Chapter Two

The Complete Model

2.1 INTRODUCTION

Aside from the specification of the stochastic equations, the complete model is presented and discussed in this chapter. Most of the remaining data questions are also considered. Presenting the complete model now has the advantage of showing very early its closed nature (with respect to the flows of funds) and of establishing all the notation that is needed in later chapters. A model building effort of this sort requires a number of detailed decisions about how certain variables are to be treated and about what kinds of data are to be used, and it seems best to get most of these details out of the way now in order to put the discussion of the stochastic equations in a better perspective.

The complete list of variables in the model is presented in Table 2-1 in alphabetic order, and the complete list of equations in the model is presented in Table 2-2. For reference purposes, the estimates of the stochastic equations are presented in Table 2-3, although this table is not discussed in this chapter. The notation used in this volume corresponds as closely as possible to the notation used for the theoretical model in Volume I. Enough detail has been presented in Table 2-1 so that one should be able to duplicate the collection of the data fairly easily, using also the information in Tables 1-2 and 1-3. The notation for most of the variables has been changed in going from Tables 1-2 and 1-3 to Table 2-1. The notation in Tables 1-2 and 1-3 is designed to try to make clear the relationships among the NIA and FFA data, whereas, as just mentioned, the notation in Table 2-1 is designed to be consistent with the notation in Volume I. The next two sections are a discussion of Tables 2-1 and 2-2. Table 2-2 will be discussed first, and then the data questions that pertain to Table 2-1 will be discussed.

Table 2–1. The Complete List of Variables in the Model in Alphabetic Order

Subscript t denotes variable for quarter t. All flow variables are at quarterly rates. Variables are seasonally adjusted where appropriate. *BCURT* denotes that the unit of the variable is billions of current dollars, and *B*1958 denotes that the unit of the variable is billions of 1958 dollars. A † denotes an exogenous variable.

Value of Variable in 1971IV	*Equation Number in Model*		
1342.4	61	A_t	= value of nondemand deposit securities of the household sector, *BCURT*. [$= SECH_t - \Sigma_{i=t+1}^{80} CG_i$ for $t < 80$; $= SECH_t + \Sigma_{i=81}^{t} CG_i$ for $t > 80$; $= SECH_t$ for $t = 80$. $t = 80$ in 1971IV. For $SECH_t$, see Table 1–3. See also the discussion in section 2.3.]
0.0	20	$BORR_t$	= commercial bank borrowing at federal reserve banks, *BCURT*. [$= -BORB_t$ in Table 1–3.]
35.3	45	BR_t	= bank reserves, *BCURT*. [$= RESB_t$ in Table 1–3.]
24.1	46	CD_t	= personal consumption expenditures on durable goods, *B*1958. [SCB, 1.2.]
7.9	53	CF_t	= cash flow before taxes and dividends of the firm sector, *BCURT*. [Defined in Table 2–2.]
−5.2	54	$\overline{CF}_t$	= cash flow net of taxes and dividends of the firm sector, *BCURT*. [$= SAVF_t$ in Table 1–2. Also defined in Table 2–2.]
28.4	23	CG_t	= capital gains (+) or losses (−) during quarter t on corporate stocks held by the household sector, *BCURT*. [See discussion section 1.2.]
53.1	2	CN_t	= personal consumption expenditures on nondurable goods, *B*1958. [SCB, 1.2.]
6.5		$^{\dagger}COM_t$	= farm output, *B*1958. [SCB, 1.8.]
48.8	1	CS_t	= personal consumption expenditures on services, *B*1958. [SCB, 1.2.]
29.2		$^{\dagger}CURR_t$	= value of currency outstanding less the value of demand deposits of the government sector, *BCURT*. [$= -DDCG_t$ in Table 1–3.]
0.412		$^{\dagger}d_{1t}$	= profit tax rate. [$= TAXF_t/\pi F_t$.]
0.084		$^{\dagger}d_{3t}$	= one of the two personal income tax rates. [$= (PTAXH_t/YH_t) - \tau \cdot YH_t$.]
0.223	84	d_{3t}^{M}	= marginal personal income tax rate. [Defined in Table 2–2.]
0.183		$^{\dagger}d_{4t}$	= indirect business tax rate. [$= IBTH_t/(PCD_tCD_t + PCN_tCN_t + PCS_tCS_t - IBTH_t)$.]

Table 2–1. (continued)

Value of Variable in 1971IV	*Equation Number in Model*		
0.059		$^\dagger d_{5t}$	= employer social security tax rate. [$=FHCSI_t/(WFF_t(HPFN_t + 1.5HPFO_t)JOBF_t)$.]
0.055		$^\dagger d_{6t}$	= employee social security tax rate. [$=HGSI2_t/(WFF_t(HPFN_t + 1.5HPFO_t)JOBF_t)$.]
0.0		$^\dagger D593_t$	= dummy variable that takes on a value of one in 1959III and zero otherwise.
0.0		$^\dagger D594_t$	= dummy variable that takes on a value of one in 1959IV and zero otherwise.
0.0		$^\dagger D601_t$	= dummy variable that takes on a value of one in 1960I and zero otherwise.
0.0		$^\dagger D644_t$	= dummy variable that takes on a value of one in 1964IV and zero otherwise.
0.0		$^\dagger D651_t$	= dummy variable that takes on a value of one in 1965I and zero otherwise.
0.0		$^\dagger D652_t$	= dummy variable that takes on a value of one in 1965II and zero otherwise.
0.0		$^\dagger D691_t$	= dummy variable that takes on a value of one in 1969I and zero otherwise.
0.0		$^\dagger D692_t$	= dummy variable that takes on a value of one in 1969II and zero otherwise.
0.0		$^\dagger D693_t$	= dummy variable that takes on a value of one in 1969III and zero otherwise.
0.0		$^\dagger D704_t$	= dummy variable that takes on a value of one in 1970IV and zero otherwise.
0.0		$^\dagger D711_t$	= dummy variable that takes on a value of one in 1971I and zero otherwise.
1.0		$^\dagger D714_t$	= dummy variable that takes on a value of one in 1971IV and zero otherwise.
0.0		$^\dagger D721_t$	= dummy variable that takes on a value of one in 1972I and zero otherwise.
1.0		$^\dagger DD661_t$	= dummy variable that takes on a value of zero before 1966I and a value of one from 1966I on.
189.5	62	DDB_t	= value of demand deposits and currency of the financial sector, *BCURT*. [$= -DDCB_t$ in Table 1–3.]
36.3	16	DDF_t	= value of demand deposits and currency of the firm sector, *BCURT*. [$=DDCF_t$ in Table 1–3.]
164.6	8	DDH_t	= value of demand deposits and currency of the household sector, *BCURT*. [$=DDCH_t$ in Table 1–3.]
6.5		$^\dagger DDR_t$	= value of demand deposits and currency of the foreign sector, *BCURT*. [$=DDCR_t$ in Table 1–3.]

Table 2–1. (continued)

Value of Variable in 1971IV	*Equation Number in Model*		
14.8		$^{\dagger}DEP_t$	= depreciation of the firm sector, *BCURT*. [F/F, Capital Consumption Allowances of Nonfinancial Corporate Business, 106300005, p. 22.]
0.2		$^{\dagger}DISB_t$	= discrepancies of the financial, firm, government, household, and foreign sectors, respectively, *BCURT*. [Same as in Table 1–3.]
2.1		$^{\dagger}DISF_t$	
1.3		$^{\dagger}DISG_t$	
−1.3		$^{\dagger}DISH_t$	
−2.1		$^{\dagger}DISR_t$	
0.6		$^{\dagger}DIVB_t$	= dividends paid by the financial sector, *BCURT*. [$=BHDIV_t + BHCGD_t$ in Table 1–2.]
5.8	17	$DIVF_t$	= dividends paid by the firm sector, *BCURT*. [$=FHDIV_t$ in Table 1–2.]
6.4	56	$DIVH_t$	= dividends received by the household sector except those dividends paid to itself, *BCURT*. [Defined in Table 2–2.]
1.0		$^{\dagger}DTAXCR_t$	= investment tax credit variable. [=0.5 in 1962III–1963IV and 1971III; 1.0 in 1964I–1966III, 1967II–1969I, and 1971IV–1975I; and 0.0 otherwise.]
83019	81	$EMPL_t$	= total number of people employed, civilian and military, thousands of persons. [Sum of civilian employment and $JOBGM_t$. Data on the former were obtained from EE, *A*-31. Average of monthly data. See discussion in section 2.3 for adjustments.]
12.3		$^{\dagger}EX_t$	= exports, *B*1958. [SCB, 1.2.]
8.8		$^{\dagger}FHCCA_t$	= capital consumption of the household sector, *BCURT*. [Same as in Table 1–2.]
8.4	43	$FHCSI_t$	= employer social security contributions, *BCURT*. [Same as in Table 1–2.]
0.0		$^{\dagger}FHPFA_t$	= profits of farms (household sector), *BCURT*. [Same as in Table 1–2.]
6.4		$^{\dagger}FHRNT_t$	= rental income of the household sector, *BCURT*. [Same as in Table 1–2.]
1.1		$^{\dagger}FHTRP_t$	= transfer payments from the firm sector to the household sector, *BCURT*. [Same as in Table 1–2.]
0.2		$^{\dagger}FHWLD_t$	= wage accruals less disbursements of the firm sector, *BCURT*. [Same as in Table 1–2.]
0.186		$^{\dagger}g_{1t}$	= reserve requirement ratio. [$=BR_t/DDB_t$.]
12.2		$^{\dagger}GFXG_t$	= value of gold and foreign exchange of the government sector, *BCURT*. [Same as in Table 1–3.]
0.3		$^{\dagger}GHSUB_t$	= net subsidies of government enterprises, *BCURT*. [Same as in Table 1–2.]
0.1		$^{\dagger}GHWLD_t$	= wage accruals less disbursements of the government sector, *BCURT*. [Same as in Table 1–2.]

Table 2–1. (continued)

Value of Variable in 1971IV	*Equation Number in Model*		
270.8		GNP_t	= gross national product, *BCURT*. [Defined in Table 2–2. See also F/F, 86901005, p. 1.]
0.7		$^{\dagger}GRTRP_t$	= transfer payments from the government sector to the foreign sector, *BCURT*. [Same as in Table 1–2.]
7.8	44	$HGSI2_t$	= employee social security contributions, *BCURT*. [Same as in Table 1–2.]
491.3	13	HPF_t	= average number of hours paid per job per quarter by the firm sector. [Unpublished data from BLS.]
451.9	50	$HPFN_t$	= average number of nonovertime hours paid per job per quarter by the firm sector. [$=HPF_t - HPFO_t$.]
39.4	14	$HPFO_t$	= average number of overtime hours paid per job per quarter by the firm sector. [EE, *C*-7. (For manufacturing.) Average of monthly data. Data multiplied by 13 to put on a quarterly basis.]
505.4		$^{\dagger}HPGC_t$	= average number of hours paid per civilian job per quarter by the government sector. [EE, *B*-5 and *C*-9. Ratio of "man hours" variable for the government in *C*-9 to $JOBGC_t$ in *B*-5. Average of monthly data. Data multiplied by 13 to put on a quarterly basis.]
520.0		$^{\dagger}HPGM_t$	= average number of hours paid per military job per quarter by the government sector. [Assumed to be 520 hours for all t.]
0.3		$^{\dagger}HRTRP_t$	= transfer payments from the household sector to the foreign sector, *BCURT*. [Same as in Table 1–2.]
26.5	40	$IBTH_t$	= indirect business taxes, *BCURT*. [$=HGIBT_t$ in Table 1–2.]
7.1	47	IH_t	= residential investment of the household sector, *B*1958. [$=HFRES_t/PIH_t$. For $HFRES_t$, see Table 1–2.]
12.9	24	IM_t	= imports, *B*1958. [SCB, 1.2.]
10.8	18	$INTF_t$	= interest paid by the firm sector, *BCURT*. [$=FHINT_t$ in Table 1–2.]
3.2	26	$INTG_t$	= interest paid by the government sector, *BCURT*. [$=GHINT_t$ in Table 1–2.]
14.0	57	$INTH_t$	= interest received by the household sector, *BCURT*. [Defined in Table 2–2.]
14.5	11	INV_t	= nonresidential plant and equipment investment of the firm sector, *B*1958. [$=FFPAE_t/PFF_t$. For $FFPAE_t$, see Table 1–2.]
−1.1	19	IVA_t	= inventory valuation adjustment, *BCURT*. [F/F, Inventory Valuation Adjustment, 105020601, p. 1.]

Table 2–1. (continued)

Value of Variable in 1971IV	*Equation Number in Model*		
299.3	75	J_t	= ratio of total worker hours paid for to the total population 16 and over. [Defined in Table 2–2.]
317.4	76	J_t^*	= J_t detrended. [Defined in Table 2–2.]
71667.	12	$JOBF_t$	= number of jobs in the firm sector, thousands of jobs. [Unpublished data from BLS.]
13027.		†$JOBGC_t$	= number of civilian jobs in the government sector, thousands of jobs. [EE, *B*-5. Average of monthly data.]
2690.		†$JOBGM_t$	= number of military jobs in the government sector, thousands of jobs. [EE, *A*-31. Average of monthly data. Difference between total labor force and civilian labor force.]
404.4	72	K_t^a	= actual capital stock of the firm sector, *B*1958. [See discussion in section 5.2.]
356.1	3	KCD_t	= stock of consumer durables, *B*1958. [See discussion in section 2.3.]
518.7	4	KIH_t	= stock of residential structures of the household sector, *B*1958. [See discussion in section 2.3.]
380.9	73	$KMIN_t$	= minimum amount of capital required to produce Y_t, *B*1958. [Defined in Table 2–2.]
250.9	64	$LBVBB_t$	= value of loans of the financial sector, *BCURT*. [$=SECB_t$ in Table 1–3.]
240.9	55	LF_t	= value of loans taken out by the firm sector, *BCURT*. [$=-SECF_t$ in Table 1–3.]
−2.7		†$MAILFLT_t$	= demand deposit mail float, *BCURT*. [See discussion in section 1.3.]
$3.43 \cdot 10^7$	74	$M_t H_t^M$	= number of worker hours required to produce Y_t, thousands of worker hours. [Defined in Table 2–2.]
4366.	7	$MOON_t$	= difference between the total number of jobs in the economy (establishment data) and the total number of people employed (household survey data), thousands of persons. This difference is called "the number of moonlighters." [$=JOBF_t + JOBGC_t + JOBGM_t - EMPL_t$.]
1.116	33	PCD_t	= implicit price deflator for CD_t, 1958 = 1.0. [SCB, 8.1, Deflator for Durable Goods.]
1.333	32	PCN_t	= implicit price deflator for CN_t, 1958 = 1.0. [SCB, 8.1, Deflator for Nondurable Goods.]
1.238		†$PCOM_t$	= implicit price deflator for COM_t, 1958 = 1.0. [SCB, 8.1, Deflator for Farm Output.]
1.501	31	PCS_t	= implicit price deflator for CS_t, 1958 = 1.0. [SCB, 8.1, Deflator for Services.]

Table 2–1. (continued)

Value of Variable in 1971IV	*Equation Number in Model*		
1.218	29	PD_t	= implicit price deflator for $X_t - EX_t + IM_t$ (domestic sales), 1958 = 1.0. [Defined in Table 2–2.]
1.260	28	PEX_t	= implicit price deflator for EX_t, 1958 = 1.0. [SCB, 8.1, Deflator for Exports.]
1.216	9	PF_t	= implicit price deflator for $X_t - COM_t$, 1958 = 1.0. [$=(XX_t - PCOM_t\ COM_t)/(X_t - COM_t)$.]
1.371	35	PFF_t	= implicit price deflator for INV_t, 1958 = 1.0. [SCB, 8.1, Deflator for Nonresidential Fixed Investment.]
1.400	36	PG_t	= implicit price deflator for XG_t, 1958 = 1.0. [$=GFPGO_t/XG_t$. For $GFPGO_t$, see Table 1–2.]
1.374	30	PH_t	= implicit price deflator for domestic sales inclusive of indirect business taxes, 1958 = 1.0. [Defined in Table 2–2.]
1.504	34	PIH_t	= implicit price deflator for IH_t, 1958 = 1.0. [SCB, 8.1, Deflator for Residential Structures.]
1.268		$^{\dagger}PIM_t$	= implicit price deflator for IM_t, 1958 = 1.0. [SCB, 8.1, Deflator for Imports.]
144315.		$^{\dagger}POP_t$	= noninstitutional population 16 and over, thousands of persons. [EE, *A*-1. Average of monthly data. See discussion in section 2.3 for adjustments.]
35181.		$^{\dagger}POP_{1t}$	= noninstitutional population of men 25–54, thousands of persons. [EE, *A*-3. Sum of total labor force and not in labor force of men 25–54. Average of monthly data. See discussion in section 2.3 for adjustments.]
109135.		$^{\dagger}POP_{2t}$	= noninstitutional population of all persons 16 and over except men 25–54, thousands of persons. [$=POP_t - POP_{1t}$.]
31.0	41	$PTAXH_t$	= personal income taxes of the household sector plus tax accruals of farms, *BCURT*. [$=HGPTX_t + HGFRM_t$ in Table 1–2.]
1.217	27	PX_t	= implicit price deflator for X_t, 1958 = 1.0. [$=(PCS_tCS_t + PCN_tCN_t + PCD_tCD_t + PIH_tIH_t + PFF_tINV_t + PEX_tEX_t - PIM_tIM_t + PG_tXG_t + PFF_t(XPAEH_t + XPAEB_t) + PIH_t(XRESF_t + XRESB_t) - IBTH_t)/(CS_t + CN_t + CD_t + IH_t + INV_t + EX_t - IM_t + XG_t + XPAEH_t + XPAEB_t + XRESF_t + XRESB_t)$. See discussion in section 2.3, which demonstrates that $PX_t = XX_t/X_t$.]
7.30	21	$RAAA_t$	= *Aaa* corporate bond rate, percentage points [FRB, *A*30. Average of monthly data.]

Table 2–1. (continued)

Value of Variable in 1971IV	*Equation Number in Model*		
4.23	70	$RBILL_t$	= three-month treasury bill rate, percentage points. FRB, *A*29. Average of monthly data.]
0.94	79	$RBILL_t^*$	= $RBILL_t$ detrended up to 1970IV, percentage points. [Defined in Table 2–2.]
4.84		$^\dagger RD_t$	= the discount rate, percentage points. [FRB, *A*8, Rate at F. R. Bank of N.Y. Quarterly average.]
7.74	22	$RMORT_t$	= mortgage rate, percentage points. [FRB, *A*45. Yield in private secondary market on FHA-insured loans. Average of monthly data. See discussion in section 2.3.]
0.9	63	$SAVB_t$	= saving of the financial sector, *BCURT*. [Same as in Table 1–2. Also defined in Table 2–2.]
−6.6	68	$SAVG_t$	= saving of the government sector, *BCURT*. [Same as in Table 1–2. Also defined in Table 2–2.]
9.0	60	$SAVH_t$	= saving of the household sector, net of capital gains or losses, *BCURT*. [Same as in Table 1–2. Also defined in Table 2–2.]
1.8	65	$SAVR_t$	= saving of the foreign sector, *BCURT*. [Same as in Table 1–2. Also defined in Table 2–2.]
−44.8	66	$SECR_t$	= value of securities of the foreign sector not including demand deposits and currency and gold and foreign exchange, *BCURT*. [Same as in Table 1–3.]
−1.1		$^\dagger STATDIS_t$	= statistical discrepancy of the national income accounts, *BCURT*. [See discussion in section 1.3.]
80		$^\dagger t$	= linear time trend, $t = 1$ in 1952I.
58.0	67	TAX_t	= total net taxes paid to the government sector, *BCURT*. [Defined in Table 2–2.]
2.0		$^\dagger TAXB_t$	= taxes paid by the financial sector, *BCURT*. [$= BGTAX_t + BGSUR_t$ in Table 1–2.]
7.2	42	$TAXF_t$	= taxes paid by the firm sector, *BCURT*. [$= FGTAX_t$ in Table 1–2.]
48.8	59	$TAXH_t$	= total net taxes paid by the household sector, *BCURT*. [Defined in Table 2–2.]
33619.	5	TLF_{1t}	= total labor force of men 25–54, thousands of persons. [Sum of civilian labor force (seasonally adjusted) and armed forces (not seasonally adjusted) of men 25–54. Data on the former were obtained from the BLS. Data on the latter were obtained from EE, *A*-3, as the difference between the total labor force and the civilian labor force (both not seasonally adjusted) of men 25–54. Average of monthly data. See discussion in section 2.3 for adjustments.]

Table 2–1. (continued)

Value of Variable in 1971IV	*Equation Number in Model*		
54504.	6	TLF_{2t}	= total labor force of all persons 16 and over except men 25–54, thousands of persons. [Difference between total labor force 16 and over (seasonally adjusted) and TLF_{1t}. Data on the former were obtained from EE, *A*-31. Average of monthly data. See discussion in section 2.3 for adjustments.]
1.5	25	TPU_t	= transfer payments in the form of unemployment insurance benefits, *BCURT*. [SCB, 2.1, State Unemployment Insurance Benefits.]
5104.	82	U_t	= number of people unemployed, thousands of persons. [Defined in Table 2–2.]
0.0597	83	UR_t	= civilian unemployment rate. [Defined in Table 2–2.]
205.9	51	V_t	= stock of inventories of the firm sector, *B*1958. [See discussion in section 2.3.]
323.1		$^{\dagger}VBG_t$	= value of government securities, *BCURT*. [$= -SECG_t$ in Table 1–3.]
132.1	15	WF_t	= average hourly earnings, private nonfarm economy, production and nonsupervisory workers, adjusted for overtime (in manufacturing only) and interindustry employment shifts, index of current dollars, 1967 = 100. [EE, *C*-17. See discussion in section 2.3.]
$3.88 \cdot 10^{-6}$	37	WFF_t	= average hourly earnings, excluding overtime, of workers in the firm sector, millions of current dollars per hour per job. [$=(FHWAG_t - FHWLD_t + FHOTH_t + FHPRI_t)/((HPFN_t + 1.5HPFO_t)JOBF_t)$. For the first four variables, see Table 1–2.]
$4.08 \cdot 10^{-6}$	38	WGC_t	= average hourly earnings of government civilian workers, millions of current dollars per hour per job. [$=(GHCIV_t - GHWLD_t + GHOTH_t)/(HPGC_t JOBGC_t)$. For the first three variables, see Table 1–2.]
$3.50 \cdot 10^{-6}$	39	WGM_t	= average hourly earnings of government military workers, millions of current dollars per hour per job. [$=GHMIL_t/(HPGM_t JOBGM_t)$. For $GHMIL_t$, see Table 1–2.]
169.4	48	X_t	= total sales of the firm sector, *B*1958. [Defined in Table 2–2.]
0.5		$^{\dagger}XCCAB_t$	= capital consumption of the financial sector, *B*1958. [$=HBCCA_t/PX_t$. For $HBCCA_t$, see Table 1–2.]
20.4		$^{\dagger}XG_t$	= purchases of goods of the government sector, *B*1958. [Difference between government purchases of goods and services in constant dollars (SCB, 1.2) and general government in constant dollars (SCB, 1.8.)]

Table 2–1. (continued)

Value of Variable in 1971IV	*Equation Number in Model*		
−0.1		†$XIVTH_t$	= inventory investment of the household sector, $B1958$. [$=HFIVT_t/PX_t$. For $HFIVT_t$, see Table 1–2.]
0.9		†$XPAEB_t$	= nonresidential plant and equipment investment of the financial sector, $B1958$. [$=BFPAE_t/PFF_t$. For $BFPAE_t$, see Table 1–2.]
4.3		†$XPAEH_t$	= nonresidential plant and equipment investment of the household sector, $B1958$. [$=HFPAE_t/PFF_t$. For $HFPAE_t$, see Table 1–2.]
3.4		†$XPROB_t$	= profits of the financial sector, $B1958$. [$=HBPRO_t/PX_t$. For $HBPRO_t$, see Table 1–2.]
0.0		†$XRESB_t$	= residential investment of the financial sector, $B1958$. [$=BFRES_t/PIH_t$. For $BFRES_t$, see Table 1–2.]
0.8		†$XRESF_t$	= residential investment of the firm sector, $B1958$. [$=FFRES_t/PIH_t$. For $FFRES_t$, see Table 1–2.]
206.2	49	XX_t	= total sales of the firm sector, $BCURT$. [Defined in Table 2–2.]
170.6	10	Y_t	= production of the firm sector, $B1958$. [$=X_t + V_t - V_{t-1}$.]
23.4		†YG_t	= transfer payments from the government sector to the household sector, not counting TPU_t, $BCURT$. [$=GHTRP_t + GHINS_t + GHRET_t - TPU_t$. For the first three variables, see Table 1–2.]
201.8	58	YH_t	= taxable income of the household sector, $BCURT$. [Defined in Table 2–2.]
45.0	71	$YNLH_t$	= nonlabor income of the household sector, $BCURT$. [Defined in Table 2–2.]
0.9664	77	ZJ_t	= hours constraint variable for the household sector. [Defined in Table 2–2.]
0.5962	78	ZJ_t'	= labor constraint variable for the firm sector. [Defined in Table 2–2.]
0.9999	80	ZR_t	= loan constraint variable. [Defined in Table 2.2.]
0.0525		†δ_D	= physical depreciation rate of the stock of durable goods, rate per quarter. [See discussion in section 2.3.]
0.00575		†δ_H	= physical depreciation rate of the stock of residential structures of the household sector, rate per quarter. [See discussion in section 2.3.]
0.0285		†δ_K	= physical depreciation rate of the stock of capital of the firm sector, rate per quarter. [See discussion in section 5.2.]

Table 2–1. (continued)

Value of Variable in 1971IV	Equation Number in Model		
$4.975 \cdot 10^{-6}$		$^{\dagger}\lambda_t$	= amount of output capable of being produced per worker hour, output (B1958) per thousand worker hours. [Constructed from peak-to-peak interpolations. See discussion in section 5.2.]
0.4480		$^{\dagger}(\mu_t \bar{H})$	= maximum amount of output capable of being produced per quarter per unit of the capital stock, output (B1958) per unit of capital stock (B1958). [Constructed from peak-to-peak interpolations. See discussion in section 5.2.]
17.5	52	πF_t	= before-tax profits of the firm sector, *BCURT*. [Defined in Table 2–2. See also F/F, Profits of Corporate Business, 106060205, p. 8, plus Foreign Profits, 266060001, p. 8.]
1.035		$^{\dagger}\psi_{1t}$	$= PEX_t/PX_t$
1.042		$^{\dagger}\psi_{2t}$	$= PCS_t((1 + d_{4t})PD_t)$
0.925		$^{\dagger}\psi_{3t}$	$= PCN_t/((1 + d_{4t})PD_t)$
0.774		$^{\dagger}\psi_{4t}$	$= PCD_t/((1 + d_{4t})PD_t)$
1.235		$^{\dagger}\psi_{5t}$	$= PIH_t/PD_t$
1.126		$^{\dagger}\psi_{6t}$	$= PFF_t/PD_t$
1.150		$^{\dagger}\psi_{7t}$	$= PG_t/PD_t$
$2.938 \cdot 10^{-8}$		$^{\dagger}\psi_{8t}$	$= WFF_t/WF_t$
$3.092 \cdot 10^{-8}$		$^{\dagger}\psi_{9t}$	$= WGC_t/WF_t$
$2.651 \cdot 10^{-8}$		$^{\dagger}\psi_{10t}$	$= WGM_t/WF_t$
0.000343		$^{\dagger}\tau$	= progressivity tax parameter in personal income tax equation. [See discussion in section 2.2.]

Note: The table includes 83 endogenous variables (not counting GNP_t) and 78 exogenous variables (not counting δ_D, δ_H, δ_K, and τ).

Table 2–2. The List of Equations in the Model

Variables Explained by Stochastic Equations

The Household Sector:

1. CS_t	[consumption expenditures on services]
2. CN_t	[consumption expenditures on nondurable goods]
3. KCD_t	[stock of consumer durables]
4. KIH_t	[stock of residential structures of the household sector]
5. TLF_{1t}	[total labor force of males 25–54]
6. TLF_{2t}	[total labor force of all others 16 and over]
7. $MOON_t$	[the number of moonlighters]
8. DDH_t	[value of demand deposits and currency of the household sector]

The Firm Sector:

9. PF_t	[implicit price deflator for $X_t - COM_t$ (total firm sales less farm output)]
10. Y_t	[production of the firm sector]
11. INV_t	[nonresidential plant and equipment investment of the firm sector]
12. $JOBF_t$	[number of jobs in the firm sector]
13. HPF_t	[average number of hours paid per job by the firm sector]
14. $HPFO_t$	[average number of overtime hours paid per job by the firm sector]
15. WF_t	[average earnings adjusted for overtime and interindustry employment shifts]
16. DDF_t	[value of demand deposits and currency of the firm sector]
17. $DIVF_t$	[dividends paid by the firm sector]
18. $INTF_t$	[interest paid by the firm sector]
19. IVA_t	[inventory valuation adjustment]

The Financial Sector:

20. $BORR_t$	[commercial bank borrowing at federal reserve banks]
21. $RAAA_t$	[the bond rate]
22. $RMORT_t$	[the mortgage rate]
23. CG_t	[capital gains (+) or losses (−) on stocks held by the household sector]

The Foreign Sector:

24. IM_t	[imports]

The Government Sector:

25. TPU_t	[unemployment insurance benefits]
26. $INTG_t$	[interest paid by the government sector]

Price Deflators Explained as a Function of PF_t

27. $PX_t = \dfrac{PF_t(X_t - COM_t) + PCOM_t COM_t}{X_t}$	[price deflator for total firm sales]
28. $PEX_t = \psi_{1t} PX_t$	[price deflator for exports]
29. $PD_t = \dfrac{PX_t X_t - PEX_t EX_t + PIM_t IM_t}{X_t - EX + IM_t}$	[price deflator for domestic sales (total firm sales, less exports, plus imports)]
30. $PH_t = PD_t + \dfrac{IBTH_t}{X_t - EX_t + IM_t}$	[price deflator for domestic sales inclusive of indirect business taxes]
31. $PCS_t = \psi_{2t}(1 + d_{4t})PD_t$	[price deflator for expenditures on services]
32. $PCN_t = \psi_{3t}(1 + d_{4t})PD_t$	[price deflator for expenditures on nondurable goods]
33. $PCD_t = \psi_{4t}(1 + d_{4t})PD_t$	[price deflator for expenditures on durable goods]

Table 2–2. (continued)

34. $PIH_t = \psi_{5t} PD_t$	[price deflator for expenditures on residential structures]
35. $PFF_t = \psi_{6t} PD_t$	[price deflator for expenditures on nonresidential plant and equipment investment]
36. $PG_t = \psi_{7t} PD_t$	[price deflator for expenditures on goods by the government sector]

Compensation Rates Explained as a Function of WF_t

37. $WFF_t = \psi_{8t} WF_t$	[average hourly earnings, excluding overtime, of workers in the firm sector]
38. $WGC_t = \psi_{9t} WF_t$	[average hourly earnings of government civilian workers]
39. $WGM_t = \psi_{10t} WF_t$	[average hourly earnings of government military workers]

Taxes Explained as a Function of Tax Rates

40. $IBTH_t = \dfrac{d_{4t}}{1+d_{4t}}(PCD_t CD_t + PCN_t CN_t + PCS_t CS_t)$	[indirect business taxes]
41. $PTAXH_t = (d_{3t} + \tau . YH_t) YH_t$	[personal income taxes]
42. $TAXF_t = d_{1t} \pi F_t$	[profit taxes of the firm sector]
43. $FHCSI_t = d_{5t}(WFF_t(HPFN_t + 1.5HPFO_t)JOBF_t)$	[employer social security taxes]
44. $HGSI2_t = d_{6t}(WFF_t(HPFN_t + 1.5HPFO_t)JOBF_t)$	[employee social security taxes]

Bank Reserves Explained as a Function of Demand Deposits and the Reserve Requirement Ratio

45. $BR_t = g_{1t} DDB_t$ [bank reserves]

Variables Explained by Definitions That Are Needed to Close the Model

46. $CD_t = KCD_t - (1-\delta_D)KCD_{t-1}$	[expenditures on durable goods]
47. $IH_t = KIH_t - (1-\delta_H)KIH_{t-1}$	[expenditures on residential structures by the household sector]
48. $X_t = CS_t + CN_t + CD_t + IH_t + INV_t + EX_t - IM_t + XG_t + XPAEH_t + XPAEB_t + XRESF_t + XRESB_t + XIVTH_t - XPROB_t - XCCAB_t$	[total sales of the firm sector (constant dollars)]
49. $XX_t = PCS_t CS_t + PCN_t CN_t + PCD_t CD_t + PIH_t IH_t + PFF_t INV_t + PEX_t EX_t - PIM_t IM_t - PG_t XG_t + PFF_t(XPAEH_t + XPAEB_t) + PIH_t(XRESF_t + XRESB_t) + PX_t(XIVTH_t - XPROB_t - XCCAB_t) - IBTH_t$	[value of total sales of the firm sector (current dollars)]
50. $HPFN_t = HPF_t - HPFO_t$	[average number of nonovertime hours paid per job by the firm sector]
51. $V_t = V_{t-1} + Y_t - X_t$	[stock of inventories at the end of period t]

Table 2–2. (continued)

52. πF_t	$= XX_t + PX_t(V_t - V_{t-1}) - WFF_t(1+d_{5t})(HPFN_t + 1.5HPFO_t)JOBF_t - FHRNT_t - FHTRP_t - FHPFA_t - FHCCA_t + GHSUB_t - INTF_t - DEP_t - IVA_t - FHWLD_t - STATDIS_t$	[before-tax profits of the firm sector]
53. CF_t	$= XX_t - WFF_t(1+d_{5t})(HPFN_t + 1.5HPFO_t) \times JOBF_t - FHRNT_t - FHTRP_t - FHPFA_t - FHCCA_t + GHSUB_t - INTF_t - PFF_tINV_t - PIH_tXRESF_t$	[cash flow of the firm sector]
54. $\overline{CF}_t$	$= CF_t - TAXF_t - DIVF_t$	[cash flow net of taxes and dividends of the firm sector]
55. LF_t	$= LF_{t-1} + DDF_t - DDF_{t-1} - \overline{CF}_t + DISF_t + FHWLD_t + STATDIS_t$	[value of loans taken out by the firm sector]
56. $DIVH_t$	$= DIVF_t + DIVB_t$	[dividends received by the household sector]
57. $INTH_t$	$= INTF_t + INTG_t$	[interest received by the household sector]
58. YH_t	$= WFF_t(HPFN_t + 1.5HPFO_t)JOBF_t + WGC_tHPGC_tJOBGC_t + WGM_tHPGM_t \times JOBGM_t + DIVH_t + INTH_t + FHRNT_t + FHTRP_t + FHPFA_t$	[taxable income of the household sector]
59. $TAXH_t$	$= PTAXH_t + IBTH_t + FHCSI_t + HGSI2_t - YG_t - TPU_t$	[total net taxes paid by the household sector]
60. $SAVH_t$	$= YH_t + FHCCA_t + FHCSI_t - PCS_tCS_t - PCN_tCN_t - PCD_tCD_t - PIH_tIH_t - PFF_tXPAEH_t - PX_tXIVTH_t - HRTRP_t - (TAXH_t - IBTH_t)$	[saving of the household sector]
61. A_t	$= A_{t-1} - DDH_t + DDH_{t-1} + SAVH_t + CG_t - DISH_t$	[value of nondemand deposit securities of the household sector]
62. DDB_t	$= DDB_{t-1} + DDH_t - DDH_{t-1} + DDF_t - DDF_{t-1} + DDR_t - DDR_{t-1} - CURR_t + CURR_{t-1} + MAILFLT_t$	[value of demand deposits and currency of the financial sector]
63. $SAVB_t$	$= PX_t(XPROB_t + XCCAB_t) - PFF_tXPAEB_t - PIH_tXRESB_t - DIVB_t - TAXB_t$	[saving of the financial sector]
64. $LBVBB_t$	$= LBVBB_{t-1} + BORR_t - BORR_{t-1} - BR_t + BR_{t-1} + DDB_t - DDB_{t-1} + SAVB_t - DISB_t$	[value of loans of the financial sector]
65. $SAVR_t$	$= PIM_tIM_t + HRTRP_t + GRTRP_t - PEX_tEX_t$	[saving of the foreign sector]
66. $SECR_t$	$= SECR_{t-1} - DDR_t + DDR_{t-1} + GFXG_t - GFXG_{t-1} + SAVR_t - DISR_t$	[value of securities of the foreign sector not including demand deposits and currency and gold and foreign exchange]
67. TAX_t	$= TAXH_t + TAXF_t + TAXB_t$	[total net taxes paid to the government sector]
68. $SAVG_t$	$= TAX_t - PG_tXG_t - WGC_tHPGC_tJOBGC_t - WGM_tHPGM_tJOBGM_t - INTG_t - GRTRP_t - GHSUB_t$	[saving of the government sector]
69. 0	$= VBG_t - VBG_{t-1} - BORR_t + BORR_{t-1} + CURR_t - CURR_{t-1} + BR_t - BR_{t-1} + SAVG_t - GFXG_t + GFXG_{t-1} - DISG_t$	[government budget constraint]

Table 2–2. (continued)

70. 0	$= -LBVBB_t + LBVBB_{t-1} - A_t + A_{t-1} + CG_t + LF_t - LF_{t-1} + VBG_t - VBG_{t-1} - SECR_t + SECR_{t-1} - (DISH_t - DISF_t - DISB_t + DISR_t - DISG_t) - FHWLD_t - STATDIS_t + MAILFLT_t$	[the change in the sum of all other securities (SEC) across sectors must be zero after adjusting for discrepancies]
71. $YNLH_t$	$= DIVH_t + INTH_t + FHRNT_t + FHTRP_t + FHPFA_t + YG_t + TPU_t - HGSI2_t$	[nonlabor income of the household sector]
72. K_t^a	$= (1 - \delta_K)K_{t-1}^a + INV_t$	[actual capital stock of the firm sector]
73. $KMIN_t$	$= \dfrac{Y_t}{(\mu_t \bar{H})}$	[minimum amount of capital required to produce Y_t]
74. $M_t H_t^M$	$= \dfrac{Y_t}{\lambda_t}$	[number of worker hours required to produced Y_t]
75. J_t	$= \dfrac{JOBF_t HPF_t + JOBGC_t HPGC_t + JOBGM_t HPGM_t}{POP_t}$	[ratio of total worker hours paid for to the total population 16 and over]
76. J_t^*	$= \dfrac{J_t}{e^{-0.00073513 \cdot t}}$	[J_t detrended]
77. ZJ_t	$= e^{-1/10000(J_t^* - 335.9)^2}$	[hours constraint variable for the household sector]
78. ZJ_t^f	$= 4.454062 + \dfrac{1}{1 - UR_t - 1.199514}$	[labor constraint variable for the firm sector]
79. $RBILL_t^*$	$= \begin{cases} RBILL_t/e^{0.019757 \cdot t} & \text{if } t \leq 76 \\ RBILL_t/e^{0.019757 \cdot 76} & \text{if } t > 76 \end{cases}$	[$RBILL_t$ detrended up to $t = 76$ (1970IV)]
80. ZR_t	$= e^{-1/1000(RBILL_t^* - 0.608)^2}$	[loan constraint variable]
81. $EMPL_t$	$= JOBF_t + JOBGC_t + JOBGM_t - MOON_t$	[total number of people employed]
82. U_t	$= TLF_{1t} + TLF_{2t} - EMPL_t$	[total number of people unemployed]
83. UR_t	$= \dfrac{U_t}{TLF_{1t} + TLF_{2t} - JOBGM_t}$	[civilian unemployment rate]
84. d_{3t}^M	$= d_{3t} + 2\tau \cdot YH_t$	[marginal personal income tax rate]

Note:

$GNP_t = XX_t + PX_t(V_t - V_{t-1}) - IBTH_t + WGC_t HPGC_t JOBGC_t + WGM_t HPGM_t JOBGM_t + GHWLD_t + PX_t(XPROB_t - XCCAB_t)$ [GNP in current dollars]

Table 2–3. TSLS and FIML Estimates of the 26 Stochastic Equations

Notes:

1. The FIML estimates appear above the TSLS estimates.
2. The sample period is 1954I–1974II (82 observations).
3. The numbers in parentheses are absolute values of the t-statistics of the TSLS estimates.
4. DW = Durbin-Watson statistic for the TSLS estimates.
5. R^2 = coefficient of determination for the TSLS estimates.
6. $\hat{\rho}$ = estimate of the first order serial correlation coefficient for the equation. "0" means the coefficient was constrained to be zero.
7. When $\hat{\rho} \neq 0$, DW and R^2 are computed using the estimates of the transformed residuals.
8. logs are natural logs.
9. $\bar{d}^M_{3t} = (d^M_{3t} + d^M_{3t-1} + d^M_{3t-2} + d^M_{3t-3})/4$.
10. "a" means that the coefficient was not estimated by FIML.

The Household Sector

Equation	$\hat{\rho}$	DW	R^2
1	0	2.32	0.9995

FIML: 0.260 0.976 0.00877

$$1.\ \log \frac{CS_t}{POP_t} = \underset{(0.50)}{-0.259} + \underset{(25.43)}{0.976} \log \frac{CS_{t-1}}{POP_{t-1}} + \underset{(1.06)}{0.00877} \log \frac{A_{t-1}}{PH_{t-1}POP_{t-1}}$$

FIML: −0.117 0.0787 0.0223

$$- \underset{(1.15)}{0.117} \log PCS_t + \underset{(0.97)}{0.0787} \log WF_t + \underset{(0.87)}{0.0223} \log \frac{YNLH_{t-1}}{PH_{t-1}POP_{t-1}}$$

FIML: −0.00984 −0.00658 0.0364

$$- \underset{(1.54)}{0.00984} \log RMORT_t - \underset{(2.73)}{0.00658} \log RBILL_t + \underset{(1.49)}{0.0364} \log ZJ_t$$

$$
\begin{array}{l}
\qquad -2.74 \quad 0.508 \qquad\qquad\qquad 0.0167 \\
2.\ \log \frac{CN_t}{POP_t} = \underset{(3.75)}{-2.74} + \underset{(6.31)}{0.508} \log \frac{CN_{t-1}}{POP_{t-1}} + \underset{(1.05)}{0.0168} \log \frac{A_{t-1}}{PH_{t-1}POP_{t-1}} \\
\qquad -0.131 \qquad\qquad 0.102 \qquad\qquad 0.0219 \\
\qquad - \underset{(2.13)}{0.131} \log PCN_t + \underset{(1.63)}{0.102} \log WF_t + \underset{(0.48)}{0.0219} \log \frac{YNLH_t}{PH_t POP_t} \\
\qquad 0.150 \qquad\qquad\qquad 0.261 \\
\qquad + \underset{(3.18)}{0.150} \log \frac{YNLH_{t-1}}{PH_{t-1}POP_{t-1}} + \underset{(2.31)}{0.256} \log(1.0 - \bar{d}^{M}_{3t-1}) \\
\qquad 0.256 \\
\qquad + \underset{(3.75)}{0.256} \log ZJ_t
\end{array}
$$

Eq. 2	O	2.14	0.996

$$
\begin{array}{l}
\qquad -1.22 \quad 0.873 \qquad\qquad -0.128 \qquad\qquad 0.137 \\
3.\ \log \frac{KCD_t}{POP_t} = \underset{(2.70)}{-1.22} + \underset{(19.92)}{0.873} \log \frac{KCD_{t-1}}{POP_{t-1}} - \underset{(3.69)}{0.128} \log PCD_t + \underset{(3.49)}{0.137} \log WF_t \\
\qquad 0.0183 \qquad\qquad -0.0152 \qquad\qquad 0.201 \\
\qquad + \underset{(1.45)}{0.0183} \log \frac{YNLH_t}{PH_t POP_t} - \underset{(2.04)}{0.0152} \log RMORT_t + \underset{(4.11)}{0.215} \log ZJ_t \\
\qquad a \qquad\qquad a \qquad\qquad a \\
\qquad - \underset{(1.31)}{0.00249} D644_t + \underset{(1.38)}{0.00259} D651_t - \underset{(1.27)}{0.00247} D704_t \\
\qquad a \\
\qquad + \underset{(1.58)}{0.00299} D711_t
\end{array}
$$

Eq. 3	0.789 0.611 (6.99)	1.94	0.9999

Table 2–3. (continued)

Equation	$\hat{\rho}$	DW	R^2
4. $\log \frac{KIH_t}{POP_t} = \overset{-0.504}{\underset{(4.89)}{0.504}} + \overset{0.929}{\underset{(74.66)}{0.929}} \log \frac{KIH_{t-1}}{POP_{t-1}} - \overset{-0.0114}{\underset{(1.24)}{0.0122}} \log PIII_{t-1}$ $+ \overset{0.0296}{\underset{(2.99)}{0.0296}} \log WF_{t-1} - \overset{-0.00725}{\underset{(2.34)}{0.00728}} \log RMORT_{t-1}$ $- \overset{-0.00677}{\underset{(2.22)}{0.00678}} \log RMORT_{t-2} + \overset{0.00338}{\underset{(1.10)}{0.0110}} \log ZJ_{t-1} + \overset{0.127}{\underset{(1.25)}{0.328}} \log ZR_{t-1}$	0.776 0.770 (10.93)	2.26	0.9999
5. $\log \frac{TLF_{1t}}{POP_{1t}} = \overset{a}{\underset{(0.82)}{-0.230}} + \overset{a}{\underset{(7.70)}{0.675}} \log \frac{TLF_{1t-1}}{POP_{1t-1}} + \overset{a}{\underset{(0.78)}{0.0268}} \log \frac{WF_t}{PH_t}$ $\overset{a}{\underset{(0.87)}{0.0130}} \cdot \frac{1}{4} \sum_{i=1}^{4} \log \frac{YNLH_{t-i}}{PH_{t-i}POP_{t-i}} + \overset{a}{\underset{(2.71)}{0.0622}} \log(1.0 - \bar{d}^{M}_{3t-1})$	0	2.03	0.947
6. $\log \frac{TLF_{2t}}{POP_{2t}} = \overset{a}{\underset{(4.14)}{0.698}} + \overset{a}{\underset{(10.79)}{0.705}} \log \frac{TLF_{2t-1}}{POP_{2t-1}} - \overset{a}{\underset{(2.23)}{0.0166}} \log \frac{A_{t-1}}{PH_{t-1}POP_{t-1}}$ $+ \overset{a}{\underset{(3.74)}{0.0852}} \log \frac{WF_{t-1}}{PH_{t-1}} + \overset{a}{\underset{(1.42)}{0.0121}} \log RMORT_t + \overset{a}{\underset{(4.79)}{0.173}} \log ZJ_t$	0	1.86	0.983

$$7.\ \log\frac{MOON_t}{POP_t} = \underset{(3.31)}{\overset{a}{-2.70}} + \underset{(4.35)}{\overset{a}{0.528}} \log\frac{MOON_{t-1}}{POP_{t-1}} + \underset{(1.28)}{\overset{a}{0.262}}\log\frac{WF_t}{PH_t}$$

$$+ \underset{(0.27)}{\overset{a}{0.176}}\log(1.0 - \bar{d}^M_{3t-1}) + \underset{(3.33)}{\overset{a}{2.29}}\log ZJ_{t-1}$$

$\hat{\rho}$ = 0, DW = 1.90, R^2 = 0.831

$$8.\ \log\frac{DDH_t}{POP_t} = \underset{(2.44)}{\overset{1.03}{1.03}} + \underset{(6.68)}{\overset{0.695}{0.695}}\log\frac{DDH_{t-1}}{POP_{t-1}} - \underset{(3.05)}{\overset{-0.0255}{0.0255}}\log RBILL_t$$

$$+ \underset{(2.84)}{\overset{0.432}{0.432}}\log\frac{YH_t}{POP_t} - \underset{(2.46)}{\overset{0.00270}{0.00271}}t$$

$\hat{\rho}$ = 0, DW = 2.39, R^2 = 0.997

The Firm Sector

$$9.\ \log PF_t = \underset{(3.01)}{\overset{-0.401}{-0.401}} + \underset{(10.71)}{\overset{0.732}{0.739}}\log PF_{t-1} + \underset{(8.17)}{\overset{0.0845}{0.0795}}\log PIM_t + \underset{(2.71)}{\overset{0.0763}{0.0763}}\log WF_{t-1}$$

$$- \underset{(3.69)}{\overset{0.0332}{0.0332}}\log RAAA_t - \underset{(0.95)}{\overset{0.00108}{0.00122}}DTAXCR_t - \underset{(1.83)}{\overset{-0.000940}{0.00228}}\log ZJ_t'$$

$\hat{\rho}$ = 0, DW = 1.54, R^2 = 0.9996

$$10.\ \log Y_t = \underset{(3.20)}{\overset{0.153}{0.153}} + \underset{(2.40)}{\overset{0.189}{0.189}}\log Y_{t-1} + \underset{(11.27)}{\overset{0.981}{0.981}}\log X_t - \underset{(4.67)}{\overset{-0.191}{0.191}}\log V_{t-1}$$

$$- \underset{(2.91)}{\overset{a}{0.0150}}D593_t + \underset{(0.57)}{\overset{a}{0.00310}}D594_t + \underset{(1.78)}{\overset{a}{0.00878}}D601_t$$

$\hat{\rho}$ = 0.675 / 0.596 (6.71), DW = 2.01, R^2 = 0.9996

Table 2–3. (continued)

11. $INV_t - INV_{t-1} = \underset{(0.80)}{\overset{a}{-0.00256}}(K^a_{t-1} - KMIN_{t-1}) + \underset{(0.78)}{\overset{a}{0.0272}}(Y_t - Y_{t-1})$

$+ \underset{(3.11)}{\overset{a}{0.0782}}(Y_{t-1} - Y_{t-2}) + \underset{(1.09)}{\overset{a}{0.0241}}(Y_{t-2} - Y_{t-3})$

$+ \underset{(2.52)}{\overset{a}{0.0558}}(Y_{t-3} - Y_{t-4}) - \underset{(0.82)}{\overset{a}{0.0155}}(INV_{t-1} - \delta_K K^a_{t-1})$

$- \underset{(3.74)}{\overset{a}{1.04}} D704_t + \underset{(1.75)}{\overset{a}{0.509}} D711_t$

$\hat{\rho}$	DW	R^2
0	1.89	0.579

12. $\log JOBF_t - \log JOBF_{t-1} = \underset{(2.86)}{\overset{-0.488}{-0.489}} - \underset{(2.85)}{\overset{-0.0780}{0.0780}}(\log JOBF_{t-1} - \log M_{t-1}H^M_{t-1})$

$+ \underset{(2.97)}{\overset{0.0000966}{0.0000971}}t + \underset{(3.67)}{\overset{0.168}{0.215}}(\log Y_t - \log Y_{t-1})$

$+ \underset{(3.84)}{\overset{0.163}{0.172}}(\log Y_{t-1} - \log Y_{t-2})$

$+ \underset{(1.79)}{\overset{0.00316}{0.0725}}(\log Y_{t-2} - \log Y_{t-3})$

$- \underset{(2.22)}{\overset{a}{0.00945}} D593_t + \underset{(0.49)}{\overset{a}{0.00196}} D594_t$

$\hat{\rho}$	DW	R^2
0.364		
0.307 (2.92)	1.96	0.737

13. $\log HPF_t - \log HPF_{t-1} =$ $\overset{1.42}{1.42} - \overset{-0.269}{0.269} \log HPF_{t-1}$ $\quad (4.15) \quad (4.15)$ $- \overset{-0.0438}{0.0438}(\log JOBF_{t-1} - \log M_{t-1}H^M_{t-1}) - \overset{-0.000250}{0.000253t}$ $\quad (2.70) \qquad\qquad (4.20)$ $+ \overset{0.162}{0.162}(\log Y_t - \log Y_{t-1})$ $\quad (5.21)$	$\overset{-0.277}{-0.221}$ (2.06)	1.96	0.345
14. $\log HPFO_t = \overset{a}{-18.9} + \overset{a}{0.0420}(HPF_t + 0.5482t) + \overset{a}{0.209}DD661_t$ $\quad (14.00) \quad (16.62) \qquad (13.41)$ [sample period began in 1956I]	0	1.34	0.885
15. $\log WF_t = \overset{-0.386}{-0.386} + \overset{0.972}{0.972} \log WF_{t-1} + \overset{0.0000602}{0.0000577t} + \overset{0.0590}{0.0590} \log PX_t$ $\quad (1.93) \quad (29.46) \qquad (0.35) \qquad (1.74)$ $+ \overset{0.0904}{0.0904} \log J^*_t$ $\quad (5.79)$	0	1.65	0.9999
16. $\log DDF_t = \overset{0.100}{0.100} + \overset{0.919}{0.919} \log DDF_{t-1} + \overset{0.0404}{0.0404} \log XX_t$ $\quad (0.99) \quad (21.53) \qquad (2.08)$ $- \overset{-0.0143}{0.0143} \log RBILL_t$ $\quad (1.35)$	0	2.04	0.962

Table 2–3. (continued)

	$\hat{\rho}$	DW	R^2
17. $\log DIVF_t = \underset{(1.56)}{\overset{a}{-0.0196}} + \underset{(69.35)}{\overset{a}{0.941}} \log DIVF_{t-1} + \underset{(4.42)}{\overset{a}{0.0592}} \log(\pi F_t - TAXF_t) + \underset{(2.41)}{\overset{a}{7.88}} \log ZR_t$	$\underset{(2.42)}{\overset{a}{-0.258}}$	1.84	0.997
18. $INTF_t = \underset{(0.37)}{\overset{a}{-0.107}} + \underset{(6.52)}{\overset{a}{0.574}} INTF_{t-1} + \underset{(4.41)}{\overset{a}{0.0159}} LF_t + \underset{(2.88)}{\overset{a}{0.144}} RAAA_t$	$\underset{(24.95)}{\overset{a}{0.940}}$	1.99	0.9998
19. $IVA_t = \underset{(4.00)}{\overset{a}{3.53}} - \underset{(10.59)}{\overset{a}{171.9}} PX_t + \underset{(9.40)}{\overset{a}{162.4}} PX_{t-1} + \underset{(4.90)}{\overset{a}{0.0399}} V_{t-1}$	0	1.75	0.861
The Financial Sector			
20. $\frac{BORR_t}{BR_t} = \underset{(3.18)}{\overset{a}{0.0121}} + \underset{(0.95)}{\overset{a}{0.0106}} (RBILL_t - RD_t)$	$\underset{(5.75)}{\overset{a}{0.536}}$	2.18	0.368
21. $\log RAAA_t = \underset{(3.52)}{\overset{0.0613}{0.0642}} + \underset{(43.03)}{\overset{0.922}{0.922}} \log RAAA_{t-1} + \underset{(3.08)}{\overset{0.166}{0.166}} \log RBILL_t - \underset{(2.67)}{\overset{-0.177}{0.180}} \log RBILL_{t-1} + \underset{(1.99)}{\overset{0.0640}{0.0601}} \log RBILL_{t-2} + \underset{(2.33)}{\overset{1.25}{1.87}} \cdot \frac{1}{6}[3(\log PX_{t-1} - \log PX_{t-2}) + 2(\log PX_{t-2} - \log PX_{t-3}) + (\log PX_{t-3} - \log PX_{t-4})]$	0	2.05	0.994

$$22.\quad \log RMORT_t = \overset{0.188}{\underset{(3.73)}{0.186}} + \overset{0.859}{\underset{(24.72)}{0.859}} \log RMORT_{t-1} + \overset{0.0355}{\underset{(0.92)}{0.0355}} \log RBILL_t$$

$$+ \overset{0.0690}{\underset{(1.32)}{0.0642}} \log RBILL_{t-1} - \overset{-0.0997}{\underset{(2.79)}{0.0939}} \log RBILL_{t-2}$$

$$+ \overset{0.0436}{\underset{(2.19)}{0.0453}} \log RBILL_{t-3} + \overset{2.51}{\underset{(2.39)}{2.36}} \cdot \tfrac{1}{6}[3(\log PX_{t-1} - \log PX_{t-2})$$

$$+ 2(\log PX_{t-2} - \log PX_{t-3}) + (\log PX_{t-3} - \log PX_{t-4})]$$

22.	0.240 0.274 (2.58)	2.00	0.988

$$23.\quad CG_t = \overset{a}{\underset{(2.57)}{13.1}} \quad \overset{a}{\underset{(1.88)}{77.1}}(RAAA_t - RAAA_{t-1}) + \overset{a}{\underset{(1.70)}{19.7}} \cdot \tfrac{1}{6}\{3[(CF_t - TAXF_t)$$

$$- (CF_{t-1} - TAXF_{t-1})] + 2[(CF_{t-1} - TAXF_{t-1}) - (CF_{t-2} - TAXF_{t-2})]$$

$$+ [(CF_{t-2} - TAXF_{t-2}) - (CF_{t-3} - TAXF_{t-3})]\}$$

23.	0	2.28	0.167

The Foreign Sector

$$24.\quad \log \frac{IM_t}{POP_t} = \overset{a}{\underset{(0.99)}{-1.60}} - \overset{a}{\underset{(2.26)}{0.426}} \log PIM_{t-2} + \overset{a}{\underset{(4.79)}{1.62}} \log PX_{t-1}$$

$$+ \overset{a}{\underset{(4.96)}{1.17}} \log \frac{X_t}{POP_t} - \overset{a}{\underset{(3.27)}{0.0712}} D651_t + \overset{a}{\underset{(1.49)}{0.0325}} D652_t$$

$$- \overset{a}{\underset{(4.11)}{0.0947}} D691_t + \overset{a}{\underset{(2.43)}{0.0640}} D692_t + \overset{a}{\underset{(1.14)}{0.0261}} D693_t - \overset{a}{\underset{(2.82)}{0.0614}} D714_t$$

	$\hat{\rho}$	DW	R^2
24.	a 0.803 (12.21)	2.03	0.996

Table 2–3. (continued)

	$\hat{\rho}$	DW	R^2
$+\overset{a}{0.0662}D721_t$ (3.05)			
The Government Sector			
25. $\log TPU_t = \overset{a}{-14.4} + \overset{a}{1.71}\log U_t + \overset{a}{1.13}\log PX_{t-1}$ (20.53) (19.99) (9.61)	$\overset{a}{0.451}$ (4.57)	1.85	0.971
26. $\log INTG_t = \overset{a}{-1.21} + \overset{a}{0.786}\log INTG_{t-1} + \overset{a}{0.223}\log VBG_t$ (3.61) (15.51) (3.45)	$\overset{a}{0.319}$ (3.05)	2.11	0.997
$+\overset{a}{0.0501}\log RBILL_t + \overset{a}{0.0643}\log RAAA_t$ (3.92) (1.43)			

2.2 A DISCUSSION OF TABLE 2–2

Consider the stochastic equations in Table 2-2 first. There are eight stochastic equations for the household sector, explaining: (1) consumption of services in real terms, CS_t, (2) consumption of nondurables in real terms, CN_t, (3) the stock of consumer durables in real terms, KCD_t, (4) the stock of houses in real terms, KIH_t, (5) the total labor force of men 25–54, TLF_{1t}, (6) the total labor force of all persons 16 and over except men 25–54, TLF_{2t}, (7) the number of moonlighters, $MOON_t$, and (8) demand deposits of the household sector, DDH_t.

There are eleven stochastic equations for the firm sector, explaining: (9) the price variable that the firm sector is assumed to set, PF_t, (10) production in real terms, Y_t, (11) investment in real terms, INV_t, (12) the number of jobs in the firm sector, $JOBF_t$, (13) the average number of hours paid per job, HPF_t, (14) the average number of overtime hours paid per job, $HPFO_t$, (15) the wage rate that the firm sector is assumed to set, WF_t, (16) demand deposits of the firm sector, DDF_t, (17) dividends paid, $DIVF_t$, (18) interest paid, $INTF_t$, and (19) the inventory valuation adjustment, IVA_t.

There are four stochastic equations for the financial sector, explaining: (20) commercial bank borrowing at the federal reserve banks, $BORR_t$, (21) the bond rate, $RAAA_t$, (22) the mortgage rate, $RMORT_t$, and (23) capital gains on stocks held by the household sector, CG_t. There is one stochastic equation for the foreign sector, explaining: (24) the value of imports in real terms, IM_t. There are, finally, two stochastic equations for the government sector, explaining: (25) transfer payments in the form of unemployment insurance benefits, TPU_t, and (26) interest paid, $INTG_t$. Putting capital gains in the financial sector and imports in the foreign sector, rather than both in the household sector, is somewhat arbitrary, but for expository purposes this seemed like the best procedure.

The next set of equations in Table 2-2 concerns the treatment of the various price deflators in the model. PX_t in Equation 27 is the implicit price deflator for total firm sales, X_t. PF_t, on the other hand, which is the price the firm sector is assumed to set according to Equation 9, is the implicit price deflator for total firm sales *less* farm output, $X_t - COM_t$. Farm output in real terms is denoted as COM_t and will be referred to, somewhat loosely, as "commodity sales." The implicit price deflator for COM_t is denoted as $PCOM_t$ and will be referred to as the "price of commodities." Since PF_t is the price deflator for $X_t - COM_t$, $PCOM_t$ the price deflator for COM_t, and PX_t the price deflator for X_t, the following equation is true by definition: $PX_t X_t = PF_t(X_t - COM_t) + PCOM_t COM_t$, which is Equation 27 in Table 2-2.

Equation 29 defines the price deflator for domestic sales, PD_t, where domestic sales are taken to be total firm sales, less exports, and plus imports. Equation 30 then defines the price deflator for domestic sales *inclusive* of indirect business taxes, PH_t. Given that PD_t is the price deflator for domestic sales net of indirect business taxes and that $IBTH_t$ is the value of indirect business taxes, the following equation is true by definition: $PH_t(X_t - EX_t + IM_t) = PD_t(X_t - EX_t + IM_t) + IBTH_t$, which is Equation 30. PH_t is used as an explanatory variable in some of the stochastic equations of the household sector. Since PH_t is inclusive of indirect business taxes, using it as an explanatory variable means that one is assuming that the prices the households are being influenced by are inclusive of indirect business taxes. This is an example in the model in which an important constraint is put on the specification of the way that taxes affect behavior. Notice also that it is the price of domestic sales that is assumed to affect household behavior, not the price of total firm sales. In other words, the price of imports is assumed to affect household behavior, but the price of exports is not.

The next six deflators in the table are explained as a function of PD_t (Equations 31–36). Consider, for example, Equation 34 explaining PIH_t, the price deflator for housing expenditures. ψ_{5t} in the equation is (from Table 2-1) the actual ratio of PIH_t to PD_t that existed in quarter t. This ratio is taken to be exogenous in the model. PIH_t is then explained as $\psi_{5t}PD_t$. This procedure has the effect of making PIH_t an endogenous variable, since PD_t is an endogenous variable, but making the ratio of PIH_t to PD_t an exogenous variable. It is beyond the scope of this study to consider the determination of relative prices, and the procedure just described is a simple way of allowing there to be more than one endogenous price variable in the model while at the same time allowing relative prices to remain exogenous.

The price deflators PFF_t and PG_t are handled the same way as PIH_t. The price deflators for service, nondurable, and durable consumption expenditures (PCS_t, PCN_t, and PCD_t) are, however, handled slightly differently because of the treatment of indirect business taxes. Indirect business taxes are a part of consumption in current dollar terms, but they are not a part of consumption in real terms. Consequently, the price deflators for the various consumption categories include indirect business tax rates.

Unfortunately, indirect business taxes are not disaggregated by consumption category, and so some assumption has to be made regarding this disaggregation. What is assumed here is that the same indirect business tax rate applies to all three consumption categories. This assumption allows the indirect business tax rate, d_{4t}, to be defined in Table 2-1 as:

$$d_{4t} = \frac{IBTH_t}{PCD_t CD_t + PCN_t CN_t + PCS_t CS_t - IBTH_t}.$$

$IBTH_t$ is subtracted from the other terms in the denominator because indirect business tax rates usually apply to the cost of the item net of indirect business taxes. d_{4t} is taken to be exogenous in the model.

Because of the assumption just made about indirect business taxes, PCS_t, PCN_t, and PCD_t are larger than the actual before-tax prices of the items. If $\overline{PCS}_t$, $\overline{PCN}_t$, and $\overline{PCD}_t$ denote the before-tax prices of the items, then PCS_t equals $(1+d_{4t})\overline{PCS}_t$, PCN_t equals $(1+d_{4t})\overline{PCN}_t$, and PCD_t equals $(1+d_{4t})\overline{PCD}_t$. PD_t does not include indirect business taxes, and so the ratios $\overline{PCS}_t/PD_t$, $\overline{PCN}_t/PD_t$, and $\overline{PCD}_t/PD_t$ are the natural ratios to take as exogenous regarding the consumption categories. These ratios are denoted as ψ_{2t}, ψ_{3t}, and ψ_{4t} in Table 2-1. In Table 2-2, PCS_t is then determined as $\psi_{2t}(1+d_{4t})\,PD_t$, PCN_t is determined as $\psi_{3t}(1+d_{4t})\,PD_t$, and PCD_t is determined as $\psi_{4t}(1+d_{4t})\,PD_t$.

The price deflator for exports, PEX_t, is determined in Equation 28 as a function of PX_t. Since total firm sales include exports and not imports, the natural ratio to take as exogenous regarding the price of exports is PEX_t/PX_t. ψ_{1t} is defined in Table 2-1 to be this ratio, and so PEX_t is determined in Table 2-2 as $\psi_{1t}PX_t$.

Two price deflators are taken to be exogenous in the model, the price of commodities, $PCOM_t$, and the price of imports, PIM_t. The assumption that PIM_t is exogenous is much more important than the assumption that $PCOM_t$ is exogenous. PIM_t enters as an explanatory variable in the equation explaining PF_t, the key price variable in the model, whereas $PCOM_t$ does not. The only place that $PCOM_t$ is used in the model is in Equation 27 in going from PF_t to PX_t.

The treatment of $PCOM_t$ and PIM_t as exogenous reflects the assumption that both variables are determined by world supply and demand conditions for the various items and are beyond the control of the firm sector in the United States. PIM_t is also influenced by changes in the value of the dollar relative to other currencies, and these changes are likewise assumed to be beyond the control of the firm sector. It is obvious that supply and demand conditions in the United States have some effect on prices determined in world markets, but these effects have to be ignored here. It is clearly beyond the scope of this study to build the kind of model that would be necessary to explain the prices of the major commodities in the world. This study is thus subject to at least a small amount of bias from ignoring the fact that $PCOM_t$ and PIM_t are determined in part by some of the endogenous variables in the model. The present approach is similar to the approach taken by Nordhaus and Shoven [36], who divide the economy into a sector in which prices are endogenously determined in the sector and a sector in which prices are exogenously determined by world supply and demand conditions. (Nordhaus and Shoven also take the price of labor to be exogenous, but this is not done here.)

Equations 37–39 in Table 2-2 determine three wage rates in the model as a function of WF_t. WF_t is the wage rate that is assumed to be set by the firm sector according to Equation 15. It is a series (see Table 2-1) on average hourly earnings in the private nonfarm economy of production and nonsupervisory workers, adjusted for overtime (in manufacturing only) and interindustry employment shifts. Since WF_t is adjusted for overtime and interindustry shifts, it is about as good a measure of an aggregate "wage rate" that one can hope to get. It is not the case, however, that WF_t provides a direct link between the employment data used in this study and the NIA data. The wage variables that do provide this link are WFF_t, WGC_t, and WGM_t, which are defined in Table 2-1 and are explained in the next section. Consequently, Equations 37–39 can be considered as providing the link between the employment data and the NIA data.

The ratio of each of the three wage variables to WF_t is assumed to be exogenous in the model. These three ratios are denoted as ψ_{8t}, ψ_{9t}, and ψ_{10t} and are defined in Table 2-1. This treatment of the wage variables is similar to the treatment of the price deflators: it allows the three wage variables to be endogenous while keeping the relative wage rates exogenous. Equations 37–39 are not, however, an important part of the model, since the three wage variables are only needed for some of the income and profit definitions. WF_t is always the wage variable that is used in the specification of the stochastic equations.

Equations 40–44 explain taxes as a function of tax rates. There are six tax rates in the model: the (already defined) indirect business tax rate, d_{4t}; two personal income tax rates, $\hat{d}_{3t}$ and τ; the corporate profit tax rate, d_{1t}; the employer social security tax rate, d_{5t}; and the employee social security tax rate, d_{6t}. These six rates are assumed to be exogenous. Although the tax rates are assumed to be exogenous, the actual taxes paid are, of course, endogenous because the tax rates multiply endogenous variables.

All the tax rates except τ are defined in Table 2-1. d_{1t}, for example, is the actual ratio of $TAXF_t$ to πF_t that existed in quarter t. $TAXF_t$ is then determined in Table 2-2 as $d_{1t}\pi F_t$. Indirect business taxes and social security taxes are treated in the same way. Personal income taxes, on the other hand, are not. It is not, for example, realistic to take the ratio of $PTAXH_t$ to YH_t as exogenous because of the somewhat progressive structure of the personal income tax system. As YH_t increases, $PTAXH_t$ generally increases more than proportionally. Consequently, some estimate of this progressivity must be made.

The progressivity of the personal income tax system was estimated in the following way. The period 1954I–1975I was first divided into eight subperiods, each subperiod corresponding roughly to a period in which there were no major changes in the tax laws (surtaxes being counted as changes in the tax laws). The eight subperiods are: 1954I–1963IV, 1964I–1965I, 1965II–1968II, 1968III–1969IV, 1970I–1970IV, 1971I–1971IV, 1972I–1972IV, and 1973I–1975I. Two assumptions about the relationship between $PTAXH_t$ and YH_t were then made. The first is that within a subperiod $PTAXH_t$ is equal to $(d_3 + \tau \cdot YH_t)YH_t$ plus a random error term, where d_3 and τ are constants. The second is that changes in the tax laws affect d_3, but not τ. These two assumptions led to the estimation of the following equation:

$$\begin{aligned} PTAXH_t = & \underset{(2.65)}{-1.67} + \underset{(11.23)}{0.119}\ YH_t \cdot D1_t + \underset{(10.07)}{0.102}\ YH_t \cdot D2_t + \underset{(9.78)}{0.101}\ YH_t \cdot D3_t \\ & + \underset{(10.47)}{0.115}\ YH_t \cdot D4_t + \underset{(8.97)}{0.102}\ YH_t \cdot D5_t + \underset{(7.72)}{0.090}\ YH_t \cdot D6_t \\ & + \underset{(8.07)}{0.099}\ YH_t \cdot D7_t + \underset{(6.04)}{0.082}\ YH_t \cdot D8_t + \underset{(7.49)}{0.000343}\ YH_t \cdot YH_t, \\ & SE = 0.39,\ R^2 = 0.999,\ DW = 1.58. \quad (2.1) \end{aligned}$$

$D1_t$ is a dummy variable that takes on a value of one in subperiod 1 and zero otherwise, $D2_t$ is a dummy variable that takes on a value of one in subperiod 2 and zero otherwise, and so on. The equation was estimated over the entire 1954I–1975I period. The coefficient of $YH_t \cdot D1_t$ is the estimate of d_3 for the first subperiod, the coefficient of $YH_t \cdot D2_t$ is the estimate of d_3 for the second subperiod, and so on. The coefficient of $YH_t \cdot YH_t$ is the estimate of τ. Since Equation (2.1) is clearly only a rough approximation to the actual tax system, a constant term was included in the estimated equation even though the two assumptions just mentioned do not call for it. When YH_t is zero, $PTAXH_t$ ought also to be zero, but the zero-zero point is so far removed from any observation in the sample that it seemed unwise from an approximation point of view to constrain the equation to pass through this point.

The assumption that changes in the tax laws do not affect τ is probably not bad as a first approximation, but again it is clearly only an approximation. The estimate of τ in Equation (2.1) is 0.000343, and this is the value of τ that has been used in this study. Given τ, d_{3t} is defined in Table 2-1 to be $PTAXH_t/YH_t - \tau \cdot YH_t$. d_{3t} is taken to be exogenous, and $PTAXH_t$ is then explained as $(d_{3t} + \tau \cdot YH_t)YH_t$ in Equation 41 in Table 2-2. The marginal personal income tax rate for quarter t, denoted as d^M_{3t}, is equal to $d_{3t} + 2\tau \cdot YH_t$, which is Equation 84 in Table 2-2. From Table 2-1 it can be seen that the marginal tax rate (d^M_{3t}) was 0.223 in 1971IV, while the average tax rate ($PTAXH_t/YH_t$) was 0.154 (= 31.0/201.8).

Equation (2.1) could have been used directly as the equation explaining $PTAXH_t$ in the model, rather than Equation 41, but for computational convenience this was not done. The results in the theoretical model indicate that the marginal tax rate ought to be an important explanatory variable in the household sector, and the procedure just outlined provides a convenient way of constructing a marginal tax rate series. If Equation (2.1) were used instead, this task would be more difficult, especially if the equation were estimated jointly with the other equations in the model. The fit of Equation (2.1) is good enough (a standard error of 0.39 billion dollars at a quarterly rate) that treating d_{3t} as exogenous is not likely to introduce any serious biases anywhere. Treating d_{3t} as exogenous effectively converts the $PTAXH_t$ equation into an equation with a perfect fit.

Equation 45 explains bank reserves (BR_t) as a function of the level of demand deposits of the financial sector (DDB_t) and the reserve requirement ratio (g_{1t}). g_{1t} is defined in Table 2-1 as the ratio of BR_t to DDB_t that actually existed in quarter t. g_{1t} is taken to be exogenous, and BR_t is then explained as $g_{1t}\,DDB_t$ in Equation 45 in Table 2-2. The relationship between BR_t and DDB_t is thus assumed to be exogenous, although both variables are themselves endogenous. This assumption is discussed in Chapter Six, but it should be noted now that the assumption says nothing about commercial bank borrowing at federal reserve banks ($BORR_t$). Borrowing can clearly exist even though the ratio of BR_t to DDB_t is taken to be exogenous. $BORR_t$ is in fact explained by Equation 20. As discussed in Chapter Six, the treatment of BR_t in the empirical model is different from its treatment in the theoretical model, where it is treated as a residual. The different treatment in the empirical model is due to the use of quarterly data, rather than data for a shorter period of time.

Equations 46 through 84 in Table 2-2 are definitions that are needed to close the model. Many of the equations are concerned with defining the savings of the sectors and the values of the securities held by the sectors. These types of equations are based on Equations (1.1)–(1.11) in Chapter One and the corresponding definitions in Tables 1-2 and 1-3.

Equation 46 relates the current expenditures on durable goods in real terms, CD_t, to the current and lagged stocks of consumer durables (KCD_t and KCD_{t-1}). δ_D is the depreciation rate on the stock of consumer durables. Its construction is explained in the next section. KCD_t is explained by Equation 3, and Equation 46 is needed to relate current expenditures to KCD_t. Equation 47 is a similar equation for current expenditures on housing of the household sector, IH_t. δ_H is the depreciation rate on the stock of houses, and its construction is also explained in the next section.

Equation 48 defines total firm sales in real terms, X_t, and Equation 49 defines total firm sales in current dollar terms, XX_t. X_t is the sum of the various quantity items, and XX_t is the sum of the various price-times-quantity items. The endogenous variables on the right-hand side of Equation 48 are CS_t, CN_t, CD_t, IH_t, INV_t, and IM_t. The exogenous variables are exports (EX_t), government purchases of goods (XG_t), plant and equipment investment of the household and financial sectors ($XPAEH_t$ and $XPAEB_t$), residential investment of the firm and financial sectors ($XRESF_t$ and $XRESB_t$), inventory investment of the household sector ($XIVTH_t$), and profits and capital consumption in real terms of the financial sector ($XPROB_t$ and $XCCAB_t$). Except for EX_t and XG_t, these exogenous variables are small in value and not very important. The last two variables, $XPROB_t$ and $XCCAB_t$, should be thought of as sales by the financial sector to the household sector, which must be subtracted from the expenditures of the household sector in determining the sales of the firm sector. The only exogenous variable that is in Equation 49 and not in Equation 48 is the price of imports, PIM_t. The value of indirect business taxes ($IBTH_t$) is subtracted from the other variables in Equation 49 because the indirect business tax rates are included in the price deflators. $IBTH_t$ is not a revenue item of the firm sector, and so it must be subtracted from the other variables to net indirect business taxes out of the equation.

In Equation 50 the average number of nonovertime hours paid per job by the firm sector, $HPFN_t$, is defined as the difference between the average number of total hours and the average number of overtime hours. In Equation 51 the current stock of inventories of the firm sector, V_t, is equal to last period's stock plus the difference between production and sales of the current period. $V_t - V_{t-1}$ is inventory investment, and it is not, as in most other macroeconometric models, explained directly by a stochastic equation. Instead, Y_t is explained by a stochastic equation, and inventory investment is residually determined by Equation 51. Y_t is explained directly because it is considered, from the theoretical model, to be a direct decision variable of the firm sector.

Equation 52 defines the before-tax profits of the firm sector, πF_t. The first two items on the right-hand side ($XX_t + PX_t(V_t - V_{t-1})$) equal the value of production. The next item is the wage costs of the firm sector. d_{5t} is the employer social security tax rate, so that $WFF_t(1 + d_{5t})$ is the wage rate paid by the firm sector inclusive of employer social security taxes. The next four items are payments by the firm sector to the household sector that are taken to be exogenous: rental income of the household sector ($FHRNT_t$), transfer payments from the firm sector to the household sector ($FHTRP_t$), profits of farms ($FHPFA_t$), and capital consumption of the household sector ($FHCCA_t$). The next item is the net subsidies of government enterprises ($GHSUB_t$), which is a revenue item of the firm sector. The last six items are interest paid by the firm sector ($INTF_t$), depreciation (DEP_t), inventory valuation adjustment (IVA_t), wage accruals less disbursements of the firm sector ($FHWLD_t$), and the statistical discrepancy of the NIA ($STATDIS_t$). As discussed in the next section, πF_t as defined in Equation 52 is the NIA definition of the profits of the firm sector.

Equation 53 defines the before-tax cash flow of the firm sector, CF_t. Equation 53 differs from Equation 52 by the exclusion of inventory investment, depreciation, the inventory valuation adjustment, wage accruals less disbursements, and the statistical discrepancy, and by the inclusion of current investment expenditures ($PFF_t INV_t$ and $PIH_t XRESF_t$). Equation 54 defines the cash flow of the firm sector *net* of taxes and dividends, $\overline{CF}_t$. $\overline{CF}_t$ is the same as $SAVF_t$ in section VI of Table 1-2.

Equation 55 determines the loans of the firm sector, LF_t. It is the same as Equation (1.5) in Chapter One. The value of loans in the current period is equal to the value last period, plus the change in the value of demand deposits, less the cash flow net of taxes and dividends, plus the discrepancy of the firm sector, plus wage accruals less disbursements of the firm sector, and plus the statistical discrepancy of the NIA. As discussed in Chapter One, this equation provides one of the key links between the FFA and NIA data.

The value of dividends received by the household sector, $DIVH_t$, is defined in Equation 56, and the value of interest received by the household sector, $INTH_t$, is defined in Equation 57. $DIVH_t$ is the sum of the dividends paid by the firm and financial sectors, and $INTH_t$ is the sum of the interest paid by the firm and government sectors.

The taxable income of the household sector, YH_t, is defined in Equation 58. YH_t is the sum of wage, dividend, interest, and rental income, plus two small items: business transfer payments from the firm sector to the household sector ($FHTRP_t$) and farm profits ($FHPFA_t$).

Equation 59 defines the net taxes paid by the household sector, $TAXH_t$, net taxes being defined as taxes paid to the government less transfer payments from the government. YG_t in the equation is defined in Table 2-1 and is equal to transfer payments from the government sector to the household sector (except for unemployment insurance benefits), including insurance and retirement credits. $TAXH_t$ in Equation 59 is equal to the sum of personal income taxes ($PTAXH_t$), indirect business taxes ($IBTH_t$), and social security taxes ($FHCSI_t + HGSI2_t$), less YG_t and less unemployment insurance benefits (TPU_t). TPU_t has not been included in YG_t because it is endogenous, while all the items that make up YG_t are exogenous.

Equation 60 defines the saving of the household sector, $SAVH_t$. This equation is the same as the equation for $SAVH_t$ in Table 1-2, section VI. $SAVH_t$ is equal to household income less household expenditures and net taxes. Household income includes taxable income (YH_t), capital consumption ($FHCCA_t$), and employer social insurance contributions ($FHCSI_t$), the latter being counted as a payment from the firm sector to the household sector. Household expenditures include expenditures on services ($PCS_t CS_t$), non-durable goods ($PCN_t CN_t$), durable goods ($PCD_t CD_t$), housing ($PIH_t IH_t$), plant and equipment ($PFF_t XPAEH_t$), inventories ($PX_t XIVTH$), and transfer payments to the foreign sector ($HRTRP_t$). $IBTH_t$ is subtracted from $TAXH_t$ in the equation because it is already included in the price deflators PCS_t, PCN_t, and PCD_t. It should be noted that since $TAXH_t$ includes both employer and employee social insurance contributions, employer social insurance contributions ($FHCSI_t$) are actually netted out of Equation 60.

Equation 61 determines the value of nondemand deposit securities of the household sector, A_t. It is the same as Equation (1.1) in Chapter One. The value of A_t is equal to its value last period, less the change in the value of demand deposits of the household sector, plus saving and capital gains or losses, and less the discrepancy of the household sector. Equation 61 is similar to Equation 55 for the firm sector and also provides one of the key links between the FFA and NIA data.

Equation 62 determines the value of demand deposits and currency of the financial sector, DDB_t. It is the same as Equation (1.9) in Chapter One. The value of demand deposits and currency of the financial sector in the current period is equal to the value last period, plus the change in the value of demand deposits and currency of the household, firm, and foreign sectors, less the change in $CURR$ (the value of currency outstanding less the value of demand deposits of the government sector), and plus the demand deposit mail floats.

The saving of the financial sector, $SAVB_t$, is defined in Equation 63. This equation is the same as the Equation for $SAVB_t$ in Table 1-2, section VI. $SAVB_t$ is not an important variable in the model, since all of the variables on the right-hand side of Equation 63 are exogenous except for the three price deflators.

Equation 64 determines the value of loans of the financial sector, $LBVBB_t$. It is the same as Equation (1.2) in Chapter One. ($TOTB_t$ in Chapter One is equal to $LBVBB_t + BR_t - BORR_t - DDB_t$ in the notation here.) It is also similar to Equation 61 for the household sector and Equation 55 for the firm sector. The value of $LBVBB_t$ is equal to its value last period, plus the change in borrowing from the federal reserve banks, less the change in bank reserves, plus the change in the value of demand deposits and currency of the financial sector, plus the saving of the financial sector, and less the discrepancy of the financial sector.

The saving of the foreign sector, $SAVR_t$, is defined in Equation 65. This equation is the same as the equation for $SAVR_t$ in Table 1-2, section VI. The two right-hand side endogenous variables in Equation 65 are IM_t and PEX_t.

Equation 66 determines the value of securities of the foreign sector not counting demand deposits and currency and gold and foreign exchange, $SECR_t$. It is the same as Equation (1.3) in Chapter One ($TOTR_t$ in Chapter One is equal to $SECR_t + DDR_t - GFXG_t$ in the notation here). It is also similar to Equations 55, 61, and 64. The value of $SECR_t$ is equal to its value last period, less the change in the value of demand deposits and currency of the foreign sector, plus the change in the value of gold and foreign exchange of the government sector, plus the saving of the foreign sector, and less the discrepancy of the foreign sector.

Equation 67 defines the total net tax collections of the government,

TAX_t, and Equation 68 defines the saving of the government, $SAVG_t$. Equation 68 is the same as the equation for $SAVG_t$ in Table 1-2, section VI. $SAVG_t$ is equal to net tax collections, less expenditures of goods ($PG_t XG_t$), less expenditures on labor ($WGC_t HPGC_t JOBGC_t + WGM_t HPGM_t JOBGM_t$), less interest payments ($INTG_t$), less transfer payments to the foreign sector ($GRTRP_t$), and less the net subsidies of government enterprises ($GHSUB_t$).

Equation 69 is the government budget constraint and is the same as Equation (1.4) in Chapter One. ($TOTG_t$ in Chapter One is equal to $-VBG_t + BORR_t - CURR_t - BR_t + GFXG_t$ in the notation here.) It says that the net saving or dissaving of the government in a period results in the change in at least one of the following items: the value of government securities (VBG_t), the value of borrowing by commercial banks at federal reserve banks ($BORR_t$), the value of currency outstanding less the value of demand deposits of the government sector ($CURR_t$), the value of bank reserves (BR_t), and the value of gold and foreign exchange held by the government sector ($GFXG_t$).

Equation 70 is the same as Equation (1.11) in Chapter One. It says that the sum of the change in all other securities (excluding demand deposits and currency, bank reserves, borrowing at federal reserve banks, and gold and foreign exchange) across sectors must, after adjustment for the various discrepancies, be zero. The notation has, of course, been changed in going from Equation (1.11) to Equation 70, and in order to see clearly that the two equations are the same it is necessary to consult Table 2-1 for the definitions of the variables in Equation 70.

The remaining definitions in Table 2-2 concern variables that are either used as explanatory variables in one or more of the stochastic equations (sometimes only in lagged form) or are needed for the construction of variables that are so used. Equation 71 defines a variable, $YNLH_t$, that is taken to be a measure of the nonlabor income of the household sector. It is equal to dividend, interest, and rental income, plus business transfer payments from the firm sector to the household sector, plus farm profits, plus ($YG_t + TPU_t$), and minus employee contributions for social insurance. $YG_t + TPU_t$ is the value of transfer payments from the government sector to the household sector.

Equation 72 determines the capital stock of the firm sector, K_t^a. δ_K is the depreciation rate of the capital stock; its construction is explained in section 5.2. Equation 73 defines $KMIN_t$, an estimate of the minimum amount of capital required to produce Y_t. The variable ($\mu_t \bar{H}$) in the equation is obtained from peak-to-peak interpolations of the Y_t/K_t^a series. Its construction is also explained in section 5.2. Equation 74 defines $M_t H_t^M$, an estimate of the number of worker hours required to produce Y_t. The variable λ_t in the equation is obtained from peak-to-peak interpolations of a series on output per paid for worker hour. Its construction is explained in section 5.2.

Equation 75 defines a variable J_t, which is the ratio of the total number of worker hours paid for in the economy to the total population 16 and over. J_t has a negative trend, and J_t^* in Equation 76 is J_t detrended. Equation 77 defines a variable, ZJ_t, as a function of J_t^*. ZJ_t is the hours constraint variable. Its construction is explained in section 4.3. Equation 78 defines a variable, ZJ_t', as a function of the unemployment rate, UR_t. ZJ_t' is the labor constraint variable. Its construction is explained in section 5.3.

The bill rate, $RBILL_t$, has a positive trend over part of the sample period, and $RBILL_t^*$ in Equation 79 is $RBILL_t$ detrended up to 1970IV. Equation 80 defines a variable, ZR_t, as a function of $RBILL_t^*$. ZR_t is the loan constraint variable. Its construction is explained in section 4.3.

The total number of people employed, $EMPL_t$, is defined in Equation 81. $EMPL_t$ is equal to the number of jobs in the economy less $MOON_t$, the latter being interpreted as the number of people holding two jobs. The data on jobs are establishment data, and the data on $EMPL_t$ are household survey data. $MOON_t$ is defined in Table 2-1 as the difference between the total number of jobs and $EMPL_t$. Both $MOON_t$ and $JOBF_t$ are explained by stochastic equations, and both $JOBGC_t$ and $JOBGM_t$ are taken to be exogenous. Consequently, $EMPL_t$ is determined residually as the difference between jobs and $MOON_t$ in Equation 81.

The number of people unemployed, U_t, is defined in Equation 82. U_t is equal to the number of people in the labor force less the number of people employed. The two labor force variables in the equation, TLF_{1t} and TLF_{2t}, are determined by stochastic equations. The civilian unemployment rate, UR_t, is defined in Equation 83. It is the ratio of U_t to the civilian labor force, $TLF_{1t} + TLF_{2t} - JOBGM_t$. The marginal personal income tax rate, d_{3t}^M, is defined in Equation 84. d_{3t}^M is the derivative of Equation 41 with respect to YH_t.

The equation at the bottom of Table 2-2 defines GNP in current dollars, GNP_t. GNP_t is useful for reference purposes, but it is not used directly as an explanatory variable in any of the equations in the model. It is equal to the value of production of the firm sector ($XX_t + PX_t(V_t - V_{t-1})$), plus indirect business taxes, plus the government wage bill, plus wage accruals less disbursements of the government sector, and plus the value of production of the financial sector ($PX_t(XPROB_t + XCCAB_t)$).

This completes the discussion of the equations in Table 2-2. Not counting the equation for GNP_t, the model as presented in Table 2-2 consists of 84 equations. It turns out, however, that one of the equations is redundant. The easiest way to see this is to refer back to Chapter One. Equations (1.1)–(1.5) and the fact that the savings of all sectors sum to zero imply Equation (1.10). Equations (1.6)–(1.10) in turn imply Equation (1.11). Now, Equation

(1.11) is the same as Equation 70 in Table 2-2. The other matchings of equations from Chapter One to Table 2-2 are as follows: (1.1) → 61, (1.2) → 64, (1.3) → 66, (1.4) → 69, (1.5) → 55, and (1.9) → 62.

This takes care of all the equations in Chapter One except Equations (1.6), (1.7), and (1.8). These three equations are, however, implicitly satisfied in Table 2-2 because they have been taken into account in the construction of the table. Consider, for example, Equation (1.6), which says that the sum of the change in bank reserves across the financial and government sectors is zero:

$$(RESB_t - RESB_{t-1}) + (RESG_t - RESG_{t-1}) = 0. \tag{1.6}$$

BR_t is defined in Table 2-1 to be equal to $RESB_t$, and $BR_t - BR_{t-1}$ enters Equation 64 with a minus sign. No variable was defined for $RESG_t$, however, and instead $BR_t - BR_{t-1}$ was merely included in Equation 69 with a plus sign. This means that Equation (1.6) is automatically satisfied in Table 2-2. This same procedure was also followed for Equations (1.7) and (1.8)—$BORR_t$ and $GFXG_t$ being the two variable names used. With these three equations taken into account, the above matching of equations shows that Equations 55, 61, 62, 64, 66, and 69 in Table 2-2 imply Equation 70. One of these equations can thus be dropped, leaving 83 independent equations.

A convenient equation to drop from the model is Equation 69, the government budget constraint. The fact that Equation 69 can be dropped means that the government budget constraint is automatically satisfied once all of the flows of funds have been accounted for. If Equation 69 is dropped, then the only other equation in Table 2-2 for which there is not an obvious left-hand side variable is Equation 70, the equation stating that the change in the sum of all other securities across sectors must be zero after adjusting for the various discrepancies.

There are thus 82 obvious endogenous variables in the model and one not so obvious. The most natural choice for the remaining endogenous variable is the bill rate, $RBILL_t$, and this is the choice made here. It should be noted, however, that any one of a number of government variables could be taken as endogenous instead. If, for example, one felt that the government pegged the bill rate at some particular level each period, then the value of government securities, VBG_t, would be the most natural variable to take as endogenous.

Given that $RBILL_t$ is taken to be endogenous, it is important to note how it is determined in the model. $RBILL_t$ enters as an explanatory variable in a number of the stochastic equations. The overall model is a system of 83 nonlinear equations in 83 unknowns, and this system can be solved numerically. Consequently, $RBILL_t$ is determined through the solution of the 83 equations. There is no one equation for which $RBILL_t$ appears naturally on the left-hand side, and the reason that $RBILL_t$ can be determined in this way is because of the linking of the NIA and FFA data and the accounting for all of the flows of funds. More will be said about this in Chapter Six.

2.3 A DISCUSSION OF TABLE 2–1

All the variables in the model are listed in Table 2-1. Presented in brackets in the table for each variable is either a reference where recent data on the variable can be found or a description of how the variable was constructed from other variables in the model. The comments in brackets rely heavily on the work in Tables 1-2 and 1-3 in Chapter One. For some variables the notation has remained the same in going from Tables 1-2 and 1-3 to Table 2-1, but for the most part the notation has been changed to conform more closely to the notation in Volume I. Also presented in the table is the value of each variable for the fourth quarter of 1971.

The data used in this study were collected for the 1952I–1975I period and are data as of about July 1975. The period prior to 1952I was not considered here because quarterly flow-of-funds data are not available before 1952I. The main sources for the data are the flow-of-funds tape, the *Survey of Current Business*, *Employment and Earnings*, and the *Federal Reserve Bulletin*. When SCB occurs in brackets in Table 2-1, this means that the data were collected from the *Survey of Current Business* starting with the July 1975 issue and working back. The number following SCB in brackets is the table number in the *Survey* where the variable can be found. Almost all the data are at annual rates in the *Survey*, and for purposes here these data have been divided by 4 to put them at quarterly rates.

When EE occurs in brackets in Table 2-1, this means that the data were collected from *Employment and Earnings* as of the July 1975 issue, and when FRB occurs in brackets, this means that the data were collected from the *Federal Reserve Bulletin* as of the July 1975 issue. The number following EE or FRB in brackets is the table number in the respective publication where the variable can be found. Back data on some of the variables referenced as EE or FRB in Table 2-1 were not obtained by going through past issues of *Employment and Earnings* and the *Federal Reserve Bulletin*, but were obtained from *1973 Business Statistics*. When F/F occurs in brackets in Table 2-1, this means that the data were obtained from the flow-of-funds tape. For these cases the code number of the variable is presented in brackets, as well as the page number in [3] where the variable can be found.

When the phrase "Defined in Table 2-2" appears in brackets, this means that data on the variable do not have to collected because the variable is merely defined in terms of other variables in the model for which data have been collected. In two cases, however (gross national product, GNP_t, and profits of the firm sector, πF_t), alternative sources for the data have been presented. Although these two variables are derived from other variables in the model, it is useful to have a check that the two variables are being defined in the appropriate way.

Much of Table 2-1 is self explanatory. The following discussion concerns only those parts of the table that need further elaboration. The first thing to note is that in going from the notation in Table 1-3 to the notation in Table 2-1, the sign of the variable has sometimes been changed. Liabilities in Table 1-3 are always negative items, but this is not the case in Table 2-1. For example, the value of currency outstanding less the value of demand deposits of the government sector is denoted as $CURR_t$ in Table 2-1, whereas it is denoted as $-DDCG_t$ in Table 1-3.

The variable $LBVBB_t$ is the value of "all other" securities held by the financial sector. In the theoretical model these securities correspond to loans to firms and households and bills and bonds of the government. The former was denoted as LB and the latter as VBB; hence the $LBVBB$ notation used here.

The variable A_t, the value of nondemand deposit securities of the household sector, was constructed by summing the capital gains or losses variable (CG_t) forward and backward from 1971IV ($t = 80$) and then adding the appropriate sum to $SECH_t$ for $t > 80$ and subtracting the appropriate sum from $SECH_t$ for $t < 80$. $SECH_t$ is defined in Table 1-3. It is equal to the difference between the value of all securities held by the household sector ($TOTH_t$) and the value of demand deposits and currency held by the household sector ($DDCH_t$). Its value in 1970IV was 1342.4 billion dollars, which includes the value of corporate stocks held by the household sector. The flow data for $SECH_t$, on the other hand, exclude capital gains or losses, and so constructing $SECH_t$ by summing the flow data (as was done here, using 1971IV as a benchmark) does not produce a series that can be considered to be the value of nondemand deposit securities of the household sector. In order to produce the latter series, cumulative capital gains or losses have to be added to or subtracted from $SECH_t$, as is indicated in Table 2-1. For any period t, the following relationship between A_t and $SECH_t$ holds:

$$A_t - A_{t-1} = SECH_t - SECH_{t-1} + CG_t.$$

The employment variables in Table 2-1 require some explanation. The total number of jobs in the economy is the number of jobs in the government sector plus the number of jobs in the private sector. As in the theoretical model, it is assumed here that there are no jobs in the financial sector, and so all jobs in the private sector have been allocated to the firm sector. In terms of the amount of output produced, the financial sector is quite small, and the assumption that there are no jobs in this sector is not very important. The number of jobs in the government sector is equal to the number of civilian jobs ($JOBGC_t$) plus the number of military jobs ($JOBGM_t$).

Data on the number of jobs in the firm sector ($JOBF_t$) were obtained directly from the BLS. The data are quarterly and pertain to the total private economy, all persons. These data are the data used in the construction of the index of "output per man-hour" for the total private economy in Table C-10 in *Employment and Earnings*. ("Man-hours" in the BLS terminology refers to hours of both men and women. "Worker hours" or "person hours" would be a more appropriate term.)

Data on the average number of hours paid per civilian job per quarter by the government sector ($HPGC_t$) were obtained by taking the ratio of "man-hours" to $JOBGC_t$, as explained in Table 2-1. Data on the same variable for military jobs ($HPGM_t$) could not be obtained in this way because there are no data on "man-hours" for the military. Instead, $HPGM_t$ was just assumed to be 520 hours for all t (40 hours per week). Data on the average number of hours paid per job per quarter by the firm sector (HPF_t) were also obtained as the ratio of "man-hours" to jobs ($JOBF_t$). The data on man-hours were obtained directly from the BLS. The data on man-hours are presented in index number form in Table C-10 in *Employment and Earnings*, but the nonindexed data must be obtained directly from the BLS.

Data on the overtime variable, $HPFO_t$, pertain only to the manufacturing sector, but it has been assumed here that the data in fact pertain to the entire firm sector. In other words, it has been assumed that the (unobserved) amount of overtime per job in the nonmanufacturing part of the firm sector is the same as the (observed) amount in the manufacturing part. As will be discussed shortly, this assumption is not very important because the $HPFO_t$ variable itself is not a very important variable in the model.

The data on jobs and hours are establishment data. The data on population (POP_t, POP_{1t}), labor force (TLF_{1t}, TLF_{2t}), and number of people employed ($EMPL_t$) are household survey data. A few changes had to be made in the household survey data here to account for adjustments to the 1970 Census data. Adjustments to the official data were made by the BLS in January 1972 and March 1973. In terms of the variables used here, the BLS in January 1972 added 787 thousand to POP_t, subtracted 42 thousand from POP_{1t}, subtracted 40 thousand from TLF_{1t}, added 373 thousand to TLF_{2t}, and added 301 thousand to $EMPL_t$. (See the February 1972 issue of *Employment and Earnings*.)

In March 1973 the adjustments were much smaller. The BLS added roughly 8 thousand to POP_t, 3 thousand to POP_{1t}, 26 thousand to TLF_{1t}, 35 thousand to TLF_{2t}, and 58 thousand to $EMPL_t$. This information was obtained directly from the BLS. (See the note to Table A-1 in the April

1973 issue of *Employment and Earnings* for a brief discussion of the March 1973 adjustments.) In order to account for these adjustments here, the data on the various series prior to March 1973 were adjusted by adding or subtracting the amounts necessary to make the series prior to March 1973 comparable to the series from March 1973 on. The data for the first quarter of 1973 were changed by one-third of the March 1973 adjustments. The changes that were made are:

POP_t: +795 for the 1952I–1971IV period; +8 for the 1972I–1972IV period; +3 for 1973I; no change for the 1973II-1975I period,

POP_{1t}: −39 for the 1952I–1971IV period; +3 for the 1972I–1972IV period; +1 for 1973I; no change for the 1973II–1975I period,

TLF_{1t}: −14 for the 1952I–1971IV period; +26 for the 1972I–1972IV period; +9 for 1973I; no change for the 1973II–1975I period,

TLF_{2t}: +408 for the 1952I–1971IV period; +35 for the 1972I–1972IV period; +12 for 1973I; no change for the 1973II–1975I period,

$EMPL_t$: +359 for the 1952I–1971IV period; +58 for the 1972I–1972IV period; +19 for 1973I; no change for the 1973II–1975I period.

These adjustments were made before data on the variables that depend on these five variables were generated.

The variable $MOON_t$ is the difference between the number of jobs in the economy according to the establishment data and the number of people employed according to the household survey data. The main reason that $MOON_t$ is not zero is because of people holding more than one job. If someone holds two jobs, he or she is counted once in the household survey data but twice in the establishment data. Although there are a number of minor discrepancies between the establishment and household survey data that would cause $MOON_t$ to be nonzero even if no one held more than one job, the primary reason that $MOON_t$ is not zero is because of people moonlighting. Consequently, $MOON_t$ will be referred to in this study as the "number of moonlighters." In interpreting $MOON_t$ in this way, one is assuming both that the other discrepancies between the two data bases are negligible and that no one holds more than two jobs.

The next variables in Table 2-1 that need to be explained are the three wage variables: WFF_t, WGC_t, and WGM_t. The numerator of the ratio defining WFF_t in Table 2-1 ($FHWAG_t - FHWLD_t + FHOTH_t + FHPRI_t$) is taken to be the measure of wage payments from the firm sector to the household sector. This measure is the sum of wages and salaries, other labor income, and proprietors income. The denominator of the ratio defining

WFF_t, $(HPFN_t + 1.5HPFO_t)JOBF_t$, is taken to be the measure of the equivalent number of nonovertime hours paid for in the firm sector. Overtime hours are assumed to be paid at time-and-a-half, which is the reason for 1.5 multiplying $HPFO_t$ in the expression. The ratio (WFF_t) is thus the measure of average straight time hourly earnings of workers in the firm sector. The main wage variable in the model is WF_t, and WFF_t is linked to WF_t by taking the ratio of WFF_t to WF_t (defined as ψ_{8t} in Table 2-1) to be exogenous.

WFF_t is needed for three definitions in the model: Equation 52, defining profits of the firm sector; Equation 53, defining cash flow of the firm sector; and Equation 58, defining income of the household sector. Since WF_t is endogenous, the linking of WFF_t and WF_t means that the wage payments of the firm sector are endogenous not only because $HPFN_t$, $HPFO_t$, and $JOBF_t$ are endogenous, but also because WFF_t is. WFF_t was linked to WF_t in the way described, and not itself taken to be the measure of the aggregate wage rate in the model, because WF_t seemed to be a much better measure. The linking of WFF_t to WF_t is not of crucial importance in the model, however, since it only affects the three definitions just mentioned. In the same way, the overtime hours variable, $HPFO_t$, is not of crucial importance in the model because it only affects the same three definitions.

The wage rate WFF_t is net of employer social security taxes. The employer social security tax rate, d_{5t}, is defined in Table 2-1. It is the ratio of employer social security taxes to the wage bill of the firm sector. Consequently, $WFF_t(1 + d_{5t})$ is the wage rate paid by the firm sector inclusive of employer social security taxes. This is the wage rate used in Equations 52 and 53 in Table 2–2, which define the profits and cash flow of the firm sector.

The government wage variables, WGC_t and WGM_t, are treated in the same way as WFF_t, except that no adjustments for overtime are made because no overtime data exist for the government sector. The numerator in the definition of WGC_t is the sum of civilian wages and salaries and the "other labor income" component that pertains to the government sector. The numerator in the definition of WGM_t is merely military wages and salaries. WGC_t and WGM_t are only needed for two definitions in the model: Equation 58, defining income of the household sector; and Equation 68, defining the saving of the government.

Data on WF_t are actually available only from 1964I on. Prior to 1964I, data on a similar type of wage rate are available only for manufacturing, as opposed to the entire private nonfarm economy. The actual series on WF_t used here is a splice of the manufacturing series before 1964I and the private nonfarm series from 1964I on. The ratio of the wage rate for the private nonfarm economy to the wage rate for manufacturing in 1964I was 0.97887, and so the manufacturing series was multiplied by 0.97887 to make it comparable to the private nonfarm series. As indicated in Table 2–1, current data on WF_t are published in *Employment and Earnings*, Table C-17. The past data on both the private nonfarm series and the manufacturing series were obtained directly from the BLS.

The construction of two of the price deflators in Table 2–1 also needs to be explained. The first is PX_t. All the variables in brackets defining PX_t are not themselves defined in terms of PX_t. Call the numerator of the ratio defining PX_t, $E1_t$, and call the denominator $E2_t$. It can be seen from Equation 49 in Table 2–2 that $E1_t$ is equal to $XX_t - PX_t(XIVTH_t - XPROB_t - XCCAB_t)$, and it can be seen from Equation 48 in Table 2–2 that $E2_t$ is equal to $X_t - (XIVTH_t - XPROB_t - XCCAB_t)$. The variable X_t is total firms sales in constant dollars, and the variable XX_t is total firm sales in current dollars. Since $PX_t = E1_t/E2_t$, it is also true, using the expressions just presented for $E1_t$ and $E2_t$, that $PX_t = XX_t/X_t$. Consequently, PX_t can be interpreted as the implicit price deflator for X_t. The reason for this somewhat roundabout process in defining PX_t is that PX_t was taken to be the deflator for the three small exogenous items: $XIVTH_t$, $XPROB_t$, and $XCCAB_t$.

The second deflator whose construction needs explaining is PG_t, the deflator for government purchases of goods, XG_t. Government purchases of goods in current dollars is denoted as $GFPGO_t$ in Table 1–2 in Chapter One. $GFPGO_t$ is government purchases of goods and services *less* government compensation of employees (general government). XG_t is the same thing in constant dollars; therefore, PG_t is defined as the ratio of $GFPGO_t$ to XG_t.

One characteristic that should be noted about the deflators PX_t and PF_t is the difference between the way the deflators are constructed and the way they are determined in the model. In the model in Table 2–2, PF_t is determined by a stochastic equation and PX_t is determined from PF_t. The other deflators are then determined from PX_t. In Table 2–1, however, PX_t is defined in terms of the other deflators. Data on PX_t are used in Table 2–1 to determine, directly or indirectly, the ψ_{it} ratios ($i = 1, \ldots, 7$), which are then taken to be exogenous in the model in Table 2–2.

The treatment of the price deflators in this way means that in any simulation with the model, the predicted value of PX_t will not necessarily equal the predicted value of XX_t divided by the predicted value of X_t. In other words, PX_t equals XX_t/X_t only in the actual data, not in the predicted data. PX_t should thus be interpreted as the implicit price deflator for X_t only in a special sense. There is nothing wrong with treating the deflators in this way; all it changes is the interpretation of PX_t. None of the equations in Table 2–2 require that XX_t be equal to PX_tX_t.

Past data on the mortgage rate series, $RMORT_t$, were obtained directly from the FHA. Prior to May 1960 the yield estimates were based on the assumption of a 30-year maturity. Since May 1960 the assumption of a 25-year maturity has been used. There are a few monthly gaps in this series, and these gaps have been closed here by simple linear interpolation. The series published in the *Federal Reserve Bulletin* is actually lagged one month, and the series was unlagged before the quarterly averages were taken. This particular mortgage rate series is fairly sensitive to recent changes in mortgage market conditions, which is the reason for its present use.

The last three variables in Table 2–1 whose construction needs to be explained are the stock of consumer durables, KCD_t; the stock of residential structures of the household sector, KIH_t; and the stock of inventories of the firm sector, V_t. Consider V_t first. Inventory investment of the firm sector in current dollars is denoted in section II.2 in Table 1–2 as $FFIVT_t$. This series was first divided by PX_t to create a series on inventory investment in real terms. Then a series on the stock of inventories in real terms (V_t) was created by summing the real investment figures forward and backward from a base period value in 1971IV. The base period value that was used is 205.9 billion dollars, which was obtained from the August 1974 issue of the *Survey of Current Business*, p. 51. For a description of the procedure that was used to construct the stock data in the *Survey*, see Loftus [31].

The series on KCD_t was constructed as follows. From Equation 46 in Table 2–2, KCD_t is:

$$KCD_t = (1 - \delta_D)KCD_{t-1} + CD_t. \tag{2.2}$$

Given data on CD_t, a series on KCD_t can be constructed once a base period value and a value for the depreciation rate δ_D are chosen. Using results of a recent study conducted by the U.S. Department of Commerce, Shavell [38] presents estimates of the stock of durable goods for the years 1946, 1950, 1955, 1960, 1965, and 1969. These estimates are end-of-year estimates. The estimate of the net stock for 1955 based on assumptions of straight line depreciation, average life, and L-2 survival patterns is 15[illegible].6 billion dollars (in real terms). This estimate was taken here to be the actual value of KCD_t in 1955IV. From this base period, various values of δ_D were used to generate, from Equation (2.2), different series on the stock of consumer durables. The values from each of these series for 1960IV, 1965IV, and 1969IV were compared to the values published in [38] to see which value of δ_D most closely reproduced the published values. The value finally chosen for δ_D was 0.0525. The use of this value lead to values of KCD_t in the three comparison quarters of 186.7, 242.4, and 320.4, which compare closely to the published values of 186.1, 236.8, and 320.4.

A similar procedure was followed for the construction of the series on KIH_t. From Equation 47 in Table 2–2, KIH_t is:

$$KIH_t = (1 - \delta_H)KIH_{t-1} + IH_t. \tag{2.3}$$

Annual estimates on the stocks of residential structures are presented in the November 1971 issue of the *Survey of Current Business* (Young, Musgrave, and Harkins [39]) for the 1925–1970 period. The estimate of the net stock of residential structures for 1963 for the private nonfarm (1–4 units and 5 or more units) and farm sectors is 434.5 billion dollars (in real terms). This figure is the sum of three figures in Table 1 in [39]. This estimate was taken here to be the actual value of KIH_t in 1963IV. From this base period, the value of δ_H that seemed to reproduce the published series the best was 0.00575, and this was the value chosen to be used in the model. The use of this value led to a value of KIH_t in 1970IV of 504.8, which compares fairly closely to the published value of 510.7. The published series on the stocks could not used directly in this study because the series are not quarterly and because of the necessity of linking the investment series (CD_t and IH_t) to the stock series in some way.