goods purchased by the government was decreased for period $t$ in experiment 1, no change was made in either the value of bills or the number of bonds issued. This meant that any surplus in the government budget resulting from the decrease in spending led to a decrease in bank reserves. No results are presented in Table 6-6 of changing the number of bonds issued by the government ($BONDG_t$) and of changing the reserve requirement ratio ($g_1$), since the effects of these changes are similar to the effects of changing the value of bills issued.

The base run from which the changes were made was a run in which none of the variables changed from period to period. By an appropriate choice of the constant terms (in the equations in Tables 2-4, 3-4, and 4-6), the various parameter values, the initial conditions, and the government values, it was possible to concoct a run in which the model simply repeated itself each period. When the model repeats itself each period, it will be said to be in equilibrium. The experiments described in this section are thus characterized as experiments in which the model in period $t$ is shocked from a prior position of equilibrium.

The shock is a one-period shock in the sense that the value of the shocked variable for periods t+1 and beyond is returned to the equilibrium value.

The parameter values, initial conditions, and government values that were used for the base run are presented in Table 6-5. Only the values that are needed to solve the model for period $t$ are presented in the table. The run for period $t$ is assumed to start with Equation (3) in Table 6-2, so that the values of $r_t$, $R_t$, and $PS_t$, which are set by the bond dealer near the end of period $t-1$, are presented in Table 6-5. The government values for period $t$ and for all future periods are also presented in Table 6-5. One of the tricks involved in concocting a run that repeated itself was to choose the values of the constant terms in Equations (2) and (3) in Table 2-4, Equation (1) in Table 3-4, and Equations (2), (3), (1)′, and (2)′ in Table 4-6 in appropriate ways. Basically, what was done was to pick a consistent[b] set of values of the endogenous variables for period $t-1$ and then choose the values of the constant terms and a few of the other parameters so that this set would be the set of solution values for period $t$. Most of the parameter values in Table 6-5 are the same as were used for the simulation results in Chapters Two through Four. The adjustment-cost parameters $\beta_2$, $\beta_3$, and $\beta_5$ are, however, smaller in Table 6-5 than they are in Table 3-2. The firm sector is double the size of firm $i$ in Chapter Three, and because the adjustment costs are deviations *squared*, doubling the size of firm $i$ causes more than a doubling of the cost of any given aggregate deviation. Before, the aggregate deviation would be split between the two firms, but now it occurs all in the firm sector. Consequently, the values of the four parameters were lowered for the condensed model. The values for the endogenous variables were chosen, whenever possible, to be of the same order of magnitude as data that existed for the U.S. economy.

The results for the base run are presented in Table 6-6 for periods $t$, $t+1$, and $t+2$. The first three variables in the table are real GNP, the unemployment rate, and the government surplus or deficit. Real GNP is defined in Table 6-4, the unemployment rate is defined in Equation (6.1), and the government surplus or deficit is the left-hand side of Equation (1) in Table 5-2. Except for the last five variables, the remaining variables in Table 6-6 are presented in roughly the order in which they are determined in Table 6-2. Some of the less important variables in Table 6-2 have been omitted from Table 6-6 because of space limitations. A number of unconstrained values for the firm and household sectors are presented in Table 6-6, in addition to the maximum values and the constrained values, so that the reader can see how the constraints affect the decisions of the two sectors.

A number of expected or planned values are also presented in Table 6-6, in addition to the actual values, so that the reader can see when expectation errors have been made. *LBMAX*, for example, is the bank sector's expectation of the unconstrained and constrained demands for loans, and *LUN* and *L* are the actual unconstrained and constrained demands for loans, respectively. *L* cannot,

**Table 6-5. Parameter Values, Initial Conditions, and Government Values for the Base Run in Table 6-6**

| | |
|---|---|
| *The Government* | |
| $d_1 = 0.5$ | $BONDG_{t-1} = 12.025$ |
| $d_2 = 0.0028$ | $BONDG_{t+k} = 12.025\ (k=0,1,\ldots)$ |
| $d_3 = 0.1934$ | $HPG_{t+k} = 120.7\ (k=0,1,\ldots)$ |
| $g_1 = 0.1667$ | $VBILLG_{t-1} = 185.0$ |
| $g_2 = 0.2956$ | $VBILLG_{t+k} = 185.0\ (k=0,1,\ldots)$ |
| $YG = 0.0$ | $XG_{t+k} = 96.5\ (k=0,1,\ldots)$ |
| *The Bond Dealer* | |
| $VBD^* = 30.0$ | $r_t = 0.06500$ |
| $\lambda = 0.25$ | $R_t = 0.06500$ |
| $BONDD_{t-1} = 1.95$ | $VBILLD_{t-1} = 0.0$ |
| $DDD_{t-1} = 30.0$ | |
| *The Bank Sector* | |
| $EMAXDD = 3.8$ | $DDB_{t-1} = 192.2$ |
| $EMAXSD = 20.2$ | $LUN_{t-1} = 810.2$ |
| $BR_{t-1} = 55.4$ | $RL_{t-1} = 0.07500$ |
| *The Firm Sector* | |
| $DDF_2 = 5.0$ | $HPF_{t-1} = 637.3$ |
| $EMAXHP + EMAXMH = 25.5$ | $HPF_{t-2} = 637.3$ |
| $\overline{H} = 1.0$ | $HPUN_{t-1} = 758.0$ |
| $m = 10$ | $INV_{t-1} = \ldots = INV_{t-m+1} = 50.0$ |
| $\beta_1 = 0.125$ | $K^a_{t-1} = 500.0$ |
| $\beta_2 = 0.001$ | $KMIN_{t-1} = 500.0$ |
| $\beta_3 = 0.015$ | $LF_{t-1} = 328.1$ |
| $\beta_4 = 0.005$ | $LFUN_{t-1} = 328.1$ |
| $\beta_5 = 0.025$ | $MH_{t-1} = 637.3$ |
| $\beta_{14} = 0.07108$ | $P_{t-1} = \ldots = P_{t-m+1} = 1.0000$ |
| $\lambda_1 = 1.3212$ | $V_{t-1} = 105.3$ |
| $\mu_1 = 1.684$ | $W_{t-1} = 1.0000$ |
| $HP_{t-1} = 758.0$ | $X_{t-1} = 842.0$ |
| *Household 1* | |
| $\gamma_1 = 0.1609$ | $PS_t = 1146.4$ |
| $DDH_{1t-1} = 60.1$ | $SD_{t-1} = 1013.4$ |
| $DIV_{t-1} = \ldots = DIV_{t-4} = 74.5$ | |
| *Household 2* | |
| $\gamma_1 = 0.1609$ | $LH_{t-1} = 482.1$ |
| $DDH_{2t-1} = 51.8$ | $LHUN_{t-1} = 482.1$ |

**Table 6-6. Results of Solving the Condensed Model**

| | *Base Run* t | t+1 | t+2 | | t | t+1 | t+2 |
|---|---|---|---|---|---|---|---|
| Real GNP | 962.7 | 962.7 | 962.7 | $X$ | 842.0 | 842.0 | 842.0 |
| $UR$ | 0.0000 | 0.0000 | 0.0000 | $LUN$ | 810.2 | 810.1 | 810.1 |
| Surplus (+) | 0.0 | 0.0 | 0.0 | $L$ | 810.2 | 810.1 | 810.1 |
| or Deficit (-) | | | | $HPUN$ | 758.0 | 758.0 | 758.0 |
| $r$ | 0.06500 | 0.06500 | 0.06500 | $HP$ | 758.0 | 758.0 | 758.0 |
| $PS$ | 1146.4 | 1146.4 | 1146.4 | $HPF$ | 637.3 | 637.3 | 637.3 |
| $FUNDS^e$ | 1150.2 | 1150.2 | 1150.2 | $MH_4$ | 0.0 | 0.0 | 0.0 |
| $RL$ | 0.07500 | 0.07500 | 0.07500 | $Y$ | 842.0 | 842.0 | 842.0 |
| $VBB$ | 340.0 | 340.0 | 340.0 | $V$ | 105.2 | 105.2 | 105.2 |
| $LBMAX$ | 810.2 | 810.2 | 810.1 | $\Pi F$ | 130.1 | 130.1 | 130.1 |
| $LHMAX$ | 482.1 | 482.1 | 482.1 | $TAXF$ | 65.0 | 65.0 | 65.0 |
| $LFMAX$ | 328.1 | 328.1 | 328.1 | $\overline{CF}$ | 0.0 | 0.0 | 0.0 |
| $LFUN$ | 328.1 | 328.1 | 328.1 | $DDF$ | 50.3 | 50.3 | 50.3 |
| $PUN$ | 1.0000 | 1.0000 | 1.0000 | $VBILLB$ | 185.0 | 185.0 | 185.0 |
| $INVUN$ | 50.0 | 50.0 | 50.0 | $BONDB$ | 10.07 | 10.07 | 10.07 |
| $Y^pUN$ | 842.0 | 842.0 | 842.0 | $BONDD$ | 1.95 | 1.95 | 1.95 |
| $WUN$ | 1.0000 | 1.0000 | 1.0000 | $\Pi D$ | 1.95 | 1.95 | 1.95 |
| $HPFMAXUN$ | 637.3 | 637.3 | 637.3 | $TAXD$ | 0.98 | 0.98 | 0.98 |
| $LF$ | 328.1 | 328.1 | 328.1 | $CGD$ | 0.00 | 0.00 | 0.00 |
| $P$ | 1.0000 | 1.0000 | 1.0000 | $DDD$ | 30.0 | 30.0 | 30.0 |
| $INV$ | 50.0 | 50.0 | 50.0 | $DDH_1$ | 60.1 | 60.1 | 60.1 |
| $Y^p$ | 842.0 | 842.0 | 842.0 | $DDH_2$ | 51.8 | 51.8 | 51.8 |
| $X^e$ | 842.0 | 842.0 | 842.0 | $DDB$ | 192.2 | 192.2 | 192.2 |
| $V^p$ | 105.2 | 105.2 | 105.2 | $YH_2$ | 435.0 | 435.0 | 435.0 |
| $W$ | 1.0000 | 1.0000 | 1.0000 | $TAXH_2$ | 77.1 | 77.1 | 77.1 |
| $HPFMAX$ | 637.3 | 637.3 | 637.3 | $SAV_2$ | 0.0 | 0.0 | 0.0 |
| $K^a/KMIN^p$ | 1.000 | 1.000 | 1.000 | $CG$ | 0.0 | 0.0 | 0.0 |
| $HPFMAX/MH^p$ | 1.000 | 1.000 | 1.000 | $YH_1$ | 463.4 | 463.4 | 463.4 |
| $MH_4^p$ | 0.0 | 0.0 | 0.0 | $TAXH_1$ | 89.6 | 89.6 | 89.6 |
| $HPHUN_1$ | 323.0 | 323.0 | 323.0 | $SAV_1$ | 0.0 | 0.0 | 0.0 |
| $XHUN_1$ | 373.8 | 373.8 | 373.8 | $SD$ | 1013.3 | 1013.3 | 1013.3 |
| $HPHUN_2$ | 435.0 | 435.0 | 435.0 | $CGB$ | 0.0 | 0.0 | 0.0 |
| $XHUN_2$ | 321.7 | 321.7 | 321.7 | $\Pi B$ | 17.0 | 17.0 | 17.0 |
| $LHUN$ | 482.1 | 482.1 | 482.1 | $TAXB$ | 8.5 | 8.5 | 8.5 |
| $HPHMAX_1$ | 323.0 | 323.0 | 323.0 | $DIVB$ | 8.5 | 8.5 | 8.5 |
| $HPHMAX_2$ | 435.0 | 435.0 | 435.0 | $DIV$ | 74.5 | 74.5 | 74.5 |
| $HPH_1$ | 323.0 | 323.0 | 323.0 | $TAX$ | 241.3 | 241.3 | 241.3 |
| $XH_1$ | 373.8 | 373.8 | 373.8 | $BR$ | 55.4 | 55.4 | 55.4 |
| $SD^p$ | 1013.3 | 1013.3 | 1013.3 | $BR^{**}$ | 55.4 | 55.4 | 55.4 |
| $HPH_2$ | 435.0 | 435.0 | 435.0 | $V/(\beta_1 X)$ | 1.000 | 1.000 | 1.000 |
| $XH_2$ | 321.7 | 321.7 | 321.7 | $HPF/MH$ | 1.000 | 1.000 | 1.000 |
| $LH$ | 482.1 | 482.1 | 482.1 | $K^a/KMIN$ | 1.000 | 1.000 | 1.000 |
| $XUN$ | 842.0 | 842.0 | 842.0 | $EXBB$ | 0.0 | 0.0 | 0.0 |

**Table 6–6. (continued)**

| | *Experiment 1 ($XG_t$:-5.0)* | | | | | | |
|---|---|---|---|---|---|---|---|
| | *t* | *t+1* | *t+2* | | *t* | *t+1* | *t+2* |
| Real GNP | 962.2 | 955.3 | 955.7 | $X$ | 837.0 | 836.1 | 836.5 |
| $UR$ | 0.0000 | 0.0035 | 0.0052 | $LUN$ | 810.2 | 812.3 | 806.0 |
| Surplus (+) | 4.5 | −4.7 | −3.7 | $L$ | 810.2 | 807.3 | 805.1 |
| or Deficit (–) | | | | $HPUN$ | 758.0 | 758.0 | 758.7 |
| $r$ | 0.06500 | 0.06500 | 0.06505 | $HP$ | 758.0 | 755.3 | 754.8 |
| $PS$ | 1146.4 | 1145.6 | 1137.7 | $HPF$ | 637.3 | 634.6 | 634.1 |
| $FUNDS^e$ | 1150.2 | 1146.4 | 1146.8 | $MH_4$ | 0.4 | 0.0 | 0.0 |
| $RL$ | 0.07500 | 0.07507 | 0.07517 | $Y$ | 841.5 | 834.6 | 835.0 |
| $VBB$ | 340.0 | 338.9 | 339.0 | $V$ | 109.7 | 108.3 | 106.8 |
| $LBMAX$ | 810.2 | 807.5 | 807.8 | $\Pi F$ | 129.6 | 125.8 | 127.0 |
| $LHMAX$ | 482.1 | 480.5 | 478.8 | $TAXF$ | 64.8 | 62.9 | 63.5 |
| $LFMAX$ | 328.1 | 327.0 | 329.0 | $\overline{CF}$ | −4.5 | 4.1 | 2.0 |
| $LFUN$ | 328.1 | 330.8 | 326.3 | $DDF$ | 45.8 | 48.7 | 50.1 |
| $PUN$ | 1.0000 | 0.9979 | 0.9974 | $VBILLB$ | 185.0 | 185.0 | 185.0 |
| $INVUN$ | 50.0 | 48.9 | 49.4 | $BONDB$ | 10.07 | 10.00 | 10.02 |
| $Y^pUN$ | 842.0 | 837.3 | 835.0 | $BONDD$ | 1.95 | 2.02 | 2.01 |
| $WUN$ | 1.0000 | 0.9987 | 0.9961 | $\Pi D$ | 1.95 | 2.00 | 1.99 |
| $HPFMAXUN$ | 637.3 | 636.6 | 634.1 | $TAXD$ | 0.98 | 1.00 | 1.00 |
| $LF$ | 328.1 | 326.8 | 326.3 | $CGD$ | 0.00 | −0.02 | −0.02 |
| $P$ | 1.0000 | 0.9985 | 0.9974 | $DDD$ | 30.0 | 28.9 | 29.1 |
| $INV$ | 50.0 | 47.3 | 49.4 | $DDH_1$ | 60.1 | 59.9 | 59.7 |
| $Y^p$ | 842.0 | 834.6 | 835.0 | $DDH_2$ | 51.8 | 51.3 | 51.1 |
| $X^e$ | 842.0 | 837.4 | 836.3 | $DDB$ | 187.7 | 188.8 | 190.1 |
| $V^p$ | 105.2 | 106.9 | 107.0 | $YH_2$ | 435.0 | 432.7 | 431.6 |
| $W$ | 1.0000 | 0.9977 | 0.9961 | $TAXH_2$ | 77.1 | 76.7 | 76.5 |
| $HPFMAX$ | 637.3 | 634.6 | 634.1 | $SAV_2$ | 0.0 | 1.1 | 1.5 |
| $K^a/KMIN^p$ | 1.000 | 1.003 | 1.002 | $CG$ | −0.8 | −7.9 | −6.0 |
| $HPFMAX/MH^p$ | 1.000 | 1.004 | 1.003 | $YH_1$ | 463.1 | 458.9 | 458.9 |
| $MH_4^p$ | 0.0 | 0.0 | 0.0 | $TAXH_1$ | 89.4 | 87.2 | 87.6 |
| $HPHUN_1$ | 323.0 | 322.7 | 323.2 | $SAV_1$ | −0.1 | −0.7 | 0.1 |
| $XHUN_1$ | 373.8 | 373.5 | 373.0 | $SD$ | 1013.3 | 1012.8 | 1013.1 |
| $HPHUN_2$ | 435.0 | 435.3 | 435.6 | $CGB$ | 0.0 | −0.1 | −0.1 |
| $XHUN_2$ | 321.7 | 321.2 | 320.8 | $\Pi B$ | 17.0 | 16.7 | 16.6 |
| $LHUN$ | 482.1 | 481.5 | 479.7 | $TAXB$ | 8.5 | 8.3 | 8.3 |
| $HPHMAX_1$ | 323.0 | 321.6 | 321.5 | $DIVB$ | 8.5 | 8.3 | 8.3 |
| $HPHMAX_2$ | 435.0 | 433.7 | 433.3 | $DIV$ | 74.3 | 72.2 | 72.8 |
| $HPH_1$ | 323.0 | 321.6 | 321.5 | $TAX$ | 240.8 | 236.2 | 236.9 |
| $XH_1$ | 373.8 | 372.9 | 372.2 | $BR$ | 50.9 | 55.5 | 59.2 |
| $SD^p$ | 1013.3 | 1013.1 | 1012.9 | $BR^{**}$ | 54.7 | 54.8 | 55.0 |
| $HPH_2$ | 435.0 | 433.7 | 433.3 | $V/(\beta_1 X)$ | 1.049 | 1.036 | 1.021 |
| $XH_2$ | 321.7 | 319.3 | 318.4 | $HPF/MH$ | 1.000 | 1.004 | 1.003 |
| $LH$ | 482.1 | 480.5 | 478.8 | $K^a/KMIN$ | 1.001 | 1.003 | 1.002 |
| $XUN$ | 837.0 | 840.1 | 839.7 | $EXBB$ | 0.0 | 1.1 | 0.9 |

**Table 6–6. (continued)**

| | *Experiment 2* ($VBILLG_t$:+5.0) *t* | *t+1* | *t+2* | | *t* | *t+1* | *t+2* |
|---|---|---|---|---|---|---|---|
| Real GNP | 962.7 | 961.7 | 958.7 | *X* | 842.0 | 838.5 | 837.8 |
| *UR* | 0.0000 | 0.0028 | 0.0035 | *LUN* | 810.2 | 809.2 | 808.9 |
| Surplus (+) | −1.4 | −0.4 | −2.2 | *L* | 810.2 | 807.8 | 808.6 |
| or Deficit (–) | | | | *HPUN* | 758.0 | 759.6 | 759.3 |
| *r* | 0.06500 | 0.06522 | 0.06524 | *HP* | 758.0 | 757.5 | 756.6 |
| *PS* | 1146.4 | 1142.0 | 1141.3 | *HPF* | 637.3 | 636.8 | 635.9 |
| $FUNDS^e$ | 1150.2 | 1146.8 | 1149.2 | $MH_4$ | 0.0 | 0.2 | 0.0 |
| *RL* | 0.07500 | 0.07516 | 0.07517 | *Y* | 842.0 | 841.0 | 838.0 |
| *VBB* | 340.0 | 339.0 | 339.7 | *V* | 105.2 | 107.8 | 107.9 |
| *LBMAX* | 810.2 | 807.8 | 809.5 | $\Pi F$ | 130.1 | 130.2 | 128.1 |
| *LHMAX* | 482.1 | 480.7 | 481.2 | *TAXF* | 65.0 | 65.1 | 64.1 |
| *LFMAX* | 328.1 | 327.1 | 328.3 | $\overline{CF}$ | 0.0 | −2.2 | 0.9 |
| *LFUN* | 328.1 | 328.1 | 329.2 | *DDF* | 50.3 | 47.1 | 49.1 |
| *PUN* | 1.0000 | 1.0002 | 0.9991 | *VBILLB* | 190.0 | 185.0 | 185.0 |
| *INVUN* | 50.0 | 50.0 | 49.4 | *BONDB* | 9.75 | 10.05 | 10.09 |
| $Y^pUN$ | 842.0 | 842.0 | 838.6 | *BONDD* | 2.28 | 1.98 | 1.93 |
| *WUN* | 1.0000 | 1.0001 | 0.9982 | $\Pi D$ | 2.16 | 1.97 | 1.94 |
| *HPFMAXUN* | 637.3 | 637.3 | 636.4 | *TAXD* | 1.08 | 0.99 | 0.97 |
| *LF* | 328.1 | 327.1 | 328.2 | *CGD* | −0.12 | −0.01 | 0.01 |
| *P* | 1.0000 | 1.0004 | 0.9992 | *DDD* | 25.1 | 29.7 | 30.4 |
| *INV* | 50.0 | 49.6 | 49.0 | $DDH_1$ | 60.1 | 60.0 | 59.8 |
| $Y^p$ | 842.0 | 841.3 | 838.0 | $DDH_2$ | 51.8 | 51.5 | 51.5 |
| $X^e$ | 842.0 | 841.9 | 838.8 | *DDB* | 187.3 | 188.2 | 190.8 |
| $V^p$ | 105.2 | 104.6 | 106.9 | $YH_2$ | 435.0 | 434.3 | 433.1 |
| *W* | 1.0000 | 0.9998 | 0.9979 | $TAXH_2$ | 77.1 | 77.0 | 76.8 |
| *HPFMAX* | 637.3 | 636.8 | 635.9 | $SAV_2$ | 0.0 | 1.1 | 0.3 |
| $K^a/KMIN^p$ | 1.000 | 1.000 | 1.002 | *CG* | −4.4 | −0.8 | −3.3 |
| $HPFMAX/MH^p$ | 1.000 | 1.000 | 1.003 | $YH_1$ | 463.3 | 463.6 | 461.6 |
| $MH_4^p$ | 0.0 | 0.0 | 0.0 | $TAXH_1$ | 88.7 | 89.5 | 88.6 |
| $HPHUN_1$ | 323.0 | 324.0 | 323.7 | $SAV_1$ | 0.7 | 1.4 | 1.1 |
| $XHUN_1$ | 373.8 | 373.0 | 372.7 | *SD* | 1014.1 | 1015.7 | 1017.0 |
| $HPHUN_2$ | 435.0 | 435.6 | 435.6 | *CGB* | −0.5 | 0.0 | 0.0 |
| $XHUN_2$ | 321.7 | 321.1 | 320.8 | $\Pi B$ | 16.4 | 16.5 | 16.6 |
| *LHUN* | 482.1 | 481.0 | 479.8 | *TAXB* | 8.2 | 8.3 | 8.3 |
| $HPHMAX_1$ | 323.0 | 323.1 | 322.5 | *DIVB* | 8.2 | 8.3 | 8.3 |
| $HPHMAX_2$ | 435.0 | 434.4 | 434.0 | *DIV* | 74.3 | 74.4 | 73.3 |
| $HPH_1$ | 323.0 | 323.1 | 322.5 | *TAX* | 240.2 | 240.9 | 238.8 |
| $XH_1$ | 373.8 | 372.5 | 372.1 | *BR* | 51.8 | 57.2 | 59.4 |
| $SD^p$ | 1013.3 | 1015.7 | 1017.3 | *BR*** | 54.6 | 54.7 | 55.2 |
| $HPH_2$ | 435.0 | 434.4 | 434.0 | $V/(\beta_1X)$ | 1.000 | 1.028 | 1.031 |
| $XH_2$ | 321.7 | 319.9 | 320.2 | *HPF/MH* | 1.000 | 1.000 | 1.002 |
| *LH* | 482.1 | 480.7 | 480.4 | $K^a/KMIN$ | 1.000 | 1.000 | 1.002 |
| *XUN* | 842.0 | 840.5 | 839.3 | *EXBB* | 5.0 | 0.4 | −0.4 |

**Table 6–6. (continued)**

| | *Experiment 3 ($XG_t$:+5.0)* | | | | | | |
|---|---|---|---|---|---|---|---|
| | *t* | *t+1* | *t+2* | | *t* | *t+1* | *t+2* |
| Real GNP | 962.1 | 962.0 | 961.6 | $X$ | 847.0 | 843.2 | 842.8 |
| $UR$ | 0.0000 | 0.0000 | 0.0000 | $LUN$ | 810.2 | 805.1 | 808.3 |
| Surplus (+) | −5.5 | 0.4 | −0.1 | $L$ | 810.2 | 805.1 | 808.3 |
| or Deficit (−) | | | | $HPUN$ | 758.0 | 757.8 | 757.2 |
| $r$ | 0.06500 | 0.06500 | 0.06494 | $HP$ | 758.0 | 757.8 | 757.2 |
| $PS$ | 1146.4 | 1145.6 | 1147.4 | $HPF$ | 637.3 | 637.1 | 636.5 |
| $FUNDS^e$ | 1150.2 | 1154.7 | 1151.3 | $MH_4$ | 0.4 | 0.2 | 0.0 |
| $RL$ | 0.07500 | 0.07492 | 0.07479 | $Y$ | 841.4 | 841.3 | 840.9 |
| $VBB$ | 340.0 | 341.3 | 340.3 | $V$ | 99.7 | 97.7 | 95.8 |
| $LBMAX$ | 810.2 | 813.4 | 811.0 | $\Pi F$ | 129.5 | 130.9 | 130.6 |
| $LHMAX$ | 482.1 | 484.0 | 486.2 | $TAXF$ | 64.8 | 65.4 | 65.3 |
| $LFMAX$ | 328.1 | 329.4 | 324.8 | $\overline{CF}$ | 5.6 | 0.3 | 1.8 |
| $LFUN$ | 328.1 | 322.4 | 324.3 | $DDF$ | 55.9 | 50.5 | 54.1 |
| $PUN$ | 1.0000 | 1.0025 | 1.0037 | $VBILLB$ | 185.0 | 185.0 | 185.0 |
| $INVUN$ | 50.0 | 51.4 | 50.1 | $BONDB$ | 10.07 | 10.16 | 10.09 |
| $Y^pUN$ | 842.0 | 844.4 | 844.5 | $BONDD$ | 1.95 | 1.86 | 1.94 |
| $WUN$ | 1.0000 | 1.0022 | 1.0039 | $\Pi D$ | 1.95 | 1.89 | 1.94 |
| $HPFMAXUN$ | 637.3 | 639.2 | 639.2 | $TAXD$ | 0.98 | 0.94 | 0.97 |
| $LF$ | 328.1 | 322.4 | 324.3 | $CGD$ | 0.00 | 0.03 | 0.00 |
| $P$ | 1.0000 | 1.0025 | 1.0037 | $DDD$ | 30.0 | 31.3 | 30.2 |
| $INV$ | 50.0 | 51.4 | 50.1 | $DDH_1$ | 60.1 | 60.2 | 60.4 |
| $Y^p$ | 842.0 | 844.4 | 844.5 | $DDH_2$ | 51.8 | 51.9 | 52.0 |
| $X^e$ | 842.0 | 846.4 | 843.0 | $DDB$ | 197.8 | 194.0 | 196.7 |
| $V^p$ | 105.2 | 97.7 | 99.3 | $YH_2$ | 435.0 | 435.5 | 435.8 |
| $W$ | 1.0000 | 1.0022 | 1.0039 | $TAXH_2$ | 77.1 | 77.2 | 77.3 |
| $HPFMAX$ | 637.3 | 639.2 | 639.2 | $SAV_2$ | 0.0 | −0.5 | −1.2 |
| $K^a/KMIN^p$ | 1.000 | 1.000 | 1.000 | $CG$ | −0.8 | 1.8 | 0.6 |
| $HPFMAX/MH^p$ | 1.000 | 1.000 | 1.000 | $YH_1$ | 463.1 | 464.6 | 464.8 |
| $MH_4^p$ | 0.0 | 0.0 | 0.0 | $TAXH_1$ | 89.4 | 90.2 | 90.0 |
| $HPHUN_1$ | 323.0 | 323.2 | 323.2 | $SAV_1$ | −0.1 | −0.1 | −0.4 |
| $XHUN_1$ | 373.8 | 373.5 | 373.9 | $SD$ | 1013.3 | 1013.1 | 1012.5 |
| $HPHUN_2$ | 435.0 | 434.6 | 434.1 | $CGB$ | 0.0 | 0.1 | 0.0 |
| $XHUN_2$ | 321.7 | 321.8 | 322.3 | $\Pi B$ | 17.0 | 16.8 | 16.8 |
| $LHUN$ | 482.1 | 482.7 | 484.0 | $TAXB$ | 8.5 | 8.4 | 8.4 |
| $HPHMAX_1$ | 323.0 | 324.1 | 324.3 | $DIVB$ | 8.5 | 8.4 | 8.4 |
| $HPHMAX_2$ | 435.0 | 435.8 | 435.6 | $DIV$ | 74.2 | 74.8 | 74.7 |
| $HPH_1$ | 323.0 | 323.2 | 323.2 | $TAX$ | 240.8 | 242.2 | 242.0 |
| $XH_1$ | 373.8 | 373.5 | 373.9 | $BR$ | 60.9 | 60.4 | 60.5 |
| $SD^p$ | 1013.3 | 1013.2 | 1012.5 | $BR^{**}$ | 56.3 | 55.7 | 56.1 |
| $HPH_2$ | 435.0 | 434.6 | 434.1 | $V/(\beta_1 X)$ | 0.942 | 0.927 | 0.910 |
| $XH_2$ | 321.7 | 321.8 | 322.3 | $HPF/MH$ | 1.000 | 1.000 | 1.000 |
| $LH$ | 482.1 | 482.7 | 484.0 | $K^a/KMIN$ | 1.001 | 1.004 | 1.004 |
| $XUN$ | 847.0 | 843.2 | 842.8 | $EXBB$ | 0.0 | −1.3 | −0.2 |

**Table 6–6. (continued)**

| | Experiment 4 (VBILLG:-5.0) t | t+1 | t+2 | | t | t+1 | t+2 |
|---|---|---|---|---|---|---|---|
| Real GNP | 962.7 | 960.4 | 961.5 | $X$ | 842.0 | 843.1 | 842.5 |
| $UR$ | 0.0000 | 0.0000 | -0.0008 | $LUN$ | 810.2 | 811.1 | 808.0 |
| Surplus (+) or Deficit (–) | 1.4 | -0.6 | -0.3 | $L$ | 810.2 | 811.1 | 806.6 |
| | | | | $HPUN$ | 758.0 | 756.3 | 756.6 |
| $r$ | 0.06500 | 0.06478 | 0.06477 | $HP$ | 758.0 | 756.3 | 757.1 |
| $PS$ | 1146.4 | 1150.9 | 1150.6 | $HPF$ | 637.3 | 635.6 | 636.4 |
| $FUNDS^e$ | 1150.2 | 1153.5 | 1150.6 | $MH_4$ | 0.0 | 0.0 | 0.0 |
| $RL$ | 0.07500 | 0.07484 | 0.07483 | $Y$ | 842.0 | 839.7 | 840.8 |
| $VBB$ | 340.0 | 340.9 | 340.1 | $V$ | 105.2 | 101.8 | 100.1 |
| $LBMAX$ | 810.2 | 812.5 | 810.5 | $\Pi F$ | 130.1 | 129.4 | 130.2 |
| $LHMAX$ | 482.1 | 483.5 | 482.7 | $TAXF$ | 65.0 | 64.7 | 65.1 |
| $LFMAX$ | 328.1 | 329.1 | 327.8 | $\overline{CF}$ | 0.0 | 3.5 | 1.6 |
| $LFUN$ | 328.1 | 328.0 | 323.8 | $DDF$ | 50.3 | 53.7 | 51.1 |
| $PUN$ | 1.0000 | 0.9998 | 1.0010 | $VBILLB$ | 180.0 | 185.0 | 185.0 |
| $INVUN$ | 50.0 | 50.0 | 49.9 | $BONDB$ | 10.40 | 10.10 | 10.05 |
| $Y^pUN$ | 842.0 | 842.0 | 841.9 | $BONDD$ | 1.63 | 1.92 | 1.98 |
| $WUN$ | 1.0000 | 0.9999 | 1.0014 | $\Pi D$ | 1.71 | 1.93 | 1.97 |
| $HPFMAXUN$ | 637.3 | 637.3 | 637.3 | $TAXD$ | 0.85 | 0.96 | 0.98 |
| $LF$ | 328.1 | 328.0 | 323.8 | $CGD$ | 0.08 | 0.01 | -0.01 |
| $P$ | 1.0000 | 0.9998 | 1.0010 | $DDD$ | 34.9 | 30.3 | 29.5 |
| $INV$ | 50.0 | 50.0 | 49.9 | $DDH_1$ | 60.1 | 60.2 | 60.3 |
| $Y^p$ | 842.0 | 842.0 | 841.9 | $DDH_2$ | 51.8 | 51.8 | 51.8 |
| $X^e$ | 842.0 | 842.1 | 842.8 | $DDB$ | 197.1 | 196.1 | 192.7 |
| $V^p$ | 105.2 | 105.2 | 100.9 | $YH_2$ | 435.0 | 434.3 | 435.5 |
| $W$ | 1.0000 | 0.9999 | 1.0014 | $TAXH_2$ | 77.1 | 77.0 | 77.2 |
| $HPFMAX$ | 637.3 | 637.3 | 637.3 | $SAV_2$ | 0.0 | -1.0 | 0.3 |
| $K^a/KMIN^p$ | 1.000 | 1.000 | 1.000 | $CG$ | 4.4 | -0.3 | -0.3 |
| $HPFMAX/MH^p$ | 1.000 | 1.000 | 1.000 | $YH_1$ | 463.5 | 461.8 | 462.6 |
| $MH_4^p$ | 0.0 | 0.0 | 0.0 | $TAXH_1$ | 90.5 | 89.2 | 89.4 |
| $HPHUN_1$ | 323.0 | 322.0 | 322.2 | $SAV_1$ | -0.8 | -1.9 | -1.7 |
| $XHUN_1$ | 373.8 | 374.5 | 374.5 | $SD$ | 1012.6 | 1010.6 | 1008.8 |
| $HPHUN_2$ | 435.0 | 434.3 | 434.3 | $CGB$ | 0.5 | 0.0 | -0.1 |
| $XHUN_2$ | 321.7 | 322.2 | 322.3 | $\Pi B$ | 17.6 | 17.4 | 17.0 |
| $LHUN$ | 482.1 | 483.1 | 484.1 | $TAXB$ | 8.8 | 8.7 | 8.5 |
| $HPHMAX_1$ | 323.0 | 322.7 | 322.8 | $DIVB$ | 8.8 | 8.7 | 8.5 |
| $HPHMAX_2$ | 435.0 | 435.3 | 435.1 | $DIV$ | 74.7 | 74.3 | 74.6 |
| $HPH_1$ | 323.0 | 322.0 | 322.2 | $TAX$ | 242.3 | 240.6 | 241.2 |
| $XH_1$ | 373.8 | 374.5 | 374.5 | $BR$ | 59.0 | 54.6 | 54.9 |
| $SD^p$ | 1013.3 | 1010.7 | 1008.7 | $BR^{**}$ | 56.2 | 56.0 | 55.5 |
| $HPH_2$ | 435.0 | 434.3 | 434.9 | $V/(\beta_1 X)$ | 1.000 | 0.966 | 0.950 |
| $XH_2$ | 321.7 | 322.2 | 321.5 | $HPF/MH$ | 1.000 | 1.000 | 1.000 |
| $LH$ | 482.1 | 483.1 | 482.7 | $K^a/KMIN$ | 1.000 | 1.003 | 1.001 |
| $XUN$ | 842.0 | 843.1 | 843.2 | $EXBB$ | -5.0 | -0.3 | 0.5 |

**Table 6–6. (continued)**

| | Experiment 5 ($XG_t$:–5.0, $VBILLG_t$:–5.0) | | | | | | |
|---|---|---|---|---|---|---|---|
| | *t* | *t+1* | *t+2* | | *t* | *t+1* | *t+2* |
| Real GNP | 962.2 | 956.1 | 959.2 | $X$ | 837.0 | 839.6 | 839.3 |
| $UR$ | 0.0000 | 0.0007 | 0.0021 | $LUN$ | 810.2 | 813.3 | 807.3 |
| Surplus (+) | 5.9 | –4.4 | –1.3 | $L$ | 810.2 | 809.7 | 805.0 |
| or Deficit (–) | | | | $HPUN$ | 758.0 | 756.4 | 757.4 |
| $r$ | 0.06500 | 0.06478 | 0.06482 | $HP$ | 758.0 | 755.8 | 755.7 |
| $PS$ | 1146.4 | 1150.1 | 1142.5 | $HPF$ | 637.3 | 635.1 | 635.0 |
| $FUNDS^e$ | 1150.2 | 1149.7 | 1147.9 | $MH_4$ | 0.4 | 0.1 | 0.0 |
| $RL$ | 0.07500 | 0.07491 | 0.07499 | $Y$ | 841.5 | 835.4 | 838.5 |
| $VBB$ | 340.0 | 339.8 | 339.3 | $V$ | 109.7 | 105.5 | 104.7 |
| $LBMAX$ | 810.2 | 809.9 | 808.6 | $\Pi F$ | 129.6 | 125.4 | 129.4 |
| $LHMAX$ | 482.1 | 481.9 | 479.7 | $TAXF$ | 64.8 | 62.7 | 64.7 |
| $LFMAX$ | 328.1 | 328.0 | 328.8 | $\overline{CF}$ | –4.5 | 6.5 | 0.3 |
| $LFUN$ | 328.1 | 330.8 | 325.2 | $DDF$ | 45.8 | 52.1 | 49.9 |
| $PUN$ | 1.0000 | 0.9977 | 0.9985 | $VBILLB$ | 180.0 | 185.0 | 185.0 |
| $INVUN$ | 50.0 | 48.9 | 50.2 | $BONDB$ | 10.40 | 10.03 | 10.00 |
| $Y^pUN$ | 842.0 | 837.3 | 838.5 | $BONDD$ | 1.63 | 2.00 | 2.02 |
| $WUN$ | 1.0000 | 0.9986 | 0.9980 | $\Pi D$ | 1.71 | 1.98 | 2.00 |
| $HPFMAXUN$ | 637.3 | 636.6 | 635.0 | $TAXD$ | 0.85 | 0.99 | 1.00 |
| $LF$ | 328.1 | 327.8 | 325.2 | $CGD$ | 0.08 | –0.02 | –0.03 |
| $P$ | 1.0000 | 0.9981 | 0.9985 | $DDD$ | 34.9 | 29.2 | 28.8 |
| $INV$ | 50.0 | 47.7 | 50.2 | $DDH_1$ | 60.1 | 60.1 | 60.0 |
| $Y^p$ | 842.0 | 835.4 | 838.5 | $DDH_2$ | 51.8 | 51.6 | 51.2 |
| $X^e$ | 842.0 | 837.5 | 839.5 | $DDB$ | 192.7 | 193.0 | 189.9 |
| $V^p$ | 105.2 | 107.6 | 104.6 | $YH_2$ | 435.0 | 433.4 | 433.1 |
| $W$ | 1.0000 | 0.9979 | 0.9980 | $TAXH_2$ | 77.1 | 76.8 | 76.8 |
| $HPFMAX$ | 637.3 | 635.1 | 635.0 | $SAV_2$ | 0.0 | 0.0 | 1.9 |
| $K^a/KMIN^p$ | 1.000 | 1.003 | 1.000 | $CG$ | 3.6 | –7.5 | –2.3 |
| $HPFMAX/MH^p$ | 1.000 | 1.004 | 1.001 | $YH_1$ | 463.2 | 458.6 | 460.6 |
| $MH_4^p$ | 0.0 | 0.0 | 0.0 | $TAXH_1$ | 90.3 | 87.2 | 88.6 |
| $HPHUN_1$ | 323.0 | 321.8 | 322.4 | $SAV_1$ | –0.8 | –2.2 | –1.0 |
| $XHUN_1$ | 373.8 | 374.4 | 373.9 | $SD$ | 1012.5 | 1010.4 | 1009.4 |
| $HPHUN_2$ | 435.0 | 434.6 | 434.9 | $CGB$ | 0.5 | –0.1 | –0.1 |
| $XHUN_2$ | 321.7 | 321.8 | 321.5 | $\Pi B$ | 17.6 | 17.1 | 16.8 |
| $LHUN$ | 482.1 | 482.6 | 482.1 | $TAXB$ | 8.8 | 8.6 | 8.4 |
| $HPHMAX_1$ | 323.0 | 321.5 | 321.7 | $DIVB$ | 8.8 | 8.6 | 8.4 |
| $HPHMAX_2$ | 435.0 | 434.3 | 434.0 | $DIV$ | 74.4 | 72.3 | 74.1 |
| $HPH_1$ | 323.0 | 321.5 | 321.7 | $TAX$ | 241.9 | 236.3 | 239.5 |
| $XH_1$ | 373.8 | 374.3 | 373.6 | $BR$ | 54.5 | 53.9 | 55.2 |
| $SD^p$ | 1013.3 | 1010.7 | 1008.9 | $BR^{**}$ | 55.5 | 55.5 | 55.0 |
| $HPH_2$ | 435.0 | 434.3 | 434.0 | $V/(\beta_1 X)$ | 1.049 | 1.005 | 0.998 |
| $XH_2$ | 321.7 | 321.1 | 319.0 | $HPF/MH$ | 1.000 | 1.004 | 1.001 |
| $LH$ | 482.1 | 481.9 | 479.7 | $K^a/KMIN$ | 1.001 | 1.003 | 1.000 |
| $XUN$ | 837.0 | 841.6 | 842.2 | $EXBB$ | –5.0 | 0.8 | 1.2 |

**Table 6-6. (continued)**

| | Experiment 6 ($XG_t$:+5.0, $VBILLG_t$:+5.0) | | | | | | |
|---|---|---|---|---|---|---|---|
| | t | t+1 | t+2 | | t | t+1 | t+2 |
| Real GNP | 962.1 | 964.1 | 962.8 | $X$ | 847.0 | 842.1 | 839.1 |
| $UR$ | 0.0000 | 0.0000 | 0.0000 | $LUN$ | 810.2 | 804.2 | 810.4 |
| Surplus (+) | -6.8 | 0.9 | 1.0 | $L$ | 810.2 | 804.2 | 806.9 |
| or Deficit (-) | | | | $HPUN$ | 758.0 | 759.5 | 758.3 |
| $r$ | 0.06500 | 0.06522 | 0.06518 | $HP$ | 758.0 | 759.5 | 758.3 |
| $PS$ | 1146.4 | 1141.2 | 1143.0 | $HPF$ | 637.3 | 638.8 | 637.6 |
| $FUNDS^e$ | 1150.2 | 1151.4 | 1150.9 | $MH_4$ | 0.4 | 0.4 | 0.1 |
| $RL$ | 0.07500 | 0.07507 | 0.07495 | $Y$ | 841.4 | 843.4 | 842.1 |
| $VBB$ | 340.0 | 340.4 | 340.2 | $V$ | 99.7 | 101.0 | 104.0 |
| $LBMAX$ | 810.2 | 811.0 | 810.7 | $\Pi F$ | 129.5 | 131.4 | 131.8 |
| $LHMAX$ | 482.1 | 482.6 | 485.6 | $TAXF$ | 64.8 | 65.7 | 65.9 |
| $LFMAX$ | 328.1 | 328.4 | 325.1 | $\overline{CF}$ | 5.6 | -3.0 | -2.0 |
| $LFUN$ | 328.1 | 322.5 | 328.5 | $DDF$ | 55.9 | 47.3 | 47.7 |
| $PUN$ | 1.0000 | 1.0027 | 1.0027 | $VBILLB$ | 190.0 | 185.0 | 185.0 |
| $INVUN$ | 50.0 | 51.4 | 50.2 | $BONDB$ | 9.75 | 10.13 | 10.12 |
| $Y^pUN$ | 842.0 | 844.4 | 844.7 | $BONDD$ | 2.28 | 1.89 | 1.91 |
| $WUN$ | 1.0000 | 1.0023 | 1.0026 | $\Pi D$ | 2.16 | 1.91 | 1.92 |
| $HPFMAXUN$ | 637.3 | 639.2 | 639.3 | $TAXD$ | 1.08 | 0.96 | 0.96 |
| $LF$ | 328.1 | 322.5 | 325.0 | $CGD$ | -0.12 | 0.02 | 0.01 |
| $P$ | 1.0000 | 1.0027 | 1.0032 | $DDD$ | 25.1 | 31.0 | 30.7 |
| $INV$ | 50.0 | 51.4 | 48.8 | $DDH_1$ | 60.1 | 60.2 | 60.1 |
| $Y^p$ | 842.0 | 844.4 | 842.4 | $DDH_2$ | 51.8 | 51.8 | 51.8 |
| $X^e$ | 842.0 | 846.3 | 842.0 | $DDB$ | 192.9 | 190.3 | 190.4 |
| $V^p$ | 105.2 | 97.7 | 101.4 | $YH_2$ | 435.0 | 436.2 | 435.3 |
| $W$ | 1.0000 | 1.0023 | 1.0017 | $TAXH_2$ | 77.1 | 77.4 | 77.2 |
| $HPFMAX$ | 637.3 | 639.2 | 637.6 | $SAV_2$ | 0.0 | 0.5 | -0.3 |
| $K^a/KMIN^p$ | 1.000 | 1.000 | 1.000 | $CG$ | -5.2 | 1.8 | 2.3 |
| $HPFMAX/MH^p$ | 1.000 | 1.000 | 1.000 | $YH_1$ | 463.0 | 466.1 | 465.6 |
| $MH_4^p$ | 0.0 | 0.0 | 0.0 | $TAXH_1$ | 88.5 | 90.5 | 90.5 |
| $HPHUN_1$ | 323.0 | 324.3 | 323.7 | $SAV_1$ | 0.7 | 1.7 | 1.4 |
| $XHUN_1$ | 373.8 | 372.9 | 372.6 | $SD$ | 1014.0 | 1015.7 | 1017.1 |
| $HPHUN_2$ | 435.0 | 435.2 | 434.6 | $CGB$ | -0.5 | 0.1 | 0.1 |
| $XHUN_2$ | 321.7 | 321.3 | 321.2 | $\Pi B$ | 16.4 | 16.4 | 16.4 |
| $LHUN$ | 482.1 | 481.7 | 481.9 | $TAXB$ | 8.2 | 8.2 | 8.2 |
| $HPHMAX_1$ | 323.0 | 324.4 | 323.7 | $DIVB$ | 8.2 | 8.2 | 8.2 |
| $HPHMAX_2$ | 435.0 | 435.5 | 434.6 | $DIV$ | 74.1 | 74.8 | 75.1 |
| $HPH_1$ | 323.0 | 324.3 | 323.7 | $TAX$ | 239.7 | 242.7 | 242.8 |
| $XH_1$ | 373.8 | 372.9 | 372.6 | $BR$ | 57.2 | 61.4 | 60.4 |
| $SD^p$ | 1013.3 | 1015.8 | 1017.1 | $BR^{**}$ | 55.5 | 55.1 | 55.1 |
| $HPH_2$ | 435.0 | 435.2 | 434.6 | $V/(\beta_1 X)$ | 0.942 | 0.959 | 0.992 |
| $XH_2$ | 321.7 | 321.3 | 321.2 | $HPF/MH$ | 1.000 | 1.000 | 1.000 |
| $LH$ | 482.1 | 481.7 | 481.9 | $K^a/KMIN$ | 1.001 | 1.001 | 1.000 |
| $XUN$ | 847.0 | 842.1 | 840.5 | $EXBB$ | 5.0 | -1.0 | -0.7 |

**Table 6-6. (continued)**

| | *Experiment 7* ($d_3$:+0.00554) | | | | | | |
|---|---|---|---|---|---|---|---|
| | *t* | *t+1* | *t+2* | | *t* | *t+1* | *t+2* |
| Real GNP | 955.6 | 958.4 | 959.2 | *X* | 837.0 | 838.2 | 839.5 |
| *UR* | -0.0015 | 0.0058 | 0.0041 | *LUN* | 812.9 | 806.2 | 806.2 |
| Surplus (+) | 2.0 | -2.5 | -0.5 | *L* | 810.2 | 806.5 | 806.8 |
| or Deficit (-) | | | | *HPUN* | 751.9 | 759.5 | 758.5 |
| *r* | 0.06500 | 0.06500 | 0.06503 | *HP* | 753.0 | 755.1 | 755.4 |
| *PS* | 1146.4 | 1143.5 | 1139.8 | *HPF* | 632.3 | 634.4 | 634.7 |
| $FUNDS^e$ | 1150.2 | 1147.9 | 1146.2 | $MH_4$ | 0.4 | 0.0 | 0.0 |
| *RL* | 0.07500 | 0.07511 | 0.07504 | *Y* | 834.9 | 837.7 | 838.5 |
| *VBB* | 340.0 | 339.3 | 338.8 | *V* | 103.1 | 102.6 | 101.6 |
| *LBMAX* | 810.2 | 808.6 | 807.4 | Π*F* | 128.0 | 128.0 | 130.6 |
| *LHMAX* | 482.1 | 482.2 | 482.7 | *TAXF* | 64.0 | 64.0 | 65.3 |
| *LFMAX* | 328.1 | 326.4 | 324.7 | $\overline{CF}$ | 2.2 | 2.7 | 0.3 |
| *LFUN* | 328.1 | 324.2 | 324.1 | *DDF* | 52.5 | 51.3 | 51.5 |
| *PUN* | 1.0000 | 1.0000 | 1.0003 | *VBILLB* | 185.0 | 185.0 | 185.0 |
| *INVUN* | 50.0 | 47.5 | 50.5 | *BONDB* | 10.07 | 10.03 | 10.00 |
| $Y^pUN$ | 842.0 | 837.7 | 838.5 | *BONDD* | 1.95 | 1.99 | 2.02 |
| *WUN* | 1.0000 | 1.0019 | 0.9990 | Π*D* | 1.95 | 1.98 | 2.00 |
| *HPFMAXUN* | 637.3 | 634.4 | 634.7 | *TAXD* | 0.98 | 0.99 | 1.00 |
| *LF* | 328.1 | 324.2 | 324.1 | *CGD* | 0.00 | -0.01 | -0.02 |
| *P* | 1.0000 | 1.0000 | 1.0003 | *DDD* | 30.0 | 29.3 | 28.9 |
| *INV* | 50.0 | 47.5 | 50.5 | $DDH_1$ | 59.8 | 60.1 | 59.9 |
| $Y^p$ | 842.0 | 837.7 | 838.5 | $DDH_2$ | 51.3 | 51.6 | 51.5 |
| $X^e$ | 842.0 | 837.0 | 838.1 | *DDB* | 193.6 | 192.3 | 191.9 |
| $V^p$ | 105.2 | 103.8 | 103.1 | $YH_2$ | 433.4 | 434.0 | 432.8 |
| *W* | 1.0000 | 1.0019 | 0.9990 | $TAXH_2$ | 79.0 | 76.9 | 76.7 |
| *HPFMAX* | 637.3 | 634.4 | 634.7 | $SAV_2$ | -0.5 | 0.2 | -0.5 |
| $K^a/KMIN^p$ | 1.000 | 1.000 | 1.000 | *CG* | -2.9 | -3.7 | -0.3 |
| $HPFMAX/MH^p$ | 1.000 | 1.000 | 1.000 | $YH_1$ | 458.8 | 461.6 | 462.2 |
| $MH_4^p$ | 0.0 | 0.0 | 0.0 | $TAXH_1$ | 90.7 | 88.6 | 89.3 |
| $HPHUN_1$ | 319.6 | 323.8 | 323.4 | $SAV_1$ | -3.7 | -0.4 | 0.5 |
| $XHUN_1$ | 371.8 | 374.5 | 372.9 | *SD* | 1010.0 | 1009.3 | 1010.0 |
| $HPHUN_2$ | 432.3 | 435.7 | 435.1 | *CGB* | 0.0 | -0.1 | -0.1 |
| $XHUN_2$ | 320.2 | 322.2 | 321.0 | Π*B* | 17.2 | 17.0 | 16.8 |
| *LHUN* | 484.8 | 482.0 | 482.1 | *TAXB* | 8.6 | 8.5 | 8.4 |
| $HPHMAX_1$ | 322.2 | 321.9 | 322.1 | *DIVB* | 8.6 | 8.5 | 8.4 |
| $HPHMAX_2$ | 435.8 | 433.1 | 433.3 | *DIV* | 73.6 | 73.5 | 74.7 |
| $HPH_1$ | 319.6 | 321.9 | 322.1 | *TAX* | 243.3 | 239.0 | 240.7 |
| $XH_1$ | 371.8 | 373.5 | 372.2 | *BR* | 53.4 | 55.9 | 56.3 |
| $SD^p$ | 1010.2 | 1009.2 | 1009.4 | *BR*** | 55.6 | 55.4 | 55.3 |
| $HPH_2$ | 433.4 | 433.1 | 433.3 | $V/(\beta_1 X)$ | 0.985 | 0.980 | 0.968 |
| $XH_2$ | 318.7 | 320.7 | 320.3 | *HPF/MH* | 1.000 | 1.000 | 1.000 |
| *LH* | 482.1 | 482.2 | 482.7 | $K^a/KMIN$ | 1.009 | 1.000 | 1.000 |
| *XUN* | 838.5 | 840.7 | 840.9 | *EXBB* | 0.0 | 0.7 | 1.1 |

**Table 6–6. (continued)**

| | *Experiment 8 ($d_3$:-0.00554)* *t* | *t+1* | *t+2* | | *t* | *t+1* | *t+2* |
|---|---|---|---|---|---|---|---|
| Real GNP | 962.7 | 960.1 | 960.4 | *X* | 842.9 | 839.9 | 840.9 |
| *UR* | 0.0083 | 0.0000 | 0.0000 | *LUN* | 807.4 | 808.4 | 809.3 |
| Surplus (+) | −5.0 | 0.8 | −0.1 | *L* | 808.8 | 808.4 | 809.3 |
| or Deficit (−) | | | | *HPUN* | 764.4 | 756.2 | 756.4 |
| *r* | 0.06500 | 0.06500 | 0.06496 | *HP* | 758.0 | 756.2 | 756.4 |
| *PS* | 1146.4 | 1146.0 | 1148.6 | *HPF* | 637.3 | 635.5 | 635.7 |
| $FUNDS^e$ | 1150.2 | 1153.6 | 1153.5 | $MH_4$ | 0.0 | 0.1 | 0.0 |
| *RL* | 0.07500 | 0.07487 | 0.07481 | *Y* | 842.0 | 839.4 | 839.7 |
| *VBB* | 340.0 | 341.0 | 341.0 | *V* | 104.3 | 103.8 | 102.7 |
| *LBMAX* | 810.2 | 812.6 | 812.5 | $\Pi F$ | 130.1 | 131.6 | 130.3 |
| *LHMAX* | 482.1 | 482.4 | 483.9 | *TAXF* | 65.0 | 65.8 | 65.2 |
| *LFMAX* | 328.1 | 330.2 | 328.7 | $\overline{CF}$ | 0.9 | 0.3 | 2.1 |
| *LFUN* | 328.1 | 327.0 | 326.5 | *DDF* | 51.2 | 50.4 | 52.0 |
| *PUN* | 1.0000 | 1.0003 | 1.0000 | *VBILLB* | 185.0 | 185.0 | 185.0 |
| *INVUN* | 50.0 | 50.3 | 49.0 | *BONDB* | 10.07 | 10.14 | 10.13 |
| $Y^pUN$ | 842.0 | 842.4 | 840.7 | *BONDD* | 1.95 | 1.88 | 1.89 |
| *WUN* | 1.0000 | 0.9970 | 0.9990 | $\Pi D$ | 1.95 | 1.90 | 1.91 |
| *HPFMAXUN* | 637.3 | 637.6 | 636.4 | *TAXD* | 0.98 | 0.95 | 0.95 |
| *LF* | 328.1 | 327.0 | 326.5 | *CGD* | 0.00 | 0.02 | 0.02 |
| *P* | 1.0000 | 1.0003 | 1.0000 | *DDD* | 30.0 | 31.0 | 30.8 |
| *INV* | 50.0 | 50.3 | 49.0 | $DDH_1$ | 60.2 | 59.9 | 60.1 |
| $Y^p$ | 842.0 | 842.4 | 840.7 | $DDH_2$ | 51.8 | 51.6 | 51.8 |
| $X^e$ | 842.0 | 842.8 | 840.0 | *DDB* | 193.2 | 192.9 | 194.7 |
| $V^p$ | 105.2 | 104.0 | 104.5 | $YH_2$ | 434.1 | 432.7 | 433.6 |
| *W* | 1.0000 | 0.9970 | 0.9990 | $TAXH_2$ | 74.8 | 76.7 | 76.9 |
| *HPFMAX* | 637.3 | 637.6 | 636.4 | $SAV_2$ | 1.4 | −0.9 | −1.2 |
| $K^a/KMIN^p$ | 1.000 | 1.000 | 1.000 | *CG* | −0.4 | 2.6 | 0.7 |
| $HPFMAX/MH^p$ | 1.000 | 1.000 | 1.000 | $YH_1$ | 464.3 | 462.3 | 462.5 |
| $MH_4^p$ | 0.0 | 0.0 | 0.0 | $TAXH_1$ | 87.1 | 89.9 | 89.6 |
| $HPHUN_1$ | 326.6 | 322.2 | 322.3 | $SAV_1$ | 2.7 | −0.1 | −0.7 |
| $XHUN_1$ | 375.9 | 372.4 | 373.6 | *SD* | 1015.9 | 1016.1 | 1015.3 |
| $HPHUN_2$ | 437.8 | 434.0 | 434.0 | *CGB* | 0.0 | 0.1 | 0.1 |
| $XHUN_2$ | 323.3 | 320.7 | 321.8 | $\Pi B$ | 16.7 | 16.7 | 16.8 |
| *LHUN* | 479.3 | 481.4 | 482.8 | *TAXB* | 8.4 | 8.4 | 8.4 |
| $HPHMAX_1$ | 323.9 | 323.1 | 322.6 | *DIVB* | 8.4 | 8.4 | 8.4 |
| $HPHMAX_2$ | 434.1 | 435.3 | 434.4 | *DIV* | 74.4 | 75.1 | 74.5 |
| $HPH_1$ | 323.9 | 322.2 | 322.3 | *TAX* | 236.3 | 241.8 | 241.0 |
| $XH_1$ | 374.5 | 372.4 | 373.6 | *BR* | 60.4 | 59.5 | 59.7 |
| $SD^p$ | 1016.0 | 1016.1 | 1015.5 | *BR*** | 55.6 | 55.5 | 55.8 |
| $HPH_2$ | 434.1 | 434.0 | 434.0 | $V/(\beta_1 X)$ | 0.990 | 0.989 | 0.977 |
| $XH_2$ | 321.9 | 320.7 | 321.8 | *HPF/MH* | 1.000 | 1.000 | 1.000 |
| *LH* | 480.7 | 481.4 | 482.8 | $K^a/KMIN$ | 1.000 | 1.004 | 1.001 |
| *XUN* | 845.7 | 839.9 | 840.9 | *EXBB* | 0.0 | −1.0 | −0.9 |

**Table 6-6. (continued)**

| | *Experiment 9 (YG:-2.5)* | | | | | | |
|---|---|---|---|---|---|---|---|
| | *t* | *t+1* | *t+2* | | *t* | *t+1* | *t+2* |
| Real GNP | 962.3 | 956.5 | 954.9 | *X* | 837.9 | 835.1 | 836.2 |
| *UR* | 0.0051 | 0.0022 | 0.0047 | *LUN* | 810.1 | 812.1 | 807.2 |
| Surplus (+) | 4.7 | −2.8 | −4.7 | *L* | 810.2 | 807.2 | 806.2 |
| or Deficit (−) | | | | *HPUN* | 761.9 | 757.4 | 758.6 |
| *r* | 0.06500 | 0.06500 | 0.06505 | *HP* | 758.0 | 755.7 | 755.0 |
| *PS* | 1146.4 | 1145.9 | 1141.1 | *HPF* | 637.3 | 635.0 | 634.3 |
| $FUNDS^e$ | 1150.2 | 1146.2 | 1145.0 | $MH_4$ | 0.3 | 0.1 | 0.0 |
| *RL* | 0.07500 | 0.07507 | 0.07520 | *Y* | 841.6 | 835.8 | 834.2 |
| *VBB* | 340.0 | 338.8 | 338.4 | *V* | 109.0 | 109.7 | 107.7 |
| *LBMAX* | 810.2 | 807.4 | 806.5 | $\Pi F$ | 129.7 | 127.9 | 125.8 |
| *LHMAX* | 482.1 | 480.4 | 478.5 | *TAXF* | 64.9 | 63.9 | 62.9 |
| *LFMAX* | 328.1 | 327.0 | 328.0 | $\overline{CF}$ | −3.7 | 1.6 | 2.9 |
| *LFUN* | 328.1 | 330.3 | 327.6 | *DDF* | 46.6 | 46.8 | 50.5 |
| *PUN* | 1.0000 | 0.9983 | 0.9970 | *VBILLB* | 185.0 | 185.0 | 185.0 |
| *INVUN* | 50.0 | 49.1 | 49.1 | *BONDB* | 10.07 | 10.00 | 9.98 |
| $Y^pUN$ | 842.0 | 838.1 | 834.2 | *BONDD* | 1.95 | 2.03 | 2.04 |
| *WUN* | 1.0000 | 0.9969 | 0.9955 | $\Pi D$ | 1.95 | 2.00 | 2.01 |
| *HPFMAXUN* | 637.3 | 636.7 | 634.3 | *TAXD* | 0.98 | 1.00 | 1.01 |
| *LF* | 328.1 | 326.8 | 327.6 | *CGD* | 0.00 | −0.02 | −0.03 |
| *P* | 1.0000 | 0.9987 | 0.9970 | *DDD* | 30.0 | 28.8 | 28.6 |
| *INV* | 50.0 | 47.7 | 49.1 | $DDH_1$ | 59.9 | 59.8 | 59.7 |
| $Y^p$ | 842.0 | 835.8 | 834.2 | $DDH_2$ | 51.4 | 51.2 | 51.1 |
| $X^e$ | 842.0 | 838.2 | 835.5 | *DDB* | 187.8 | 186.7 | 189.9 |
| $V^p$ | 105.2 | 106.6 | 108.4 | $YH_2$ | 434.7 | 432.4 | 431.7 |
| *W* | 1.0000 | 0.9960 | 0.9955 | $TAXH_2$ | 79.6 | 76.6 | 76.5 |
| *HPFMAX* | 637.3 | 635.0 | 634.3 | $SAV_2$ | −0.4 | 1.5 | 1.8 |
| $K^a/KMIN^p$ | 1.000 | 1.003 | 1.003 | *CG* | −0.5 | −4.8 | −8.1 |
| $HPFMAX/MX^p$ | 1.000 | 1.004 | 1.004 | $YH_1$ | 463.5 | 459.4 | 458.0 |
| $MH_4^p$ | 0.0 | 0.0 | 0.0 | $TAXH_1$ | 92.0 | 87.9 | 87.0 |
| $HPHUN_1$ | 325.0 | 322.3 | 322.9 | $SAV_1$ | −0.6 | −0.4 | −0.1 |
| $XHUN_1$ | 372.9 | 372.7 | 373.0 | *SD* | 1013.1 | 1012.7 | 1012.7 |
| $HPHUN_2$ | 436.9 | 435.1 | 435.7 | *CGB* | 0.0 | −0.1 | −0.1 |
| $XHUN_2$ | 320.8 | 320.4 | 320.6 | $\Pi B$ | 17.0 | 16.7 | 16.6 |
| *LHUN* | 482.0 | 481.8 | 479.6 | *TAXB* | 8.5 | 8.3 | 8.3 |
| $HPHMAX_1$ | 323.3 | 321.6 | 321.4 | *DIVB* | 8.5 | 8.3 | 8.3 |
| $HPHMAX_2$ | 434.7 | 434.1 | 433.6 | *DIV* | 74.3 | 73.3 | 72.2 |
| $HPH_1$ | 323.3 | 321.6 | 321.4 | *TAX* | 246.0 | 237.8 | 235.8 |
| $XH_1$ | 372.1 | 372.3 | 372.3 | *BR* | 50.7 | 53.5 | 58.2 |
| $SD^p$ | 1013.1 | 1012.8 | 1012.8 | *BR*** | 54.7 | 54.5 | 55.0 |
| $HPH_2$ | 434.7 | 434.1 | 433.6 | $V/(\beta_1 X)$ | 1.041 | 1.051 | 1.031 |
| $XH_2$ | 319.3 | 318.6 | 318.3 | *HPF/MH* | 1.000 | 1.003 | 1.004 |
| *LH* | 482.1 | 480.4 | 478.5 | $K^a/KMIN$ | 1.000 | 1.003 | 1.003 |
| *XUN* | 840.2 | 838.6 | 839.2 | *EXBB* | 0.0 | 1.2 | 1.4 |

**Table 6-6. (continued)**

| | *Experiment 10 (YG:+2.5)* | | | | | | |
|---|---|---|---|---|---|---|---|
| | *t* | *t+1* | *t+2* | | *t* | *t+1* | *t+2* |
| Real GNP | 957.4 | 962.0 | 960.8 | $X$ | 843.8 | 842.1 | 843.5 |
| $UR$ | 0.0000 | 0.0007 | 0.0000 | $LUN$ | 810.2 | 802.0 | 808.0 |
| Surplus (+) | −7.0 | 0.2 | −0.2 | $L$ | 810.2 | 802.1 | 807.2 |
| or Deficit (−) | | | | $HPUN$ | 754.1 | 758.1 | 756.8 |
| $r$ | 0.06500 | 0.06500 | 0.06493 | $HP$ | 754.1 | 757.6 | 756.8 |
| $PS$ | 1146.4 | 1144.3 | 1145.8 | $HPF$ | 633.4 | 636.9 | 636.1 |
| $FUNDS^e$ | 1150.2 | 1155.9 | 1150.6 | $MH_4$ | 0.0 | 0.0 | 0.0 |
| $RL$ | 0.07500 | 0.07490 | 0.07471 | $Y$ | 836.7 | 841.3 | 840.1 |
| $VBB$ | 340.0 | 341.7 | 340.1 | $V$ | 98.2 | 97.4 | 94.0 |
| $LBMAX$ | 810.2 | 814.2 | 810.5 | $\Pi F$ | 128.7 | 130.7 | 130.7 |
| $LHMAX$ | 482.1 | 484.5 | 487.9 | $TAXF$ | 64.4 | 65.4 | 65.4 |
| $LFMAX$ | 328.1 | 329.7 | 322.6 | $\overline{CF}$ | 7.0 | 0.9 | 2.3 |
| $LFUN$ | 328.1 | 319.2 | 323.3 | $DDF$ | 57.3 | 49.3 | 55.0 |
| $PUN$ | 1.0000 | 1.0024 | 1.0035 | $VBILLB$ | 185.0 | 185.0 | 185.0 |
| $INVUN$ | 50.0 | 49.6 | 51.2 | $BONDB$ | 10.07 | 10.18 | 10.07 |
| $Y^pUN$ | 842.0 | 841.3 | 843.3 | $BONDD$ | 1.95 | 1.84 | 1.95 |
| $WUN$ | 1.0000 | 1.0032 | 1.0037 | $\Pi D$ | 1.95 | 1.87 | 1.95 |
| $HPFMAXUN$ | 637.3 | 636.9 | 638.4 | $TAXD$ | 0.98 | 0.94 | 0.98 |
| $LF$ | 328.1 | 319.2 | 322.6 | $CGD$ | 0.00 | 0.03 | 0.00 |
| $P$ | 1.0000 | 1.0024 | 1.0036 | $DDD$ | 30.0 | 31.7 | 29.9 |
| $INV$ | 50.0 | 49.6 | 50.9 | $DDH_1$ | 60.3 | 60.3 | 60.3 |
| $Y^p$ | 842.0 | 841.3 | 842.8 | $DDH_2$ | 51.9 | 52.0 | 52.1 |
| $X^e$ | 842.0 | 843.2 | 841.8 | $DDB$ | 199.5 | 193.3 | 197.3 |
| $V^p$ | 105.2 | 96.3 | 98.4 | $YH_2$ | 433.1 | 435.7 | 435.2 |
| $W$ | 1.0000 | 1.0032 | 1.0035 | $TAXH_2$ | 74.3 | 77.3 | 77.2 |
| $HPFMAX$ | 637.3 | 636.9 | 638.1 | $SAV_2$ | 0.1 | −0.7 | −1.7 |
| $K^a/KMIN^p$ | 1.000 | 1.000 | 1.000 | $CG$ | −2.1 | 1.5 | 0.4 |
| $HPFMAX/MX^p$ | 1.000 | 1.000 | 1.000 | $YH_1$ | 460.7 | 464.8 | 464.6 |
| $MH_4^p$ | 0.0 | 0.0 | 0.0 | $TAXH_1$ | 86.2 | 90.2 | 89.9 |
| $HPHUN_1$ | 321.0 | 323.5 | 323.1 | $SAV_1$ | −0.2 | −0.1 | −0.4 |
| $XHUN_1$ | 374.7 | 373.9 | 373.7 | $SD$ | 1013.0 | 1012.9 | 1012.5 |
| $HPHUN_2$ | 433.1 | 434.6 | 433.7 | $CGB$ | 0.0 | 0.2 | 0.0 |
| $XHUN_2$ | 322.6 | 322.3 | 322.4 | $\Pi B$ | 17.0 | 16.6 | 16.6 |
| $LHUN$ | 482.1 | 482.8 | 484.7 | $TAXB$ | 8.5 | 8.3 | 8.3 |
| $HPHMAX_1$ | 322.6 | 323.3 | 323.9 | $DIVB$ | 8.5 | 8.3 | 8.3 |
| $HPHMAX_2$ | 435.3 | 434.3 | 434.8 | $DIV$ | 73.8 | 74.6 | 74.7 |
| $HPH_1$ | 321.0 | 323.3 | 323.1 | $TAX$ | 234.3 | 242.1 | 241.8 |
| $XH_1$ | 374.7 | 373.8 | 373.7 | $BR$ | 62.4 | 62.1 | 62.4 |
| $SD^p$ | 1013.2 | 1013.0 | 1012.3 | $BR^{**}$ | 56.6 | 55.6 | 56.2 |
| $HPH_2$ | 433.1 | 434.3 | 433.7 | $V/(\beta_1 X)$ | 0.931 | 0.925 | 0.891 |
| $XH_2$ | 322.6 | 322.2 | 322.4 | $HPF/MH$ | 1.000 | 1.000 | 1.000 |
| $LH$ | 482.1 | 482.9 | 484.7 | $K^a/KMIN$ | 1.006 | 1.000 | 1.003 |
| $XUN$ | 843.8 | 842.3 | 843.8 | $EXBB$ | 0.0 | −1.7 | 0.1 |

**Table 6-6. (continued)**

| | *Experiment 11* ($HPG_t$:-5.0) | | | | | | |
|---|---|---|---|---|---|---|---|
| | *t* | *t+1* | *t+2* | | *t* | *t+1* | *t+2* |
| Real GNP | 957.5 | 958.0 | 955.6 | $X$ | 839.0 | 835.9 | 836.4 |
| $UR$ | 0.0066 | 0.0013 | 0.0039 | $LUN$ | 810.2 | 811.5 | 808.2 |
| Surplus (+) | 3.9 | -1.5 | -4.2 | $L$ | 810.2 | 807.7 | 806.6 |
| or Deficit (-) | | | | $HPUN$ | 758.0 | 757.2 | 758.3 |
| $r$ | 0.06500 | 0.06500 | 0.06504 | $HP$ | 753.0 | 756.2 | 755.3 |
| $PS$ | 1146.4 | 1146.2 | 1143.6 | $HPF$ | 637.3 | 635.5 | 634.6 |
| $FUNDS^e$ | 1150.2 | 1146.9 | 1145.1 | $MH_4$ | 0.1 | 0.1 | 0.0 |
| $RL$ | 0.07500 | 0.07506 | 0.07517 | $Y$ | 841.8 | 837.3 | 834.9 |
| $VBB$ | 340.0 | 339.0 | 338.5 | $V$ | 108.1 | 109.4 | 107.9 |
| $LBMAX$ | 810.2 | 807.8 | 806.6 | $\Pi F$ | 129.9 | 129.1 | 126.3 |
| $LHMAX$ | 482.1 | 480.7 | 478.9 | $TAXF$ | 64.9 | 64.6 | 63.2 |
| $LFMAX$ | 328.1 | 327.2 | 327.7 | $\overline{CF}$ | -2.8 | 0.3 | 2.6 |
| $LFUN$ | 328.1 | 329.7 | 328.2 | $DDF$ | 47.5 | 46.7 | 50.0 |
| $PUN$ | 1.0000 | 0.9987 | 0.9974 | $VBILLB$ | 185.0 | 185.0 | 185.0 |
| $INVUN$ | 50.0 | 49.3 | 49.1 | $BONDB$ | 10.07 | 10.01 | 9.98 |
| $Y^pUN$ | 842.0 | 839.1 | 835.3 | $BONDD$ | 1.95 | 2.01 | 2.04 |
| $WUN$ | 1.0000 | 0.9966 | 0.9960 | $\Pi D$ | 1.95 | 1.99 | 2.01 |
| $HPFMAXUN$ | 637.3 | 636.9 | 634.9 | $TAXD$ | 0.98 | 1.00 | 1.01 |
| $LF$ | 328.1 | 327.0 | 327.7 | $CGD$ | 0.00 | -0.02 | -0.03 |
| $P$ | 1.0000 | 0.9991 | 0.9975 | $DDD$ | 30.0 | 29.0 | 28.7 |
| $INV$ | 50.0 | 48.3 | 48.9 | $DDH_1$ | 60.0 | 59.8 | 59.8 |
| $Y^p$ | 842.0 | 837.3 | 834.9 | $DDH_2$ | 51.4 | 51.3 | 51.1 |
| $X^e$ | 842.0 | 839.2 | 836.3 | $DDB$ | 188.9 | 186.9 | 189.6 |
| $V^p$ | 105.2 | 106.2 | 108.0 | $YH_2$ | 432.1 | 432.6 | 432.0 |
| $W$ | 1.0000 | 0.9959 | 0.9958 | $TAXH_2$ | 76.6 | 76.7 | 76.6 |
| $HPFMAX$ | 637.3 | 635.5 | 634.6 | $SAV_2$ | -0.3 | 1.2 | 1.6 |
| $K^a/KMIN^p$ | 1.000 | 1.002 | 1.003 | $CG$ | -0.2 | -2.6 | -7.3 |
| $HPFMAX/MH^p$ | 1.000 | 1.003 | 1.004 | $YH_1$ | 461.1 | 460.3 | 458.5 |
| $MH_4^p$ | 0.0 | 0.0 | 0.0 | $TAXH_1$ | 89.1 | 88.5 | 87.3 |
| $HPHUN_1$ | 323.0 | 322.2 | 322.7 | $SAV_1$ | -0.7 | -0.2 | -0.2 |
| $XHUN_1$ | 373.8 | 372.5 | 373.0 | $SD$ | 1012.8 | 1012.8 | 1012.6 |
| $HPHUN_2$ | 435.0 | 435.0 | 435.6 | $CGB$ | 0.0 | -0.1 | -0.1 |
| $XHUN_2$ | 321.7 | 320.2 | 320.6 | $\Pi B$ | 17.0 | 16.7 | 16.6 |
| $LHUN$ | 482.1 | 481.8 | 479.9 | $TAXB$ | 8.5 | 8.4 | 8.3 |
| $HPHMAX_1$ | 320.9 | 321.8 | 321.5 | $DIVB$ | 8.5 | 8.4 | 8.3 |
| $HPHMAX_2$ | 432.1 | 434.4 | 433.8 | $DIV$ | 74.4 | 73.9 | 72.5 |
| $HPH_1$ | 320.9 | 321.8 | 321.5 | $TAX$ | 240.2 | 239.1 | 236.4 |
| $XH_1$ | 372.7 | 372.3 | 372.4 | $BR$ | 51.5 | 53.0 | 57.2 |
| $SD^p$ | 1012.8 | 1012.7 | 1012.7 | $BR^{**}$ | 54.8 | 54.5 | 55.0 |
| $HPH_2$ | 432.1 | 434.4 | 433.8 | $V/(\beta_1 X)$ | 1.031 | 1.047 | 1.032 |
| $XH_2$ | 319.7 | 318.9 | 318.6 | $HPF/MH$ | 1.000 | 1.002 | 1.004 |
| $LH$ | 482.1 | 480.7 | 478.9 | $K^a/KMIN$ | 1.000 | 1.002 | 1.003 |
| $XUN$ | 842.0 | 838.5 | 839.3 | $EXBB$ | 0.0 | 1.0 | 1.4 |

**Table 6–6. (continued)**

| | Experiment 12 ($HPG_t$:+5.0) *t* | *t+1* | *t+2* | | *t* | *t+1* | *t+2* |
|---|---|---|---|---|---|---|---|
| Real GNP | 961.0 | 960.7 | 960.8 | *X* | 842.0 | 841.2 | 843.8 |
| *UR* | 0.0000 | 0.0020 | 0.0000 | *LUN* | 810.2 | 802.0 | 807.3 |
| Surplus (+) | −6.5 | −0.5 | −0.3 | *L* | 810.2 | 802.4 | 807.3 |
| or Deficit (−) | | | | *HPUN* | 758.0 | 758.3 | 756.9 |
| *r* | 0.06500 | 0.06500 | 0.06493 | *HP* | 758.0 | 756.7 | 756.9 |
| *PS* | 1146.4 | 1143.9 | 1144.3 | *HPF* | 632.3 | 636.0 | 636.2 |
| $FUNDS^e$ | 1150.2 | 1155.5 | 1150.8 | $MH_4$ | 0.0 | 0.0 | 0.1 |
| *RL* | 0.07500 | 0.07490 | 0.07471 | *Y* | 835.3 | 840.0 | 840.1 |
| *VBB* | 340.0 | 341.6 | 340.2 | *V* | 98.6 | 97.4 | 93.7 |
| *LBMAX* | 810.2 | 813.9 | 810.7 | $\Pi F$ | 128.4 | 130.1 | 130.6 |
| *LHMAX* | 482.1 | 484.3 | 488.0 | *TAXF* | 64.2 | 65.0 | 65.3 |
| *LFMAX* | 328.1 | 329.6 | 322.6 | $\overline{CF}$ | 6.7 | 2.0 | 2.2 |
| *LFUN* | 328.1 | 319.2 | 322.3 | *DDF* | 57.0 | 50.1 | 55.4 |
| *PUN* | 1.0000 | 1.0020 | 1.0031 | *VBILLB* | 185.0 | 185.0 | 185.0 |
| *INVUN* | 50.0 | 48.8 | 51.3 | *BONDB* | 10.07 | 10.18 | 10.08 |
| $Y^pUN$ | 842.0 | 840.0 | 842.1 | *BONDD* | 1.95 | 1.85 | 1.95 |
| *WUN* | 1.0000 | 1.0032 | 1.0030 | $\Pi D$ | 1.95 | 1.88 | 1.95 |
| *HPFMAXUN* | 637.3 | 636.0 | 637.5 | *TAXD* | 0.98 | 0.94 | 0.97 |
| *LF* | 328.1 | 319.2 | 322.3 | *CGD* | 0.00 | 0.03 | 0.00 |
| *P* | 1.0000 | 1.0020 | 1.0031 | *DDD* | 30.0 | 31.5 | 30.0 |
| *INV* | 50.0 | 48.8 | 51.3 | $DDH_1$ | 60.1 | 60.3 | 60.3 |
| $Y^p$ | 842.0 | 840.0 | 842.1 | $DDH_2$ | 51.8 | 51.9 | 52.0 |
| $X^e$ | 842.0 | 841.5 | 840.9 | *DDB* | 198.9 | 193.8 | 197.7 |
| $V^p$ | 105.2 | 97.1 | 98.6 | $YH_2$ | 435.0 | 435.1 | 435.0 |
| *W* | 1.0000 | 1.0032 | 1.0030 | $TAXH_2$ | 77.1 | 77.2 | 77.1 |
| *HPFMAX* | 637.3 | 636.0 | 637.5 | $SAV_2$ | 0.0 | −1.0 | −1.7 |
| $K^a/KMIN^p$ | 1.000 | 1.000 | 1.000 | *CG* | −2.5 | 0.4 | 0.3 |
| $HPFMAX/MH^p$ | 1.000 | 1.000 | 1.000 | $YH_1$ | 462.5 | 464.1 | 464.5 |
| $MH_4^p$ | 0.0 | 0.0 | 0.0 | $TAXH_1$ | 89.0 | 89.8 | 89.9 |
| $HPHUN_1$ | 323.0 | 323.6 | 323.2 | $SAV_1$ | −0.2 | −0.3 | −0.3 |
| $XHUN_1$ | 373.8 | 374.1 | 373.7 | *SD* | 1013.2 | 1012.7 | 1012.4 |
| $HPHUN_2$ | 435.0 | 434.6 | 433.7 | *CGB* | 0.0 | 0.2 | 0.0 |
| $XHUN_2$ | 321.7 | 322.4 | 322.3 | $\Pi B$ | 17.0 | 16.6 | 16.7 |
| *LHUN* | 482.1 | 482.8 | 485.0 | *TAXB* | 8.5 | 8.4 | 8.3 |
| $HPHMAX_1$ | 325.1 | 323.0 | 323.7 | *DIVB* | 8.5 | 8.3 | 8.3 |
| $HPHMAX_2$ | 437.9 | 433.8 | 434.5 | *DIV* | 73.7 | 74.3 | 74.6 |
| $HPH_1$ | 323.0 | 323.0 | 323.2 | *TAX* | 239.8 | 241.3 | 241.6 |
| $XH_1$ | 373.8 | 373.8 | 373.7 | *BR* | 61.9 | 62.4 | 62.7 |
| $SD^p$ | 1013.3 | 1012.9 | 1012.2 | *BR*** | 56.5 | 55.7 | 56.3 |
| $HPH_2$ | 435.0 | 433.8 | 433.7 | $V/(\beta_1 X)$ | 0.937 | 0.926 | 0.888 |
| $XH_2$ | 321.7 | 322.1 | 322.3 | *HPF/MH* | 1.000 | 1.000 | 1.000 |
| *LH* | 482.1 | 483.2 | 485.0 | $K^a/KMIN$ | 1.008 | 1.000 | 1.002 |
| *XUN* | 842.0 | 841.9 | 843.8 | *EXBB* | 0.0 | −1.6 | 0.0 |

of course, be greater than *LBMAX*, although *LUN* can be. Both can be less than *LBMAX*. $FUNDS^e$ in Table 6-6 is the bank sector's expected level of loanable funds. The actual level of loanable funds is $FUNDS^e$ of the previous period.

$Y^p$ is the firm sector's planned output, and *Y* is the actual output, *Y* cannot be greater than $Y^p$, but it can be less if the firm sector gets less labor than it expected or if its worker hour requirements are greater than expected. *HPFMAX* is the firm sector's expected quantity of labor, and *HPF* is the actual quantity of labor received. $MH_4^p$ is the number of worker hours needed to meet the expected change in sales, and $MH_4$ is the number of worker hours needed to meet the actual change in sales. $X^e$ is the expected level of sales, and *X* is the actual level of sales. $K^a/KMIN^p$ is the planned ratio of excess capital, and $K^a/KMIN$ is the actual ratio. The actual ratio can be greater than the planned ratio if the firm sector is forced to produce less output. $HPFMAX/MH^p$ is the planned ratio of excess labor, and *HPF*/*MH* is the actual ratio. The actual ratio can differ from the planned ratio since *HPF* can be less than *HPFMAX* and *MH* can differ from $MH^p$. $SD^p$ is the planned level of savings deposits of household 1, and *SD* is the actual level. The planned level is based on household 1's expectation of the dividend level for the period and on its expectation of the value of capital gains or losses. Since both these expectations may be incorrect, *SD* can differ from $SD^p$.

The fifth-to-last variable in Table 6-6, *BR***, is the bank sector's desired level of reserves. The desired level of reserves is equal to the required level of reserves plus the planned level of excess reserves, the latter being equal to $(1-g_1)EMAXDD + EMAXSD$. The difference between the desired level of reserves and *BR*, the actual level of reserves, is a measure of the disequilibrium situation of the bank sector. The fourth-to-last variable in Table 6-6, $V/\beta_1 X$, is the ratio of the actual level of inventories to the level corresponding to no inventory adjustment costs. This variable is used in the price equation (Equation (1) in Table 3-4) and is a measure of the inventory situation of the firm sector. The last variable in Table 6-6 is the difference between the supply of bills and bonds from the government ($VBILLG + BONDG/R$) and the sum of the demand for bills and bonds from the bank sector and the desired value of bills and bonds of the bond dealer ($VBB + VBD^*$). This variable is a measure of the excess supply of bills and bonds and is used by the bond dealer in setting the bill rate for the next period. No values for the goods constraints, $XHMAX_1$ and $XHMAX_2$, are presented in Table 6-6 because these constraints were not binding on the households for any of the experiments.

The self-repeating or equilibrium nature of the base run is evident from the results in Table 6-6. The value of each variable is the same for all three periods. Also, the unconstrained demand for loans (*LUN*) is equal to the maximum allowed (*LBMAX*), and the unconstrained supply of labor (*HPUN*) is equal to the maximum allowed ($HPFMAX + HPG$). *BR* is equal to *BR***, and there is no excess labor, no excess capital, and no excess supply of bills and bonds. All the planned or expected values are equal to the actual values, and all the unconstrained values are equal to the actual values.

The following discussion is a verbal summary of the results of the twelve experiments in Table 6-6. It is obviously not practical to discuss all the results in detail, and many of the results are left to the reader to read from the table. It should be stressed again, as was done in Section 1.3 (Chapter One), that the results in the table are only meant to aid in understanding the properties of the model and are not meant to be a test of the validity of the model. Although in some cases the initial conditions were chosen to be of the same order of magnitude as data that existed for the U.S. economy, none of the parameter values in the model has been estimated from any data.

### Experiment 1: A Decrease in the Number of Goods Purchased by the Government in Period $t$ ($XG_t$: $-5.0$)

The results of the first experiment are presented next in Table 6-6. The decision of the government to purchase fewer goods in period $t$ had no effect on the decisions of the behavioral units for period $t$. When transactions took place in period $t$, however, the level of sales of the firm sector was less by 5.0 ($X_t = 837.0$). Compared with the values for the base run, the decrease in sales in period $t$ had the following other effects in the period. Worker hour requirements to handle fluctuations in sales ($MH_{4t}$) increased by 0.4 from the expected level of 0.0, which forced the firm sector to produce 0.5 fewer goods than originally planned ($Y_t = 841.5$ vs. $Y_t^p = 842.0$). The level of inventories increased by 4.5 ($V_t = 109.7$), corresponding to the sales decrease of 5.0 and the production decrease of 0.5. The profits of the firm sector decreased by 0.5 ($\Pi F_t = 129.6$), corresponding to the decrease in production of 0.5.

Since the firm sector pays out all its profits in the form of taxes and dividends and since the profit tax is 0.5, half the decrease in profits took the form of a decrease in taxes of the firm sector and half took the form of a decrease in dividends. The cash flow net of taxes and dividends of the firm sector ($\overline{CF}_t$) was $-4.5$, which meant that the demand deposits of the firm sector decreased by 4.5 ($DDF_t = 45.8$). Near the end of period $t$ the bond dealer set the same bill and bond rates for period $t+1$ as existed for period $t$, since the excess supply of bills and bonds in period $t$ was zero, but it lowered the stock price for period $t+1$ by 0.8 as a result of the decrease in dividends in period $t$. Household 1 thus received less dividend income in period $t$ and also suffered a capital loss. This caused it to have to pay less in taxes in period $t$.

The net result of the decrease in dividend income and taxes was an unintended dissavings of 0.1 on the part of household 1, which caused its savings deposits to decrease by 0.1 ($SD_t = 1013.3$ vs. $SD_t^p = 1013.4$). The total tax intake of the government decreased by 0.5, causing the surplus to be 4.5 rather than the 5.0 that it would have been had there been no decrease in taxes. Bank reserves then also decreased by 4.5 ($BR_t = 50.9$). The decrease in bank reserves took the form of a decrease in demand deposits of the firm sector of slightly less than 4.5 and a decrease in the savings deposits of household 1 of slightly less than 0.1.[c]

The action of the government in period $t$ thus decreased sales by 5.0 and decreased bank reserves by 4.5. Had the firm sector not been forced to cut production by 0.5 because of the increased worker hour requirements, profits would have remained unchanged, as would have firm taxes and dividends. Had dividends remained unchanged, the stock price for period $t+1$ would not have been changed, and so household 1 would not have been affected in any way. In this case all that would have happened in period $t$ as a result of the decrease in sales would have been a decrease in the demand deposits of the firm sector of 5.0 and a corresponding decrease in bank reserves of 5.0. Although the decrease in taxes of 0.5 in period $t$ for this experiment is small and not too important, it does provide a good indication of how taxes are affected when profits decrease. When profits decrease, capital losses are suffered by household 1, so that household 1 pays less in taxes both because of lower dividend income and because of the capital losses. This decrease in taxes is in addition to the direct decrease in profit taxes of the firm sector.

Another important point to get out of the example so far is that the level of savings deposits of household 1 can turn out to be different from what the household had originally planned. In this example, household 1 had planned to have savings deposits in period $t$ ($SD_t^p$) of 1013.4, but ended up having savings deposits ($SD_t$) of 1013.3. Unintended savings or dissavings (net of capital gains and losses) on the part of household 1 occurs whenever the level of dividends and the stock price turn out to be different from what the household expected. An unintended change in dividend income affects savings directly. An unintended change in the stock price does not affect before-tax income net of capital gains and losses, but it does affect after-tax income (and thus savings) through its effect on the taxes of the household.

Turning next to the results for period $t+1$, the bank sector expected in period $t+1$ to have fewer funds at its disposal because of the lower level of demand and savings deposits that existed in period $t$. This caused it to raise the loan rate, decrease its demand for bills and bonds, and lower the maxumum value of loans that it will make in the period. Unconstrained, the firm sector chose to lower its price, investment, planned production, wage rate, and the maximum number of hours that it will pay for as a result of the sales decrease in period $t$ and the higher loan rate in period $t+1$.

The firm sector also chose, however, to increase its loans to make up for the lower demand deposits in period $t$ ($LFUN_{t+1} = 330.8$), and this amount of money was greater than the maximum amount allowed ($LFMAX_{t+1} = 327.0$). This constraint caused the firm sector to lower even more its investment, planned production, wage rate, and the maximum number of hours. Its price, however, was higher than the price it chose unconstrained ($P_{t+1}$ = *0.9985* vs. $PUN_{t+1}$ = *0.9979*), although still lower than the price it set for period *t* (1.0000). The firm sector planned to hold some excess capital and excess labor in period *t+1* ($K^a_{t+1}/KMIN^p_{t+1}$ = *1.003* and $HPFMAX_{t+1}/MH^p_{t+1}$ = *1.004*). Unconstrained, household 1 chose to work less and consume less as a result of the new price, wage rate, and other relevant inputs into its decision process. Household 2 chose to work more and consume less. The hours constraint was, however, binding on both households ($HPHUN_{1t+1}$ = *322.7* vs. $HPHMAX_{1t+1}$ = *321.6* and $HPHUN_{2t+1}$ = *435.3* vs. $HPHMAX_{2t+1}$ = *433.7*), and the loan constraint was binding on household 2 ($LHUN_{t+1}$ = *481.5* vs. $LHMAX_{t+1}$ = *480.5*). These constraints caused the households to work and consume less.

When transactions took place in period *t+1*, sales were even less than in period *t*, even though the government increased its purchases back to the original level, because of the decrease in investment and consumption. Near the end of period *t+1* the bond dealer increased the bill rate for period *t+2* because of the lower demand for bills and bonds on the part of the bank sector in period *t+1*. The stock price was set lower because of the lower level of dividends and the higher bill rate.

To summarize the results so far: a decrease in government spending in period *t* has generated a decrease in the price, the wage rate, production, investment, consumption, employment, and loans. The loan rate and the bill rate, on the other hand, are higher initially. The higher initial interest rates are caused by the fact that the bank sector had less money on hand at the end of period *t* to lend to households and firms and to buy bills and bonds.

It is easy to see from the above outline how a multiplier reaction can take place corresponding to a one-period decrease in government spending. Sales fall; the firm sector lowers investment and the maximum number of hours that it will pay for; households, being constrained in their work effort, lower consumption; investment and consumption fall, causing sales to fall further; the firm sector lowers investment and the maximum number of hours that it will pay for even more; households lower consumption even more; and so it goes. This multiplier effect is also aggravated in the short run by the fact that the decrease in government spending decreases bank reserves, which causes the bank sector to raise the loan rate and make the loan constraint more restrictive.

### Experiment 2: An Increase in the Value of Bills Issued in Period *t* ( $VBILLG_t$: +5.0)

Consider next the results of the second experiment. The increase in bills had no effect on the decisions of the behavioral units for period *t*, although it did cause the bond dealer near the end of period *t* to increase the bill and bond rates for period *t+1* because of the excess supply of bills and bonds in period *t*. The higher bond rate caused both the bank sector and the bond dealer to suffer capital losses on their bonds in period *t*, which caused their taxes and dividends to be lower. The lower level of dividends and the higher bill rate caused the bond dealer to lower the stock price for period *t+1*, which in turn caused household 1 to suffer a capital loss in period *t*. The capital losses of the bank sector, the bond dealer, and household 1 and the lower dividend income of household 1 in period *t* caused taxes to decrease.

The government ran a deficit of 1.4 in period *t*, which was caused by the decrease in taxes and by an increase in government interest payments because of the greater supply of bills. Bank reserves thus decreased by 3.6, the difference between the 5.0 increase in bills and the 1.4 increase in the deficit. This 3.6 decrease took the form of a 4.9 decrease in the demand deposits of the bond dealer, a 0.7 increase in the savings deposits of household 1 (caused by the lower taxes due to the capital losses), and a 0.5 capital loss of the bank sector on its bonds.[d] Capital losses of the bond dealer have a positive effect on the demand deposits of the bond dealer (see Chapter Five), which is why the demand deposits of the bond dealer only decreased by 4.9 even though the bond dealer absorbed the entire 5.0 increase in bills in period *t*. Likewise, the capital losses of the bank sector have a positive effect on bank reserves (see Chapter Two), which is why the 0.5 capital loss of the bank sector is needed in describing the form in which the decrease in bank reserves took in period *t*.

The increase in bills in period *t* thus had no effect on real output in the period, but it did cause bank reserves to decrease by 3.6. Were it not for the effect of the capital losses on the bonds and stock, bank reserves would have decreased by almost the full 5.0 amount. The decrease would not have been quite 5.0 because the government would still have run a slight deficit due to the increased interest payments on the greater supply of bills. Although the decrease in taxes due to the capital losses for this experiment is not too important, it does provide an indication of how capital losses affect the system.

It is the author's feeling that the *quantitative* effects of capital gains and losses are probably exaggerated in the results in Table 6-6, as compared with the actual effects in practice. In practice, capital gains and losses are not recorded and taxed every period and are not taxed at the same rate as other income. Also, long term interest rates are usually much less volatile than short term rates in practice, whereas in the model the bill and bond rates are always equal because of the simple expectational assumptions used. A less volatile bond rate in the model would decrease the quantitative importance of capital gains and losses. Although the quantitative importance of capital gains and losses may be exaggerated in Table 6-6, the exaggeration should have little effect on the qualitative results and should not decrease the usefulness of the results in helping one to understand the properties of the model.

Turning to the results for period *t+1*, the bank sector expected in period *t+1* to have fewer funds at its disposal because of the decrease in the sum of demand deposits and savings deposits in period *t*. As was the case in experiment 1, this caused it to raise the loan rate, decrease its demand for bills and bonds, and lower the maximum value of loans that it will make. The increase in the loan rate caused the firm sector, unconstrained, to raise the price and wage rate slightly and decrease investment, planned production, and the maximum number of hours slightly.[e] The loan constraint in period *t+1* was binding on the firm sector, however, which caused the firm sector to raise its price more and to decrease investment, planned production, and the maximum number of hours more.

Household 1 chose unconstrained to work more, consume less, and thus save more; and household 2 chose unconstrained to work more, consume less, and thus borrow less. The higher bill rate was one cause of household 1's decision to plan to save more, and the higher loan rate was one cause of household 2's decision to plan to borrow less. The loan constraint in period *t+1* was binding on household 2, however, and the hours constraint was binding on both households. These constraints caused both households to work less and consume even less than in the unconstrained case. Sales in period *t+1* were thus lower because of the decrease in investment and consumption.

An increase in bills in period *t* has thus generated an initial increase in interest rates and the price level and a decrease in production, investment, employment, the wage rate, and loans. The difference between this case and the case of a decrease in government spending is that in this case the price level is initially higher. The price level is initially higher because the initial effect on the firm sector is an increase in the loan rate and a more restrictive loan constraint, both of which cause the firm sector to raise the price level. For this experiment, the price level came back down in period *t+2* because of the lower sales in period *t+1*.

It is also easy to see from this experiment how a multiplier reaction can take place corresponding to a one-period increase in the value of government bills issued. The bank sector raises the loan rate for period *t+1* and makes the loan constraint more restrictive because of the decrease in bank reserves in period *t*. This causes the firm sector to lower planned production, investment, and the maximum number of hours. The more restrictive loan and hours constraints then cause the households to consume less. The lower investment and consumption cause sales to fall in period *t+1*, and thus the cycle as described in experiment 1 has started.

### Experiment 3: An Increase in the Number of Goods Purchased by the Government in Period $t$ ($XG_t$: +5.0)

The results for the third experiment are essentially opposite to those for the first experiment, with one important exception. The exception is as follows. Because of the increase in sales in period *t*, the firm sector planned to increase production in period $t+1$ to 844.4. It was not constrained in doing so by the bank sector, since the loan constraint was less restrictive in period $t+1$ (due to the increase in bank reserves in period $t$). The firm sector needed to borrow less anyway because of its positive cash flow net of taxes and dividends in period $t$ (which resulted in an increase in its demand deposits in period $t$). Unconstrained, household 1 chose to work slightly more and consume slightly less in period $t+1$, and household 2 chose to work slightly less and consume slightly more. As a group, the households chose to work slightly less in period $t+1$ than they did in period $t$ ($HPUN_{t+1} = 757.8$ vs. $HPUN_t = 758.0$). Neither household was constrained in any way in period $t+1$. What is the case, however, is that the households chose to work less than the firm sector expected them to work ($HPFMAX_{t+1} = 639.2$ vs. $HPF_{t+1} = 637.1$).[f] This meant that the firm sector had to cut back its production from the level originally planned ($Y_{t+1} = 841.3$ vs. $Y^p_{t+1} = 844.4$). In other words, the system was constrained in this case by the work effort of households. The work effort of the households in period $t+1$ was such as to lead to a slight decrease in real GNP in period $t+1$. Real GNP, in other words, did not increase in experiment 3 corresponding to an increase in government spending, whereas it decreased in experiment 1 corresponding to a decrease in government spending. In period $t+2$ for experiment 3 the system was again constrained by the work effort of households. The households chose to work slightly less in period $t+2$ than they did in period $t+1$. Real GNP was slightly lower in period $t+2$ than in period $t+1$.

The important point to be gained from this experiment is that the economy can be stimulated to produce more output from an initial position of equilibrium only to the extent that households can be induced to work more. In the present model, as was seen in Chapter Four, the price level has a negative effect on work effort and the wage rate has a positive effect. In addition, the bill rate has a positive effect on the work effort of household 1, and the loan rate has a positive effect on the work effort of household 2. The initial level of wealth of household 1 also has a negative effect on household 1's work effort, which means, for example, that capital gains have a negative effect on work effort. Whether the households can be stimulated to work more depends on how the various variables that affect work change in relationship to one another. Of particular importance in this regard is the size of the firm sector's wage rate change relative to its price change. In the case of the decrease in government spending in experiment 1, the unconstrained reactions of the households were not as important in determining how the system would behave because the more restrictive constraints in experiment 1 forced the households to work less and borrow less. In experiment 3 there is nothing equivalent forcing the households to work more.

One other small difference between experiments 1 and 3 should perhaps be pointed out. In both experiments the level of real GNP in period $t$

was lower than the base-run value. This is because in both cases the change in sales in period *t* of 5.0 caused worker hour requirements to increase, which in turn forced the firm sector to produce less in both cases.

### Experiment 4: A Decrease in the Value of Bills Issued in Period *t* ($VBILLG_t$: -5.0)

The results for the fourth experiment are essentially the opposite from those for the second experiment, with the same exception that in experiment 4 the system is constrained by the work effort of households. The firm sector chose to expand slightly in period *t+1*, because of the lower loan rate that the bank sector set for period *t+1*,[9] but the households chose to work less in period *t+1* than they did in period *t* and less than the firm sector expected. This forced the firm sector to cut production in period *t+1* from the level originally planned and to cut it even below the level for period *t*. Real GNP thus dropped slightly in period *t+1* as a result of the decrease in bills. This is another good example of the system being constrained by the work effort of households. The unemployment rate was slightly negative in period *t+2*. This was caused by the fact that household 2 was constrained in its borrowing behavior in period *t+2*, but not in its work behavior. The loan constraint caused household 2 to choose to work slightly more than it would have if it had not been constrained in its borrowing behavior. Therefore, the unconstrained supply of labor for household 2 was slightly less than the constrained supply, thus causing the unemployment rate to be negative.

### Experiment 5: A Decrease in the Number of Goods Purchased by the Government in Period *t* ($XG_t$: -5.0) and a Decrease in the Value of Bills Issued in Period *t* ($VBILLG_t$: -5.0)

For the fifth experiment the number of goods purchased by the government and the value of bills issued were both decreased by 5.0. This had the effect of contracting the economy in periods *t+1* and *t+2* less than was the case for the first experiment, where only the number of goods purchased was decreased. The government surplus in period *t* was 5.9, but since there were 5.0 fewer bills in the system in period *t*, bank reserves were only decreased by 0.9. In experiment 1 bank reserves were decreased by 4.5. The government surplus of 5.9 is the sum of the surplus of 4.5 in experiment 1 and the surplus of 1.4 in experiment 4. The surplus of 1.4 is due to the increased tax collections caused by the capital gains made in period *t*. Capital gains are made in period *t* because of the lower bill and bond rates for period *t+1*. The lower bill and bond rates are due to the excess demand for bills and bonds in period *t*. The 4.5 surplus in experiment 1 instead of a surplus of 5.0 is, as mentioned in the discussion for experiment 1, due to decreased tax collections caused by lower profits and dividends.

Because bank reserves were only decreased by 0.9 in experiment 5, rather than the 4.5 in experiment 1, the bank sector in period $t+1$ set a lower loan rate and a less restrictive loan constraint in experiment 5 than in experiment 1 ($RL_{t+1} = 0.07491$ vs. $0.07507$ and $LBMAX_{t+1} = 809.9$ vs. $807.5$). In experiment 5 the firm sector and household 2 were still constrained in their borrowing behavior in period $t+1$, but less so than in experiment 1. Output in period $t+1$ was thus larger in experiment 5 than in experiment 1 ($Y_{t+1} = 835.4$ vs. $834.6$) and sales were greater ($X_{t+1} = 839.6$ vs. $836.1$). Output and sales in period $t+2$ were also greater in experiment 5 than in experiment 1.

It is also interesting regarding experiment 5 to consider the following case. Assume for sake of argument that the change in sales in period $t$ did not affect worker hour requirements, so that output and profits were not changed in period $t$. Assume also that the capital gains due to the lower bill and bond rates for period $t+1$ were not recorded in period $t$. Assume finally that the government interest payments in period $t$ were not any lower, even though the value of bills issued was less. Under these assumptions all that would have happened in period $t$ regarding the financial variables would have been a decrease in the demand deposits of the firm sector of 5.0 and an increase in the demand deposits of the bond dealer of 5.0. Bank reserves would have remained unchanged. The demand deposits of the firm sector would be lower because of a negative cash flow net of taxes and dividends of 5.0 in period $t$, and the demand deposits of the bond dealer would be higher because it buys 5.0 fewer bills from the government than it sells to the bank sector.

In this case the main effects for period $t+1$ would be as follows. Because of the lower bill rate for period $t+1$, the bank sector would lower the loan rate for period $t+1$, decrease its demand for bills and bonds, and make the loan constraint less restrictive. The loan constraint would be made less restrictive because of the fact that in this case the bank sector would expect to have the same amount of funds at its disposal for period $t+1$ as it had for period $t$ and would decrease its demand for bills and bonds. Other things being equal, the firm sector would need to borrow 5.0 more in period $t+1$ because of the lower demand deposits in period $t$. Since sales were lower in period $t$, however, the firm sector would choose to contract in period $t+1$. (The lower loan rate would, of course, offset this contraction somewhat.) Whether the firm sector contracts to the point where it needs to borrow less than the maximum set by the bank sector depends on the size of the firm sector's response to the sales decrease, as well as on the size of the bank sector's response to the bill rate decrease in terms of substituting out of bills and bonds. The only way the economy would be prevented from contracting in this case would be if the loan rate decrease offset the sales decrease enough to cause the firm sector to produce and invest the same amount as before, and at the same time the bank sector substituted out of bills and bonds sufficiently to allow the firm sector to borrow the extra amount needed to offset the negative cash flow of the previous period.

The case just described is useful in helping to separate the effects of the tax changes from the other effects. In the results for experiment 5 the surplus of the government in period $t$ was 5.9 rather than the 5.0 that it would have been with no tax changes and no change in government interest payments. This decrease of 0.9 in bank reserves in period $t$ caused the bank sector to decrease slightly the maximum loan value in period $t+1$, whereas in the no-tax case it would have increased the maximum loan value slightly. This difference is not large, however, and similar results would have been obtained for experiment 5 had the tax changes been less.

An important point about experiment 5 in relation to experiment 1 is that in experiment 5 the economy contracts even though the decrease in government spending corresponds to an equal decrease in the value of bills issued. The response of the model in period $t+1$ to the sales decrease in period $t$ is greater than is its response to the lower bill and bond rates for period $t+1$, which thus causes the economy to contract in period $t+1$.

### Experiment 6: An Increase in the Number of Goods Purchased by the Government in Period $t$ ($XG_t$: +5.0) and an Increase in the Value of Bills Issued in Period $t$ ($VBILLG_t$: +5.0)

For the sixth experiment the increase in the number of goods purchased by the government was assumed to be financed by an equal increase in bills. The government deficit in period $t$ in this case was 6.8, which, aside from rounding, is the sum of the deficit of 1.4 in experiment 2 and the deficit of 5.5 in experiment 3. The deficit of 1.4 is due to the decreased tax collections caused by the capital losses in period $t$. The deficit of 5.5 rather than of merely 5.0 is due to the lower profits and dividends caused by the increase in worker hour requirements in period $t$. The level of output for period $t+1$ is actually higher in experiment 6 than it is in experiment 3, where the increased spending in period $t$ was financed by an increase in bank reserves (*Real GNP* = *964.1* vs. *962.0*). In both experiments output was constrained in period $t+1$ by the work effort of households, but in experiment 6 the households chose to work somewhat more. The bill and loan rates in period $t+1$ were higher in experiment 6 than in experiment 3, and higher bill and loan rates have a positive effect on the work effort of the households.

The important difference between experiments 3 and 6 is that interest rates in period *t+1* are higher in experiment 6 because of the excess supply of bills and bonds in period *t*. Although bank reserves in period *t* were higher in experiment 3 than in experiment 6 ($BR_t = 60.9$ vs. *57.2*), in neither case was the loan constraint binding on the firm sector and household 2 in period *t+1*.

**Experiment 7: An Increase in the Personal Income Tax Parameter in Period $t$ ($d_3$: +0.00554 in period $t$)**

The increase in the personal tax rate in period *t* caused households to want to work and consume less in period *t*. Household 2 would have liked, unconstrained, to borrow slightly more in period *t*, but it was prevented from doing so by the bank sector. Being constrained by the bank sector, it chose to work slightly more than it otherwise would have, which caused the unemployment rate to be negative in period *t*. Because of the lower labor supply in period *t*, the firm sector was forced to cut production to *834.9* from the planned level of *842.0*. Sales were less in period *t* because of the lower consumption ($X_t = 837.0$ vs. $X_t = 842.0$ for the base run). For the base run the taxable income of the household sector is *862.2* $[YH_{1t} + YH_{2t} - RL_tLH_t]$. Had there been no drop in income in experiment 7, taxes would have increased by *4.8* $[0.00554 \times 862.2]$. Because of the lower income, however, taxes only increased by 3.0. Bank reserves thus decreased by 3.0 in period *t*. In period *t+1* the bank sector raised the loan rate and lowered the maximum value of loans as a result of the decrease in bank reserves in period *t*. The more restrictive loan constraint was not, however, binding on either the firm sector or household 2 in period *t+1*. The firm sector chose to contract in period *t+1* as a result of the sales decrease in period *t*. The households chose, unconstrained, to work and consume more in period *t+1* than they did in period *t*, because the personal tax rate was lowered back to its original level in period *t+1*. The households were constrained in their work effort, however, which forced them to work less and led them to consume less than they had planned to unconstrained. The level of sales was, however, slightly greater in period *t+1* than it was in period *t*, and the level of production was also slightly greater in period *t+1* than it was in period *t*.

An important point about experiment 7 is that an increase in the personal income tax rate causes a decrease in the work effort of households in addition to a decrease in consumption. Output can thus fall in this case without an increase in the unemployment rate. In experiment 7 real GNP fell in period *t*, but the unemployment rate was actually negative. The level of employment was, of course, less, but the lower level of employment was voluntary.

**Experiment 8: A Decrease in the Personal Income Tax Parameter in Period *t* ($d_t$: -0.00554 in period *t*)**

The decrease in the personal tax rate in period *t* caused households to want to work and consume more in period *t*. They were constrained from working any more by the firm sector, however, but they still chose, constrained, to consume somewhat more. Sales were thus greater in period *t*, which forced the firm sector to cut production slightly because of the increased worker hour requirements.[h] Taxes were less by 5.0 because of the lower personal tax rate and the slight decrease in profits.[i] Bank reserves thus increased by 5.0. In periods *t+1* and *t+2* no constraints were binding on the households, and the system was constrained by the work effort of the households.

**Experiment 9: A Decrease in the Minimum Guaranteed Level of Income in Period *t* (*YG*: – 2.5 *in period t*)**

The decrease in *YG* in period *t* caused the households to want to work more and consume less. They were, however, constrained from working more by the firm sector. They thus worked the same and chose to consume even less. Sales were less in period *t* because of the decreased consumption, which caused the economy to begin to contract in period *t+1*. The unemployment rate was higher in period *t* than in period *t+1*, even though the level of employment (*HP*) was lower in period *t+1*, because the decrease in *YG* in period *t* caused the unconstrained work effort of the households to increase in period *t*.

**Experiment 10: An Increase in the Minimum Guaranteed Level of Increase in Period *t* (*YG*: +2.5 in period *t*)**

The increase in *YG* in period *t* caused the households to work less and consume more. The firm sector was forced to decrease production in period *t* because of the decreased supply of labor. Sales were greater in period *t* because of the increased consumption. In period *t+1* the firm sector chose to produce more than it had actually produced in period *t* ($Y^p_{t+1} = 841.3$ vs. $Y_t = 836.7$), but slightly less than it had *planned* to produce in period *t* ($Y^p_t = 842.0$). The firm sector actually expected to sell more in period *t+1* than it had expected it was going to sell in period *t* ($X^e_{t+1} = 843.2$ vs. $X^e_t = 842.0$). The reason that $Y^p_{t+1}$ is less than $Y^p_t$ has to do in part with the firm sector's reaction to employment adjustment costs. Unconstrained, the households chose to work more in period *t+1* than they had in period *t*, because *YG* was changed back to the original level in period *t+1*. The households were constrained slightly in period *t+1*, which caused the unemployment rate to rise slightly. The system was again constrained in period *t+2* by the work effort of the households, and the unemployment rate was back to zero.

**Experiment 11: A Decrease in the Number of Worker Hours Paid For by the Government in Period *t* ($HPG_t$ : −5.0)**

The decrease in $HPG_t$ caused the hours constraint to be binding on the households in period *t*. The households worked less and consumed less. Sales were lower because of the decreased consumption. The firm sector planned in period *t* to produce the same amount as was the case for the base run ($Y_t^p = 842.0$), but it was forced to produce slightly less ($Y_t = 841.8$) because of the increase in worker hour requirements caused by the change in sales.

The government ran a surplus of 3.9 in period *t*, and so bank reserves were less by 3.9. The decrease in bank reserves took the form of a 2.8 decrease in the demand deposits of the firm sector (caused by a negative cash flow net of taxes and dividends of 2.8), a 0.5 decrease in the demand deposits of the two households (due to the lower consumption), and a 0.5 decrease in the savings deposits of household 1.[j] Another way of looking at the households' portion of the 3.9 decrease in bank reserves is that the households dissaved 1.0 in period *t* ($SAV_{1t} = -0.7$ and $SAV_{2t} = -0.3$).

The bank sector raised the loan rate and made the loan constraint more restrictive in period *t+1* as a result of the decrease in bank reserves in period *t*. Because of the higher loan rate and the decrease in sales, the firm sector chose, unconstrained, to produce and invest less and hire less labor in period *t+1*. The loan constraint was binding on the firm sector, however, which caused it to contract even more. Even though in period *t+1* the government increased its amount of labor hired back to the original level, the households were still constrained in their work effort because of the more restrictive hours constraints from the firm sector. The unemployment rate was thus still positive in period *t+1*, although it was less than in period *t*.

**Experiment 12: An Increase in the Number of Worker Hours Paid For by the Government in Period *t* ($HPG_t$ : +5.0)**

The increase in $HPG_t$ meant that the firm sector got less labor in period *t*, which forced it to cut production from the planned level ($Y_t = 835.3$ vs. $Y_t^P = 842.0$). Because of employment adjustment costs, the firm sector planned to produce less in period *t+1* than it had planned to in period *t*. The firm sector thus also planned to invest less and hire less labor in period *t+1*. The households were constrained in their work effort in period *t+1* because of the decrease in *HPG* back to its original level and because of the more restrictive hours constraint from the firm sector. The government ran a large deficit in period *t*, which caused the loan rate to decrease in period *t+1* and the bill rate to decrease in period *t+2*. The system was contrained slightly in period *t+2* by the work effort of the households.

## SUMMARY OF THE EXPERIMENTAL RESULTS

Some of the main characteristics of the model that can be gleaned from the above experiments are as follows. A decrease in the number of goods purchased by the government in period *t* causes sales and bank reserves in period *t* to decrease. The decrease in bank reserves leads the bank sector to raise the loan rate for period *t+1* and lower the maximum value of loans that it will make. The decrease in sales and the higher loan rate lead the firm sector in period *t+1* to lower planned production, investment, and the maximum number of worker hours that it will pay for. The firm sector's unconstrained demand for loans in period *t+1* may be greater or less than it was in period *t*. The lower level of demand deposits of the firm sector in period *t*, do to the negative cash flow net of taxes and dividends in period *t*, causes the firm sector to increase its demand for loans in period *t+1*. The contraction planned by the firm sector because of the sales decrease, on the other hand, causes it to decrease its demand for loans. The loan constraint, therefore, may or may not be binding on the firm sector in period *t+1*, depending on the size of the various reactions.

Ignoring tax effects, when a decrease in the number of goods purchased by the government in period *t* corresponds to an equal decrease in the value of bills issued, bank reserves in period *t* are unchanged. The bill rate for period *t+1* is lower because of the excess demand for bills in period *t*. The lower bill rate leads the bank sector in period *t+1* to lower the loan rate, decrease its demand for bills and bonds, and increase the maximum value of loans that it will make. The lower interest rates have a positive effect on the economy in period *t+1*, but the decrease in sales in period *t* and the resulting higher level of inventories have a negative effect. In the model the negative effect outweighs the positive effect, and the economy contracts in period *t+1* as a result of the simultaneous decrease in goods purchased and bills issued.

Tax changes tend to offset somewhat the effects of the various government actions. When profits decrease, both personal taxes and corporate taxes decrease. Personal taxes decrease both because of lower dividend income and capital losses on stocks. The opposite happens when profits increase. When the bill and bond rates increase, taxes decrease because of the capital losses suffered on bonds and stocks, and vice versa when the bill and bond rates decrease.

When from a position of equilibrium the number of goods purchased by the government is increased or the value of bills issued is decreased, the system may be prevented from expanding by the work effort of households. If the number of goods purchased by the government is increased, the firm sector will want to expand in the next period because of the sales increase, and if the value of bills issued is decreased, the firm sector will want to expand in the next period because of the lower loan rate that will be set by the bank sector. Only if the households can be induced to work more, however, will the system actually be able to expand. It should also be noted that in the case of a *decrease* in government spending or an *increase* in the value of bills issued, the firm sector is forced to contract because of the more restrictive loan constraint, whereas in the case of an *increase* in government spending or a *decrease* in the value of bills issued, there is nothing similar forcing the firm sector to expand.

Regarding the price setting behavior of the firm sector, the price level responds positively to a higher loan rate and a more restrictive loan constraint, so that an increase in the value of bills issued results in an initial increase in the price level. This initial increase then reverses itself as sales fall and the firm sector responds by lowering the price level. Likewise, a decrease in the values of bills issued results in an initial decrease in the price level, which then reverses itself as sales rise and the firm sector responds by raising the price level.

The important difference between the government influencing the economy through a change in the number of goods purchased and a change in one of the tax parameters, $d_3$ and $YG$, is that the latter change has a direct effect on the work effort of the households, whereas the former change does not. Increasing taxes by increasing $d_3$ has a negative effect on the work effort of households, which, other things being equal, has a negative effect on the unemployment rate. Increasing taxes by decreasing the minimum guaranteed level of income, on the other hand, has a positive effect on work effort, which, other things being equal, has a positive effect on the unemployment rate. Increasing taxes and decreasing the number of goods purchased do, however, have similar effects on bank reserves. Both changes lead to a smaller deficit or a larger surplus in the government budget and thus to a decrease in bank reserves.

## 6.3 THE EFFECTS OF POLICY CHANGES FROM A DISEQUILIBRIUM POSITION

Although the experiments in Table 6-6 were all made from an initial position of equilibrium, the results do help to show how various policy actions would affect an economy that is out of equilibrium. In an economy characterized by binding loan constraints, the need is to increase bank reserves. Increasing government spending with no change in bills and bonds, and decreasing bills and bonds with no change in government spending both increase bank reserves. Which action is more effective in increasing bank reserves depends on the tax response. In experiments 3 and 4, increasing government spending was more effective in increasing bank reserves. Decreasing bills in experiment 4 led to increased tax collections because of the resulting capital gains on bonds and stocks, whereas increasing government spending in experiment 3 actually led to a slight decrease in tax collections because of the decreased production due to the increased worker hour requirement. The quantitative importance of both of these effects may be exaggerated, however, especially the capital gains effects. Nevertheless, the results do highlight the importance of taking into account possible tax responses when considering the effectiveness of various policy actions in increasing bank reserves.

In an economy characterized by binding hours constraints, the need is to induce the firm sector to produce more and hire more labor. Increasing government spending on goods with no change in bills and bonds does this by increasing the sales of the firm sector directly. Decreasing bills and bonds with no change in government spending leads to lower interest rates, which in turn induces the firm sector to invest more and the household sector to save less and consume more. This then leads to increased sales because of the increased investment and consumption. Which action is initially most effective in increasing sales depends on the size of the initial rate changes and the size of the initial responses to the interest rate changes.

In an economy characterized by binding hours constraints, the government can also increase the amount of labor that it hires. For the same expenditure, this policy is likely to be more effective in increasing aggregate employment in the short run than the policy of increasing the number of goods purchased by the government. When the number of goods purchased by the government is increased, the firm sector initially will meet some of this increase by drawing down inventories (because of the adjustment costs) and so will not increase production to the full extent of the increase in sales. Also, if the firm sector is holding excess labor, it will be able to meet at least part of its increased worker hour requirements, due to the increased production, by taking up the slack in its work force. This will, of course, further lessen the initial employment response to the sales increase.

Ignoring possible tax effects, the policy of increasing government spending and the policy of decreasing the value of bills and bonds issued would appear at first glance to be about equally effective (for the same outlay) in an economy characterized by binding loan constraints. The need in this case is to increase bank reserves, and both policies are of about the same effectiveness in doing this. Increasing government spending in this case, however, has the possibly undesirable characteristic of increasing sales directly. In an economy characterized by binding loan constraints, production is constrained by the availability of loanable funds and not by lack of sales, and increasing government purchases of goods directly may just exaberate the problem in the short run. One does not want to increase the sales of firms before the firms realize that they can borrow more money to increase investment and output. If there are information lags from the banks to the firms, increasing the sales of firms at the same time that bank reserves are increased may lead firms to raise prices in order to lower expected sales to the levels that are consistent with the production plans that are based on the old loan constraints. What is needed in the case of binding loan constraints is just more money in the system, and the most direct way of doing this is merely to decrease the value of bills and bonds issued.

If monetary policy is defined as a change in bills and bonds with no change in government purchases of goods and labor, and fiscal policy is defined as a change in government purchases of goods and labor with no change in bills and bonds, then the above argument says that monetary policy is a more direct tool to use in an economy characterized by binding loan constraints than is fiscal policy. In an economy characterized by binding hours constraints, however, fiscal policy would appear to be the more direct tool to use. The need in this case is to increase sales and employment. Fiscal policy does this directly, whereas monetary policy must work through the interest rate responses of the firm and household sectors. Only if the interest rate responses are large and quick will monetary policy be as effective or more effective than fiscal policy in a binding hours constraint situation.

The above discussion thus indicates that it is not just the interest rate responses that are important in determining the effectiveness of monetary policy versus fiscal policy at any given time, but also the kind of disequilibrium situation that the economy is in at the time. In a situation of binding loan constraints, monetary policy would appear to be more effective, and in a situation of binding hours constraints, fiscal policy may be more effective. Also, in a situation of binding hours constraints, fiscal policy in the form of an increase in government purchases of labor would appear to be more effective in increasing the level of employment than fiscal policy in the form of an increase in government purchases of goods.

If the government desires to contract the economy from, say, a situation in which none of the constraints are binding, the results in the previous section indicate that both monetary policy and fiscal policy are likely to be effective in doing this. A contractionary fiscal policy lowers sales directly. A contractionary monetary policy leads to higher interest rates and more restrictive loan constraints, which in turn cause investment and consumption to decrease. However, a contractionary monetary policy may lead, other things being equal, to a higher price level than will a contractionary fiscal policy. Higher interest rates and more restrictive loan constraints have a positive effect on the prices that firms set.

## 6.4 THE LONG-RUN PROPERTIES OF THE MODEL

The model used for the results in Table 6-6 is not stable in the sense that it does not return to the "equilibrium" self-repeating position once a one-period shock has been inflicted on it. This conclusion was reached from examining numerous runs in which, from a self-repeating position, a parameter or exogenous variable was changed for one period and then returned the next period to its previous value. The model was allowed to run for 100 periods after the particular change. The model definitely had a tendency to meander around near the original self-repeating values, but in no case did it give any indication of returning exactly to the self-repeating position. This conclusion was also verified for other versions of the condensed model—i.e., for versions based on different sets of parameter values.

The lack of stability of the model in the above sense is, of course, not surprising. In fact, it would be surprising if the model did return to the self-repeating position after being shocked, since there is nothing in the model that indicates that it should return. The bank sector when setting its values only has expectations of what the firm and household sectors are going to do in the period, and the firm sector when setting its values only has expectations of what the household sector is going to do. Even if the assumptions regarding the formation of expectation of banks and firms were made more sophisticated than the assumptions used here, it is not reasonable to assume that these expectations are always perfect. This is particularly true in a market share model, where it is not only the expectations regarding the aggregate quantities that would need to be perfect, but also the expectations of the behavior of other banks and firms. Even if a firm's expectations of the aggregate quantities were perfect, the firm may still misestimate what its competitors are going to do. Since expectations are not perfect, there is no reason to expect the banks and firms to set interest rates, prices, and wage rates in such a way that no constraints are ever binding and in such a way that the system gradually approaches a particular state.[k]

There are, of course, reactions in the model that prevent the system from accelerating or decelerating indefinitely. Holding the variables under the control of the government constant, as the system contracts, interest rates fall. Interest rates fall because the firm and household sectors demand fewer funds to borrow. Falling interest rates, on the other hand, induce the firm sector to invest more and the household sector to save less and consume more. Falling interest rates also cause capital gains on stocks, which have a positive effect on household 1's consumption behavior. As the system contracts the price level and the wage rate also fall, but whether this induces households to consume more depends on how the price level and wage rate change relative to one another. There is thus no natural tendency for the price level and the wage rate to bring the economy out of a contracting situation, as there is for the interest rates. Falling prices and wages do, however, decrease the demand deposit needs of the firm and household sectors, which, other things being equal, decrease the demand for loans of the firm sector and household 2 and increase the savings deposits of household 1. A one-dollar switch from demand deposits to savings deposits frees up fraction $g_1$ of a dollar in loanable funds because of the reserve requirement ratio on demand deposits. Likewise, a one-dollar decrease in demand deposits and loans at the same time frees up fraction $g_1$ of a dollar in loanable funds.

An interesting question about the long run dynamic properties of the model is whether it is possible to concoct a self-repeating run in which there exists a positive level of unemployment. It is easy to see that this is not possible. Unemployment occurs if the hours constraint is binding on the households. If the hours constraint is binding, then the ratio of the unconstrained supply of labor (*HPUN*) to the constrained supply of labor (*HP*) is not one, and if the ratio is not one, the firm sector will not set the same wage rate each period (see statements [15] and [36] in Table 3-4). In other words, as long as firms are assumed to know last period's unconstrained as well as constrained supply of labor, one cannot concoct a self-repeating run with positive unemployment.

It is possible, however, to concoct a self-repeating run with positive unemployment if it is assumed that firms do not know the unconstrained supply of labor. Consider a self-repeating run with no unemployment. Now change the utility functions of the households in such a way that they desire to work more, consume more, but keep the same level of savings deposits and loans. Assume also that when constrained by the old equilibrium values of hours worked, they choose the same values of hours worked and goods purchased as they did before (and thus the same level of savings deposits and loans as before). The aggregate unconstrained and constrained demands for loans are the same, so the bank sector is unaffected even if it knows the unconstrained as well as the constrained demands. If the firm sector does not know the unconstrained supply of labor, there is no way for the information on the change in the utility functions of households to be communicated to it. It only observes the actual demand for goods and supply of labor, which are the same as before. The firm sector thus makes the same decisions as it did before, households are subject to the same constraints as before (and so make the same decisions as before) and so on. A self-repeating run will thus still exist, but now in a situation where there is unemployment.

Because firms are assumed to observe the unconstrained supply of labor, unemployment arises in the model only because of errors of expectations. It was seen in Chapter Three that each firm sets its price and wage rate with the expectation that it will not turn any workers away and with the expectation that no workers will be turned away in the aggregate. Therefore, any unemployment that arises in the model is due to errors in the firms' expectations of the behavioral responses of the households. It is also the case that binding loan constraints are due only to errors of expectations. It was seen in Chapter Two that a bank sets its loan rate with the expectation that there will be no customers turned away in the aggregate. Therefore, any binding loan constraints are due to errors in the banks' expectations of the responses of the firms and households.

It is important to distinguish between two kinds of errors of expectations on the part of banks and firms: errors of expectations of aggregate quantities and errors of expectations of market share. A bank, for example, can misestimate either the aggregate demand for loans or its share of the aggregate loan market or both. In practice, with many banks and firms in existence, expectations of market share factors are likely to have more of an effect on the behavior of a bank or firm than are expectations of aggregate quantities. If a bank or firm is a small part of the overall economy, then changes in its market share, due to its behavior relative to the behavior of its competitors, are likely to affect it more than are changes in the aggregate quantities. In other words, there is likely to be less payoff to a particular bank or firm from making accurate expectations of aggregate quantities than from making accurate expectations of its market share, and the bank or firm is likely to put more resources into the latter than the former. If in practice each bank and firm is more concerned with what its competitors are going to do than with what the aggregate quantities are going to be like, it is not surprising that errors of expectations are made in the aggregate. There may be little incentive in the system for firms as a group to set price and wages so as to leave households always unconstrained and for banks as a group to set loan rates so as to leave firms and households always unconstrained.

## 6.5 PRICE AND WAGE RESPONSES

The price and wage setting behavior of a firm was discussed in Chapter Three, and little extra discussion is needed here. The price that a firm sets responds positively to an increase in sales of the previous period and negatively to the existence of excess labor and excess capital in the previous period. The price also responds positively to the loan rate and to a binding loan constraint, so that periods of tight money correspond, other things being equal, to price increases.

The wage rate that a firm sets is equal to the rate that the firm expects is necessary to attract the amount of labor that it wants in the period. The expected supply of labor facing a firm is a positive function of the firm's wage rate and of the expected aggregate supply of labor, and is a negative function of the expected wage rates of other firms. The expected aggregate supply of labor is a positive function of the expected average wage rate in the economy and of the aggregate unconstrained supply of labor in the previous period, and is a negative function of the expected average price level in the economy.

Although the price and wage decisions of a firm are made simultaneously, both resulting from the solution of the firm's optimal control problem, it is possible to talk loosely about the effect of a firm's price decision on its wage decision. An increase in price, other things being equal, has a negative effect on expected sales, planned production, investment, and planned employment. If planned employment is less, then the firm expects to be able to attract the amount of labor that it wants with a lower wage rate than before. So on this score a higher price implies a lower wage rate being set. On the other hand, if a firm increases its price, it expects the average price in the economy to be higher, especially a few periods into the future as other firms are expected to respond to the firm's higher price. A higher expected average price has a negative effect on the expected aggregate supply of labor, which implies a tighter aggregate labor market and thus the need to raise wages to attract the same number of workers. So on this score a higher price implies a higher wage rate being set. The ceteris paribus relationship between the price that a firm sets and the wage rate that it sets is thus ambiguous.

Because of the market share nature of the model, the most important factors affecting a firm's price and wage decisions are its expectations of what its competitors' prices and wages are going to be. The assumptions that are made about how these expectations are formed are thus of crucial importance in determining the price and wage responses in the model. For the most part the specification of these assumptions has been fairly simple, but it should be obvious that more elaborate assumptions could be easily incorporated into the model.

As one final point regarding prices and wages, it should be obvious that there is no simple relationship in the model between the level of the unemployment rate and changes in prices and wages. Each variable is determined each period by a complex set of factors, many factors being expectations of various sorts, and there is nothing in this process that indicates that one should observe any simple or stable relationship between the unemployment rate and price and wage changes.

## 6.6 THE RELATIONSHIP BETWEEN DEMAND DEPOSITS AND AGGREGATE OUTPUT

Demand deposits serve two main purposes in the model. Demand deposits are needed to carry out transactions, and they also serve as a buffer for firms and the bond dealer to meet unexpected changes in cash flow. The demand deposits of households are proportional to the households' expenditures on goods and have not been assumed to be a direct function of any interest rate. The number of hours worked and the number of goods purchased by the households are, however, functions of the bill rate and the loan rate, which means that the savings behavior of the households is a function of the interest rates. The savings behavior of the households affects their savings deposits and loans. The saving deposits of household 1 also serve as a buffer in the current period in the sense that any unexpected change in dividend income or tax payments takes the form of a change in the level of savings deposits in the period.

The demand deposits of the firms are on average proportional to the firms' wage bills, but they also serve an important purpose in the current period in meeting unexpected changes in cash flow net of taxes and dividends. Actual net cash flow will differ from expected net cash flow for a firm as the actual price of investment goods differs from the expected price and as the actual level of inventories differs from the expected level. The demand deposits of the bond dealer change as its holdings of bills and bonds change. If, for example, the change in the value of bills and bonds issued by the government in a period is less than the change in the demand for bills and bonds from the banks, the bond dealer will sell bills and bonds to the bank out of its inventories, which will have the effect of increasing its demand deposits.

Because of the residual or buffer nature of the demand deposits of the firms and the bond dealer, the short run relationship between the aggregate level of demand deposits and aggregate level of output is likely to be quite eratic. The aggregate level of demand deposits is likely to be a more eratic variable than the aggregate level of output, especially considering the fact that fluctuations in output are generally less than fluctuations in sales because of the buffer nature of goods inventories. Over long periods of time, demand deposits and output will, of course, move together because of the use of demand deposits for transactions purposes.

Although the demand deposits of the firms and households were assumed not to be a direct function of interest rates, relaxing this assumption would have little effect on the overall properties of the model. The important property of the model in this regard is the fact that the savings behavior of the households and the investment behavior of the firms are functions of the interest rates. Higher interest rates imply more savings and less investment and thus, other things being equal, more loanable funds in the system. Lower interest rates have the opposite effect. The only thing that making demand deposits a negative function of interest rates would do would be to lessen slightly the restrictiveness caused by those policies (e.g., experiments 1 and 2 in Table 6-6) that take money out of the system and lead to higher interest rates. In these cases the higher interest rates would imply that less money would be used to meet the same level of transactions, which, because of the reserve requirement on demand deposits, would allow the bank sector to lend slightly more than otherwise.

If, say, the demand deposits of the firm sector were decreased by 1.0, the firm sector would need to take out 1.0 less in loans. Likewise, if the demand deposits of household 2 were decreased by 1.0, household 2 would need to take out 1.0 less in loans. If the demand deposits of household 1 were decreased by 1.0, household 1's savings deposits could be increased by 1.0. Now, a simultaneous decrease in demand deposits of 1.0 and decrease in loans of 1.0 frees up fraction $g_1$ of this amount for new loans. Likewise, a simultaneous decrease in demand deposits of 1.0 and increase in savings deposits of 1.0 frees up fraction $g_1$ of this amount for new loans (assuming no reserve requirement on savings deposits). Since $g_1$ is only $\frac{1}{6}$ in the model, however, the amount of funds freed up by a decrease in demand deposits would be small unless the responsiveness of demand deposits to interest rate changes was extremely high. Therefore, little is lost in the model by not postulating that demand deposits are a direct function of interest rates.

## NOTES

[a]See footnote i in Chapter Three for a discussion of this equation. In the notation in Table 6-2, this equation is $Y_t/\lambda_1 + \beta_2(V_{t-1} + Y_t - X_t - \beta_1 X_t)^2 + MH_{4t} + MH_{5t} + MH_{6t} = HPF_t$.

[b]By consistent in this case is meant a set of values that satisfies all the adding-up and other constraints in the model.

[c]Because of rounding, the numbers in Table 6-6 do not always add together properly. Not rounded, the surplus of the government in period *t* was 4.530, with the level of bank reserves also being less by this amount. The level of demand deposits of the firm sector was lower by 4.472, and the level of savings deposits of household 1 was lower by 0.058.

[d]Not rounded, the figures are 3.628, 4.882, 0.749, and 0.505, respectively.

[e]The decrease in investment, planned production, and the maximum number of hours was not large enough to show up in the rounded numbers in Table 6-6.

[f]Remember that *HPFMAX* is the firm sector's expected supply of labor.

[g]The increase in investment, planned production, and the maximum number of hours as a result of the lower loan rate was not large enough in this case to show up in the rounded numbers in Table 6-6.

[h]The cut in production of the firm sector was too small to show up in the rounded numbers in Table 6-6.

[i]The decrease in profits of the firm sector was likewise too small to show up in the rounded numbers in Table 6-6.

[j]The numbers are off by 0.1 because of rounding.

[k]As mentioned in the Appendix, the non-condensed model is also not stable in the above sense, even though for the non-condensed model the banks, firms, and bond dealer are allowed to estimate some of the important expectational parameters on the basis of past observations. Even though some parameters are updated each period, there is still too much room for expectation errors to be made for the model to settle back down to the self-repeating position once it is shocked.