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Chapter Title: Data on Household Income and Expenditure, Investment, the Government, and Foreign Trade

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5 Data on Household Income and Expenditure, Investment, the Government, and Foreign Trade

5.1 Composition of Final Demands

Our model includes four major components of final demand for each of the nineteen goods. These vectors are private consumption, (C), business investment, (I), government purchases, (G), and total exports, (E). Intermediate input requirements are given by the product of the input-output coefficient matrix, (A), and the domestic gross output vector, (X). The gross supply of a good is simply the sum of domestic gross output, (X), and imports, (M). In equilibrium, total supply equals total demand for every commodity. For all commodities taken together, this relationship can be expressed as

$$(5.1) \quad X + M = AX + C + I + G + E.$$

Rearrangement allows us to express gross output, X , as a function of other variables:

$$(5.2) \quad X = (I^* - A)^{-1}(C + I + G + E - M),$$

where I^* is the identity matrix. For a given price vector, evaluation of the right-hand side of equation (5.2) provides the amount of domestic production necessary to satisfy demand.

Table 5.1 shows final demand data for each of the nineteen producer goods in the model. Column (1) provides consumption, (C), columns (2) and (3) together are used to obtain investment, (I), while columns (4), (5), and (6) represent government expenditure, (G), exports, (E), and imports, (M), respectively. Much of the rest of the chapter consists of a discussion of how we derive these data.

All agents finance their final demands with their disposable incomes. We assume that each agent obeys the relevant budget constraint. Private

Table 5.1 Components of Final Demand, Estimates by Industry for 1973 (in millions of dollars)

	Personal Consumption Expenditures (1)	Gross Private Fixed Capital Formation (2)	Net Inventory Change (3)	General Government Expenditures (4)	Exports (5)	Imports (6)
ALL INDUSTRIES	827,520.0	202,092.0	18,787	119,764	84,598.8	84,598.8
Agriculture, forestry, fisheries	10,194.9	0.0	3,248	-1,526	10,313.2	4,707.3
Mining	266.3	0.0	1,421	217	1,253.3	1,221.5
Crude petroleum and gas	0.0	0.0	410	0	103.1	5,190.6
Contract construction	0.0	115,132.0	-773	45,690	0.0	0.0
Food and tobacco	105,701.8	0.0	-1,044	1,522	6,831.7	5,690.4
Textiles, apparel, and leather	36,571.4	163.9	-652	669	3,475.3	5,741.5
Paper and printing	9,656.8	0.0	116	2,178	1,405.6	2,170.0
Petroleum refining	16,673.5	0.0	-16	1,501	556.7	3,139.8
Chemicals, rubber, and plastics	17,795.8	38.6	1,243	4,141	6,259.0	3,509.5
Lumber, furniture, stone, clay, and glass	8,154.0	2,508.2	849	927	1,700.9	2,760.9
Metals, machinery, instruments, and miscellaneous manufacturing	29,956.9	42,279.4	10,644	14,117	27,499.4	25,250.3
Transport equipment and ordnance	3,045.0	8,478.8	-3,189	16,103	4,653.3	1,084.2
Motor vehicles	21,643.9	16,154.6	-1,877	2,503	6,080.0	10,238.9
Transportation, communi- cations, and utilities	57,192.2	3,493.1	682	9,961	8,662.3	11,584.3
Trade	191,084.4	10,040.2	7,959	2,121	0.0	0.0
Finance and insurance	57,997.9*	21.3	0	884	0.0	0.0
Real estate	122,201.5	3,419.9	0	1,783	0.0	0.0
Services	135,514.7	0.0	-234	16,154	5,805.0	2,309.6
Government enterprises	3,873.8	0.0	0	818	0.0	0.0

*Includes imputed service charge payments.

consumption is financed by household capital income, labor income, and transfer payments, less taxes and savings. The government finances transfer payments and commodity purchases with net government income. Business investments are financed by household savings. The foreign sector finances export demand by sales of imports to the United States. In this chapter we also present data on income and expenditures for each of these groups.

5.2 Disposition of Consumer Income

5.2.1 Expenditures on Commodities by Consumer Class

During 1972–74, the Bureau of Labor Statistics conducted a Consumer Expenditure Survey. This survey provides all of the household expenditure data for our model. The data are disaggregated by current gross income ranges for 1973, which are shown in table 3.1.

The survey consists of two separate components, each with its own sample of about 10,000 families each year. The first component is an interview panel survey for which each consumer unit was visited by an interviewer every three months over a fifteen-month period. The second component is a diary or record-keeping survey, completed by respondents for two consecutive one-week periods. The diary component was designed to gather information on small, frequently purchased items; the interview survey was designed to focus on larger items. Both surveys provide average expenditures for a household in each income class. In principle, these should be comparable. However, the diary survey provides average weekly expenditures for fiscal years. Therefore, it is necessary to multiply by fifty-two and take a price-indexed average of two fiscal years to get average yearly expenditures by income class for calendar year 1973. For the most part we use data from the interview survey. We supplement these data with information from the diary survey in a few cases.

The consumption data from the interview surveys are broken down into fifty-four categories. We use a detailed description of these categories in order to place them as accurately as possible into our classification of fifteen consumer goods. In the appendix to this chapter we show the correspondence between these categories. In that table we have indicated those categories for which the data come from the diary survey, rather than from the interview survey.¹

1. In four instances we did not use the categories from the interview survey. First, none of the categories from the interview describes our nondurable household commodity very well, so we use different categories from the diary survey. Second, we chose not to use the personal care category from the interview survey. This category contains some appliances, some services, and some nondurable household items. Instead, we chose a more disaggre-

We adjust purchases of financial services to account for imputed interest and service charge payments. These adjustments have already been described in section 4.3. The \$15,388 million of imputed interest income from the production data are spent on imputed service charge payments, and we use Consumer Expenditure Survey data on ownership of financial assets to allocate proportionately these expenditures among the twelve consumer groups.

In table 5.2 we show the average yearly per household expenditures of each consumer group on each of the fifteen commodities. Not surprisingly, per household expenditures tend to increase as we move to consumer groups with more income. However, this pattern does not hold monotonically for some goods, such as alcoholic beverages, tobacco, and transportation. While expenditures on housing increase with income, the share of income spent on housing actually decreases. The share of income spent on clothing and jewelry increases dramatically.

Before using these figures, we multiply by the total number of households in each of these groups in order to obtain total expenditure by each group for each product. We obtain the number of households in each group from the Treasury Department's Merged Tax File. These data are shown in table 5.3.

These expenditures on the fifteen consumer goods are converted into expenditures on nineteen producer goods using the *Z* matrix described in section 4.6 above. Column (1) of table 5.1 provides unadjusted data on personal consumption expenditures on our nineteen producer goods, from table 2.6 of the July 1976 *Survey of Current Business* (U.S. Department of Commerce, BEA 1976b). Chapter 6 describes how we adjust the data sources to match.

5.2.2 Consumer Expenditure Taxes

In this section our calculations of effective rates of tax on the fifteen consumer goods other than savings are explained. We have specific data for the taxes on alcoholic beverages, tobacco, and gasoline. For the other goods, we must make a series of imputations.

According to the July 1976 *SCB*, state and local liquor taxes yielded \$2,013 million in 1973. The federal government collected \$6,671 million in liquor taxes, bringing the total liquor tax to \$8,684 million. State and local tobacco taxes amounted to \$3,274.4 million, while federal tobacco taxes were \$2,357 million, for a total of \$5,631.4 million. Excise taxes on

gated classification from the diary survey. Third, we omitted the retirement pensions category, since this primarily represents savings. Finally, we did not use the cost of owned dwellings category. Instead, we use an estimated gross rent figure, which represents an owner's estimate of how much he would charge to rent the house to someone else. If it is accurate, this figure should reflect the homeowners' implicit expenditure on housing services.

Table 5.2 Matrix of 1973 Expenditures on Consumer Goods per Household (in dollars)

	Household Groups					
	(1)	(2)	(3)	(4)	(5)	(6)
1. Food	766.80	1,034.90	1,153.10	1,292.80	1,336.30	1,400.70
2. Alcoholic beverages	22.48	37.00	44.88	50.68	56.24	67.60
3. Tobacco	68.41	78.58	85.63	92.46	108.39	115.66
4. Utilities	271.60	340.40	388.10	407.40	448.20	442.80
5. Housing	1,094.23	1,323.34	1,353.06	1,439.94	1,480.34	1,540.81
6. Furnishings	72.97	112.32	131.92	131.56	157.80	183.19
7. Appliances	52.29	71.85	85.75	96.96	110.62	143.16
8. Clothing and jewelry	142.90	218.90	241.00	303.40	321.60	368.40
9. Transportation	47.14	65.83	68.63	69.41	59.29	79.75
10. Motor vehicles	288.80	419.80	470.10	502.60	768.90	804.90
11. Services	406.50	483.72	590.04	669.44	709.92	780.88
12. Financial services	191.19	289.06	404.61	400.24	471.25	497.38
13. Reading, recreation, and miscellaneous	102.30	150.90	147.50	200.60	204.80	255.50
14. Nondurable household items	135.46	165.10	188.24	219.96	235.56	243.62
15. Gas and other fuel	151.20	194.10	251.90	264.60	316.00	372.00

Household Groups

	(7)	(8)	(9)	(10)	(11)	(12)
1. Food	1,592.90	1,804.00	1,972.70	2,373.50	2,764.90	3,311.40
2. Alcoholic beverages	67.77	89.66	82.53	115.82	124.93	199.44
3. Tobacco	135.05	146.13	151.04	170.22	166.72	153.12
4. Utilities	483.30	534.80	591.20	671.90	738.40	891.20
5. Housing	1,699.56	1,872.23	1,989.17	2,430.00	2,885.93	3,663.97
6. Furnishings	232.52	237.19	294.53	425.47	545.61	770.44
7. Appliances	155.14	164.49	195.37	216.44	248.34	270.96
8. Clothing and jewelry	419.60	506.00	562.40	743.10	934.90	1,366.00
9. Transportation	84.82	91.68	77.15	102.75	140.88	304.84
10. Motor vehicles	880.10	1,195.30	1,317.00	1,564.80	1,891.40	2,373.20
11. Services	854.30	903.64	1,059.10	1,367.96	1,802.96	3,362.58
12. Financial services	546.15	568.11	714.66	774.28	1,021.09	1,749.67
13. Reading, Recreation, and miscellaneous	322.10	395.10	471.50	651.30	915.10	1,193.20
14. Nondurable household items	260.00	303.42	345.54	388.44	452.14	505.44
15. Gas and other fuel	411.40	474.20	556.50	626.80	714.40	767.10

Table 5.3 Thousands of Households in Each Consumer Group

Group Number	Gross Income	Number in Thousands
1.	0 < 3,000	14,149 ^a
2.	3 < 4,000	6,863
3.	4 < 5,000	6,236
4.	5 < 6,000	6,107
5.	6 < 7,000	5,042
6.	7 < 8,000	4,755
7.	8 < 10,000	8,563
8.	10 < 12,000	7,565
9.	12 < 15,000	9,774
10.	15 < 20,000	10,220
11.	20 < 25,000	4,589
12.	25,000 +	5,033

^aOnly those of age over twenty. See Section 5.3 for a discussion of this adjustment.

gasoline were \$8.283 million. These figures are summarized in column (1) of table 5.4.

In addition to these specific taxes, the July 1976 *SCB*, reports that state and local (S&L) governments collected \$30,384.6 million of general and miscellaneous taxes, for which no breakdown among consumer goods is given. Columns (2) through (6) of table 5.4 show our method for allocating these taxes among consumer goods. Column (2) is based on the tax rates in table 5.5, which in turn are based on information from the *Commerce Clearing House State Tax Handbook*. Each of the rates in table 5.5 is a weighted average of the statutory rates in each state, where the weights are the states' proportions of national personal income in 1973. For example, only eight states tax the transportation of persons and property, at rates varying from 2 to 5 percent of purchase price. The sum of each state's rate times its proportion of personal income yields the low national effective sales tax rate of .25 percent.

We then use the nine rates in table 5.5 to generate rates for our classification of consumer goods. These state and local (S&L) rates, t_m ($m = 1, \dots, 15$), are shown in column (2) of table 5.4. The 3.99 percent rate for "tangible personal property" in table 5.5 applies directly to consumer goods such as appliances in table 5.4. On the other hand, our food category includes some food from restaurants, which is taxed at the full rate of 3.99 percent, some food from stores, which is taxed at the lower rate of 1.82 percent, and some value of food consumed on farms, which is not taxed. The weighted average of these is 2.30 percent, which is the first entry in column (2) of table 5.4.

Column (4) of table 5.4 shows personal consumption expenditures on the consumer good classification, from table 2.6 of the July 1976 *SCB*.

Table 5.4 Consumer Sales Taxes (in millions of 1973 dollars)

Consumer Good	Tax Collections on Which We Have Specific Data (1)	S&L Consumer Sales Tax Rates, t_m , based on Table 5.5 (2)	t_m 1 + t_m (3)	Consumer Expenditures from July 1976 SCB (4)	Initial Estimate of S&L Tax Collections (3) × (4) (5)	Final Estimate of S&L Tax Collections (\$30,384.6 allocated by column 5) (6)	Total Consumer Tax Collections (7)
TOTAL				827,525	16,718.94	30,384.6	52,983.0
Food		.0230	.02248	146,763	3,299.64	5,996.7	5,996.7
Alcoholic beverages	8,684.0	.0399	.03837	21,302	817.34	1,485.4	10,169.4
Tobacco	5,631.4	.0411	.03948	13,134	518.50	942.3	6,573.7
Utilities		.0238	.02325	38,644	898.35	1,632.6	1,632.6
Housing				123,173			
Furnishings		.0399	.03837	31,716	1,216.91	2,211.6	2,211.6
Appliances		.0399	.03837	26,836	1,029.67	1,871.3	1,871.3
Clothing and jewelry		.0399	.03837	68,062	2,611.47	4,746.0	4,746.0
Transportation		.0025	.00249	7,326	18.27	33.2	33.2
Motor vehicles		.0312	.03026	70,607	2,136.29	3,882.5	3,882.5
Services		.0185	.01816	117,219	2,129.15	3,869.5	3,869.5
Financial services				55,894 ^a			
Reading, recreation, and miscellaneous		.0274	.02667	39,398	1,050.71	1,909.5	1,909.5
Nondurable household items		.0321	.03110	31,916	922.64	1,804.0	1,804.0
Gas and other fuel	8,283.0			35,535			8,283.0

^aIncludes imputed service charge payments.

Table 5.5 Sales Tax Rates on Selected Consumer Purchases

Consumer Purchase	Percentage of Tax Rate
Tangible personal property	3.99
Food	1.82
Alcoholic beverages	3.99
Tobacco	4.11
Drugs	.99
Utilities	2.38
Services	1.85
Transportation	.25
Other	.00

(This has the same column total as column (1) of table 5.1, although the latter uses the producer good classification.) The figures in column (4) of table 5.4 are *gross* of sales taxes. Consequently, to estimate tax collections, the observed gross-of-tax expenditures in column (4) are multiplied by $t_m/(1 + t_m)$, shown in column (3). This procedure gives us initial estimates of S&L tax collections in column (5). The total in column (5), however, is substantially less than the total of \$30,384.6 million found in the *SCB*. Therefore, we allocate the *SCB* total on the basis of the estimated tax collection figures in column (5), in order to get column (6). Finally, adding columns (1) and (6) gives our total for consumer sales taxes, which is shown in column (7). These final figures on tax payments remain unchanged as the construction of the benchmark data set develops. Because of our consistency procedures, however, the tax rates may not be unchanged. Personal consumption expenditures are one of the items scaled to match value added. Therefore, a fixed amount of tax will yield different rates, depending on the severity of the consistency adjustment.

5.2.3 Household Savings Data

Each consumer group exhausts its income with expenditures on commodities and saving. As explained in the preceding sections, we consider a saving commodity that feeds through the Z coefficient matrix in the same manner as other consumer goods and is thereby translated into demands for the nineteen producer goods. These coefficients are determined by data on business investment from the *Survey of Current Business*. In this way the total saving of consumers exactly equals the net investment of the business sector.

The 1973 Consumer Expenditure Survey provides data on the net change in assets, less net change in liabilities for each income group. Unfortunately, the resulting saving estimates across our twelve income classes are extremely volatile and unreliable. That is, a graph of saving against income is very irregular in shape, and no alternative data source is

Table 5.6 Saving per Household in 1973, by Income Class (in dollars)

Gross Income	Saving
0-2,999	- 18.74
3,000-3,999	64.58
4,000-4,999	106.87
5,000-5,999	174.20
6,000-6,999	239.35
7,000-7,999	309.86
8,000-9,999	419.54
10,000-11,999	596.77
12,000-14,999	835.96
15,000-19,999	1,203.55
20,000-24,999	1,670.55
25,000 +	4,980.27

better. To correct for this irregularity, we manually smoothed the points on the 1973 function.² With this procedure we believe we have obtained more reasonable values for saving by income class. The resulting estimates are shown in table 5.6.

5.3 Household Income Sources and Taxes Paid

In chapter 4 we describe industry and government use of labor and capital services. In equilibrium these demands for factors equal the supplied endowments of factors. We must, therefore, estimate the ownership of each factor by each consumer group. The income from these factors will equal the total of expenditures and saving (after the benchmark consistency adjustments that we describe in chapter 6).

The major source of data on income and income taxes is the Treasury Department's Merged Tax File, which is compiled from individual income tax returns. The Merged Tax File classifies individuals by gross income, including nontaxable government transfers. This measure is very similar to the gross income concept used to classify households in the expenditure survey data. The only substantive difference between the two data sources is the treatment of young family members who are wage earners. The Treasury Tax File counts these tax returns in the same manner in which it counts all other individual returns. Most of them fall into the lowest income group. As a result, the source of income for the Treasury's lowest income group is almost entirely wages. The Consumer

2. Data in Projector and Weiss (1966) suggest that saving per household is negative for the lowest-income group(s), increases with income, and increases at a decreasing rate. We wish to obtain this general shape for our twelve income groups, but we wish to use as much of the basic data as possible. Rather than regress savings on income, then, we merely keep the savings amounts for seven of the groups and change the savings data for the five outliers so that they fit on a smooth curve.

Expenditure Survey does not interview these family members separately, so their lowest income group consists primarily of retired persons with relatively low wage income and higher capital income, especially from the owner-occupied home. To correct for this discrepancy, we eliminate from the Treasury sample all tax returns for individuals under twenty years of age.

5.3.1 Household Capital Income

Sources of capital income are shown in table 5.7. All of the income categories in this table are returns to the capital owned by individuals, even if that ownership is implicit. For example, pension funds are a conduit through which individuals earn a return to their own personal saving, while dividends and financial capital gains are the forms in which corporate source income is attributed to individuals.

Partnership net income is a combined return to the investment of capital and labor by the entrepreneur, and so must be apportioned between the two.³

The first eight columns of table 5.7 derive from the Treasury Merged Tax File. For imputed net rental information we use Consumer Expenditure Survey data as follows. We take total reported "estimated gross rent" and subtract a figure for "cost of home ownership" that includes maintenance, depreciation, property taxes, and mortgage interest payments. This difference is scaled up by the ratio of the total number of homeowners to the number of households in the group to get average imputed rental income, shown in column (9) of table 5.7. (This procedure is consistent with our imputations for owner-occupied housing expenditures.)

Column (10) provides the estimated imputed interest receipts from ownership of financial assets. These receipts are exactly equal to the imputed service charge payments for financial services, described in section 5.2.1 above. Column (11) shows the totals of columns (1) through (10).

5.3.2 Household Labor Income and Taxes Paid

The data for household labor income also come from the Merged Tax File. Two sources of labor income are shown in the first two columns of table 5.8. Wages and salaries plus the labor share of net partnership income equal total labor income, shown in column (3). When this total is

3. In discussing production side data in section 4.2, we describe a procedure to divide these returns for each industry. After totaling all industries, it turns out that 36.66 percent of this income had been attributed to capital. We apply this proportion to the self-employed income of each consumer group in order to estimate capital income from this activity. This assumes implicitly that all consumer groups have the same proportions of activity among industries.

Table 5.7 Average Capital Income per Household by Source (in 1973 dollars)

Consumer Income Class	Private Pensions (1)	Dividends before Exclusions (2)	Interest Receipts (3)	Net Rents (4)	Short-Term Capital Gains (5)	Full Long-Term Capital Gains (6)	Royalties (7)	36.66% of Partnership Income (8)	Net Rent of Owner-Occupied Homes (9)	Imputed Interest Receipts (10)	Total (11)
0-2,999	10	17	43	6	-5	12	1	-14.30	311.23	40.66	421.59
3,000-3,999	38	32	93	14	-3	23	1	1.47	400.73	101.65	701.85
4,000-4,999	52	30	110	9	-9	13	0	0	410.73	127.79	743.52
5,000-5,999	63	36	168	31	-11	17	1	1.47	437.48	148.12	892.07
6,000-6,999	77	51	218	23	-6	32	2	4.40	427.00	159.74	988.14
7,000-7,999	72	46	232	33	-8	44	4	11.00	444.57	171.35	1,049.92
8,000-9,999	105	79	280	36	-38	7	3	4.77	451.45	153.93	1,082.15
10,000-11,999	147	112	328	30	-18	85	8	11.00	518.10	148.12	1,369.22
12,000-14,999	135	110	356	33	-27	128	4	23.83	560.77	182.97	1,306.57
15,000-19,999	163	183	476	38	-33	190	11	29.70	735.37	223.63	2,016.70
20,000-24,999	221	339	721	97	-2	361	27	78.82	913.41	345.61	3,101.84
25,000+	438	2,637	2,154	420	-221	4,552	142	714.52	1,060.80	909.05	12,806.37
Average	99	205	323	44	-24	291	11	43.26	—	—	—

Table 5.8 Average Labor Income and Income Taxes per Household (in 1973 dollars)

Consumer Income Class	Wages and Salaries (1)	63.33% of Partnership Income (2)	Labor Income (1) + (2) (3)	Capital Income (4)	Total Income (3) + (4) (5)	Federal Income Tax (6)	S&L Income Tax (7)	Total Tax (6) + (7) (8)	Average Tax Rate (8) ÷ (5) (9)	Marginal Tax Rate (10)
0-2,999	623.3	-24.70	607.60	421.59	1,029.19	6	0	6	.0058	.0100
3,000-3,999	1,640.2	2.53	1,642.73	701.85	2,344.58	74	1	75	.0320	.0608
4,000-4,999	2,586.0	0	2,586.00	743.52	3,329.52	158	3	161	.0484	.1019
5,000-5,999	3,459.2	2.53	3,461.73	892.07	4,353.80	257	6	263	.0604	.1228
6,000-6,999	4,370.6	7.60	4,378.20	988.14	5,366.34	365	13	378	.0704	.1346
7,000-7,999	5,529.0	19.00	5,548.00	1,049.92	6,597.92	516	24	540	.0818	.1570
8,000-9,999	6,925.9	8.23	6,934.13	1,082.15	8,016.28	709	47	756	.0943	.1813
10,000-11,999	8,739.0	19.00	8,758.00	1,369.22	10,127.22	962	90	1,052	.1039	.2078
12,000-14,999	11,169.5	41.17	11,210.67	1,506.57	12,717.24	1,330	143	1,473	.1158	.2215
15,000-19,999	14,294.3	51.30	14,345.60	2,016.70	16,362.30	1,951	270	2,221	.1357	.2618
20,000-24,999	17,443.5	136.18	17,579.68	3,101.84	20,681.52	2,829	449	3,278	.1585	.2897
25,000 +	22,549.7	1,234.48	23,784.18	12,806.37	36,590.55	8,049	1,303	9,352	.2556	.4067
TOTAL	6,794.4	74.74	6,869.14	—	—	1,057	139	1,196	—	—

added to capital income in column (4) (which is repeated from table 5.7), we have total factor income in column (5).

The total in column (5) of table 5.8 is the measure of economic income that provides the proper denominator for our calculations of effective average tax rates. In this model, income tax is defined as the sum of federal, state, and local income taxes. These data, which are shown in columns (6) and (7) of table 5.8, were provided by the Treasury Department's Merged Tax File. When we divide total income taxes (column 8) by income (column 5), we get the average income tax rates, which appear in column (9). We use gross-of-tax income in the denominator of these calculations. This differs from our net-of-tax rates on the production side of the model. On the production side we define a unit of a factor to be that which earns a dollar *net* of factor taxes. The rate for factor taxes is tax paid per unit value of the factor used. In order to calculate personal income tax rates, however, we divide taxes by each individual's total factor income.

We should note that the income sources shown in table 5.8 will be scaled to match production side data. (We will describe this consistency adjustment in chapter 6.) The tax collection data, however, are not altered. Consequently, the average tax rates used by the model are slightly different from the rates shown here, although the differences are small, and relative magnitudes are roughly preserved.

The last column of table 5.8 shows estimates of the appropriate marginal tax rates that apply to changes in income for each of the income groups. The Merged Tax File provides information on the federal marginal income tax rate, averaged over all members of an income class, but we require information on state marginal tax rates as well. One might think that state and local income taxes are less progressive than federal income taxes, since the maximum marginal tax rates are reached at relatively low income levels in most states (Maxwell and Aronson 1977). The data on tax collections, however, tell the opposite story. When state and local income tax collections, by income group, are divided through by income, we see that these state and local average tax rates rise faster than the federal average tax rates at all levels of income. For total marginal tax rates we simply scale up each federal marginal rate by the ratio of total income taxes to federal income taxes in the group. This procedure assumes that marginal tax rates in the federal and state income tax systems increase at similar rates.

5.3.3 Household Transfer Incomes

Each consumer's disposable income consists of after-tax factor incomes, plus the (nontaxable) transfer from government. The components of these transfers are shown in table 5.9. These data come from the Treasury Tax File.

We might expect government transfers to accrue to low income groups

Table 5.9 Average Government Transfers per Household by Source (in 1973 dollars)

Consumer Income Class	Unemployment Compensation (1)	Welfare Receipts (2)	Government Employee Pension (3)	Workmen's Compensation (4)	Veterans' Benefits (5)	Social Security (6)	Insurance Value of Medicare (7)	Insurance Value of Medicaid (8)	Insurance Value of Veteran Benefits (9)	Value of Food Stamp Bonus (10)	Total (11)	Transfers as Proportion of Income (12)
0-2,999	20	130	9	4	18	458	123	104	11	36	913	.462
3,000-3,999	38	237	29	10	59	844	164	161	38	51	1,631	.396
4,000-4,999	47	236	48	14	69	805	160	139	37	51	1,606	.309
5,000-5,999	61	165	73	18	55	810	157	92	29	41	1,501	.242
6,000-6,999	65	157	110	31	80	748	133	76	34	36	1,470	.201
7,000-7,999	63	95	109	47	81	585	97	61	31	28	1,197	.142
8,000-9,999	69	49	153	53	81	547	89	35	28	16	1,120	.113
10,000-11,999	64	26	196	56	86	475	83	23	30	9	1,048	.086
12,000-14,999	58	10	208	68	85	341	60	14	31	6	881	.059
15,000-19,999	57	12	300	69	99	301	55	10	33	5	941	.050
20,000-24,999	46	3	510	81	103	303	58	7	37	3	1,151	.048
25,000 +	41	4	1,005	80	112	358	76	5	32	2	1,715	.043
TOTAL	45	81	172	37	64	467	91	56	26	21	1,060	

more than to those with higher incomes. Column (11) of table 5.9 shows this pattern over much of the income range, with two notable exceptions. The poorest consumer group has the smallest per capita transfer income. This fact may be due to the imprecision of our correction for teenage workers. (See above in section 5.3.) Also, the group with the highest total income has the largest transfers. This is largely the result of the concentration of government employee pensions in the high-income group. Many recipients of these pensions work at other full-time jobs after retiring from the government.⁴ Still, if transfers are taken as a proportion of total income for each consumer group, as in column (12) of table 5.9, we have a very progressive pattern.⁵

5.4 Investment Data

5.4.1 Gross Private Fixed Capital Formation and Depreciation

Purchases of investment goods are an element of final demand. The 1972 input-output table contains a column for Gross Private Fixed Capital Formation (GPFCE). Table 5.2 of the July 1976 *SCB* contains a 1973 total for this item. We scale the 1972 input-output column to the 1973 total by the following method. Purchases of structures, which appear in table 5.4 of the *SCB*, are attributed directly to demand for the output of the construction industry. We use purchases of producers' durable equipment for 1973 (table 5.6 of the *SCB*) in conjunction with similar data from the 1972 *SCB* to scale up particular elements of the GPFCE column. For the remaining elements of the column, including the trade and transportation margins, we scale the 1972 input-output entry by the ratio of total GPFCE for 1973 and 1972. Finally, we adjust the column of estimates proportionally to the proper 1973 total of \$202,092 million, shown in column (2) of table 5.1. Not surprisingly, construction and metals and machinery account for the bulk of the capital formation. About 57 percent of the total occurs in construction and about 21 percent in metals and machinery.

A major portion of these gross investment purchases is required to replace depreciated capital. We must be careful to distinguish between

4. It could be argued that government pension programs should be treated like private pension programs (i.e., that the benefit payments should be considered capital income). Instead, we have chosen to treat all flows to the government (including government retirement contributions) as taxes, and to treat all payments from the government to individuals as transfer payments.

5. If one uses columns (11) and (12) of table 5.9 to calculate the average income for each of the consumer groups, one will notice that these average incomes are greater than the upper limit of the Consumer Expenditure Survey income brackets in many cases. This is because we include imputed rents, which are not counted as income in the Consumer Expenditure Survey.

gross investment and net investment, since, in our model, industries use capital services but do not use up the capital itself. For our estimate of economic depreciation we use figures from table 1.9 of the July 1976 *SCB* to find the total capital consumption allowance with capital consumption adjustment. This comes to \$117,652 million in 1973—a figure that is 58.22 percent of total GPFCE of \$202,092 million. Using this ratio we assume that 58.22 percent of each gross investment purchase is used to replace capital, leaving 41.78 percent of the GPFCE column as net investment.

5.4.2 Net Inventory Change

The second component of net investment is net inventory change. For this component we once again scale up a column of the 1972 input-output table to a 1973 total. The elements of this vector, however, are more volatile from year to year than are the elements of other sectors. Consequently, we do not scale the entire column by a single ratio of the 1973 total to the 1972 total. Instead, we use subtotals from table 5.8 of the July 1976 *SCB* for five broad categories such as “durable manufacturing.” We take the ratio of the 1973 subtotal to the 1972 subtotal for each of the five categories, and then use these five ratios for our scaling. Column (3) of table 5.1 includes the results of these calculations. Net investment demand for each output is 41.78 percent of column (2) plus all of column (3) of table 5.1. Over all industries this net investment demand is \$103,070 million in 1973.

5.5 Government Receipts and Expenditures

Expenditures by government (other than those for public enterprises) are an element of final demand. We model the government as a consumer with a Cobb-Douglas utility function. This function is defined over all nineteen producer goods, plus capital and labor services.

5.5.1 Government Purchases of the Nineteen Producer Goods

The 1972 input-output table has four columns for final purchases by government. These four categories are federal defense expenditures, other federal expenditures, state and local education expenditures, and other state and local expenditures. In order to obtain 1973 estimates we multiply each column by the ratio of its 1973 total to its 1972 total. These totals come from table 3.6 of the July 1976 *SCB*. The sum of the four scaled columns is our basic government expenditure column. These expenditures are shown in column (4) of table 5.1. The largest increase from 1972 to 1973 was in state and local expenditures for items other than education, while federal defense expenditures actually decreased in nominal terms. Once again, construction and metals and machinery are important components of these expenditures, along with transport equip-

ment and ordnance, and services. Construction gets about 38 percent of the total, while these other three industries receive around 12 percent to 14 percent each.

Rather than purchasing agricultural output in 1973, the federal government was observed to sell, through price stabilization programs, \$1,526 million of goods stored from previous years. Government cannot be assigned a negative Cobb-Douglas expenditure share, so we set government demand for agricultural output to zero. Government is then assigned an endowment of 1,526 million units of agricultural output, which they sell in the benchmark equilibrium. On the other eighteen outputs, general government spends \$121,290 million.

5.5.2 Government Use of Labor, and Labor Tax

Table 4.11 shows government purchases of labor services, with a total of \$165,785 million. The purchases of labor for government enterprises are equal to \$16,723 million. The difference of \$149,062 million is the appropriate number for general government. The difference between total contributions for social insurance (\$16,056 million) and the estimate of the contributions in government enterprises (\$1,557 million) is \$14,499 million for general government. When we subtract the contributions figure from the labor purchase figure, we calculate that general government paid \$134,563 million for net-of-tax labor services. Division yields an effective tax rate of .1077. This rate differs from the government enterprise rate because the federal rate differs from the state and local rate, while enterprises make up a different fraction of the two.

5.5.3 Government Use of Capital

Capital use estimates for government pose problems, since no return to governmental capital is ever earned. Our previous approach of defining a unit of capital—that which earns a dollar per year—is less appropriate here. If we assume that the interaction of the economy and the governmental process causes a rough equilibration of rates of return, however, we can apply the private rate of return to a government capital stock estimate. We show the calculations for this imputation in table 5.10. John Kendrick's (1976) national wealth estimates provide column (1) of the table.

In column (6) of table 4.2 we show the total capital income for all industries as \$181,973 million. If we subtract the imputed earnings of government enterprises, we get \$174,162 million for capital income in the private business sector, which is shown in column (2) of table 5.10. When we divide this by Kendrick's figure for business net wealth, we get the return of almost 10 percent. We then impute this rate of return to the government capital stock. Since the government capital stock estimate is for total government, we must subtract the \$7,811 million imputed return

Table 5.10 1973 Government Capital Stock Estimates (in millions of dollars)

	Net Worth (1)	Earnings Net of Tax (2)	Rate of Return (3)
Business	\$1,747,200	\$174,162	.09968
Government	1,081,000	107,755	.09968

in government enterprises. This gives us a \$99,944 million imputed return to the capital used by general government. To this we add the \$160 million of net rent paid by government as payment for borrowed capital.⁶ The total return to capital used by general government is then \$100,104 million.

Only part of this capital return is endowed to government, however; the \$160 million of net rent paid are for capital owned by individuals, as are the \$15,351 million of net interest paid. We assume that all of the capital employed by government enterprises (\$7,811 million) is privately owned. Since total government use of private capital is \$15,511 million, general government is assigned the residual of \$7,700 million.⁷ Government's endowment of capital is then \$92,404 million (\$100,104 – \$7,700). The government finances its total expenditures by using the revenue from the sale of this capital endowment plus tax revenues.

5.6 Foreign Trade Data

We treat the foreign sector transactions of the United States in a fairly simple manner, so as to close the model. First of all, we do not deal with capital flows (i.e., we only model commodity trade). Secondly, we do not differentiate between commodities on the basis of place of origin (i.e., automobiles produced in the United States and those produced abroad are considered to be identical).⁸

Despite these simplifying assumptions, it would be incorrect to say that foreign trade has no effect on our model. Foreign trade introduces a difference between the aggregate demands of U.S. consumer groups (broadly defined to include business investment and government purchases) and the demands for products faced by domestic industries in the United States.

We take data on foreign trade from two sources. For merchandise trade we use series B of the 1973 foreign trade statistics of the Organization for Economic Cooperation and Development. These data are presented on a Standard International Trade Classification (SITC) basis, but

6. See section 4.3 and table 4.3 for the derivation of this figure.

7. Note that $160 + 15,351 = 15,511 = 7,811 + 7,700$.

8. Each of these basic assumptions will be relaxed in chapter 11.

we have converted them to the Standard Industrial Classification (SIC) basis of our model. For service items we take data from the 1973 balance-of-payments accounts for the United States. These appear in the December 1974 *SCB*. The balance-of-payments accounts identify transportation as a separate category. This is fortunate, since the merchandise trade-statistics report imports at market value in the country of origin, while exports are reported at market value at the point of shipment.

When we add these two together, we have a total value of exports of \$84,598.8 million. The total value of imports is \$83,004 million. In this general equilibrium model, however, we impose zero balance of foreign trade activity. To get zero trade balance, we allocate the 1973 trade surplus of \$1,595 million proportionately among the imports. When this procedure is complete, we have a total of \$84,598.8 million for both exports and imports. The detailed breakdown of these totals is shown in table 5.1.

For most goods, there are substantial trade flows in both directions. In fact, at this level of aggregation, a noticeable correlation exists, by industry, between imports and exports. For example, metals and machinery is by far the most important industry for both imports and exports, with around 30 percent of the total. The largest trade surplus is in agriculture, while the largest deficit is in petroleum and gas.

Appendix

Table 5.A.1 **Correspondences between Our Consumer Goods and Bureau of Labor Statistics (BLS) Categories**

Our Categories	Bureau of Labor Statistics Categories
Food	Food at home Food away Meals as pay Food on vacation
Alcoholic beverages	Alcoholic beverages Alcoholic beverages on vacation
Tobacco	Tobacco
Utilities	Gas in mains Gas in bottles Electricity Gas and electricity combined bills Water, garbage Telephone
Housing	Rent Estimated gross rent Other shelter Owned vacation home Lodging on vacation
Furnishings	Household textiles Furniture Floor coverings Miscellaneous furnishings

Table 5.A.1 (continued)

Our Categories	Bureau of Labor Statistics Categories
Appliances	Major appliances Small appliances Housewares Television
Clothing and jewelry	Clothing, male Clothing, female Clothing, infant
Transportation	Other transportation Other transportation on vacation
Motor vehicles	Vehicle purchase Auto repair
Services	Domestic services Dry cleaning Materials and repair Personal care services ^a Private education Public education Gifts and contributions ^b
Financial services	Vehicle finance charges Health insurance Miscellaneous Life insurance ^c Other personal insurance ^c
Recreation, reading, and miscellaneous	All expense tours on vacation Other vacation expenses Boats, aircraft, wheel goods Other recreation Reading
Nondurable, nonfood household items	Nonprescription drugs ^a Housekeeping supplies ^a Personal care products ^a
Gasoline and other fuels	Fuel oil and kerosene Other fuels Gasoline Gasoline on vacation

Table 5.A.1 (continued)

Our Categories	Bureau of Labor Statistics Categories
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^aDiary survey.

^bGifts and contributions include several categories such as appliances for wedding gifts. The majority, however, includes cash gifts to religious and educational institutions, which are part of our service good.

^cThe appropriate measure of expenditure on insurance services is premiums less claims paid. Since only data on premiums are available, we subtract 75 percent in order to approximate the desired expenditure before we add these insurance categories to purchases of financial services. The National Income Division suggested this 75 percent figure.