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5 The Accumulation of Human and Nonhuman Capital, 1948–84

Dale W. Jorgenson and Barbara M. Fraumeni

5.1 Introduction

The objective of this paper is to present a new system of national accounts for the U.S. economy. The purpose of this accounting system is to provide a comprehensive perspective on the role of capital formation in U.S. economic growth. The distinctive feature of our system is that we include fully comparable measures of investment in human and nonhuman capital. We have implemented this system of accounts for the private sector of the U.S. economy, covering the period 1948–84.

The concept of human capital is based on an analogy between investment in physical capital and investment in human beings. The common element is that present expenditures yield returns over the future. In order to construct comparable measures of investment in human and nonhuman capital, we define human capital in terms of lifetime labor incomes for all individuals in the U.S. population. Lifetime labor incomes correspond to the asset values for investment goods used in accounting for physical or nonhuman capital. We present a summary of our methodology in section 5.2.

The U.S. national income and product accounts (NIPAs) contain a great deal of valuable information on capital formation. For example, these accounts provide data on investment in physical or nonhuman capital that are both comprehensive and detailed;¹ however, the national accounts are closely tied to market transactions, avoiding imputations

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for nonmarket activities wherever possible. Not surprisingly, investment in human capital is not included in the U.S. national accounts.

The perspective on capital formation provided by the U.S. national accounts is seriously incomplete, as a consequence of the fact that these accounts are limited to market transactions. Our measures of capital formation show that investment in human capital is at least four times the magnitude of investment in nonhuman capital; moreover, the value of wealth in the form of human capital is over eleven times the value of physical or nonhuman capital.

The total product of an economic system includes investment in human and nonhuman capital and consumption of market and nonmarket goods and services. We define full consumption as the sum of goods and services supplied by market and nonmarket activities. Similarly, we define full investment as the sum of investments in human and nonhuman capital. Finally, we define full product as the sum of investment and consumption. We present measures of full product, investment, and consumption in section 5.3.

Our system of accounts assigns an equal role to consumption and investment as proportions of the national product; however, the relative importance of investment is much greater in our system than in the U.S. national accounts. Full investment is around 50 percent of full product, where human and nonhuman capital are treated on a comparable basis. Full consumption is about half of full product, where both market and nonmarket goods and services are included in consumption.

The value of full product is equal to the value of outlays on the services of human and nonhuman capital. These outlays take the form of labor and property compensation. We define full labor compensation as the sum of market labor compensation for activities involving employment through the labor market and nonmarket labor compensation for activities resulting in investment in education and direct consumption of labor services. Similarly, we define full property compensation as the sum of market and nonmarket property compensation. Finally, we define full factor outlay as the sum of labor and property compensation. We present measures for full factor outlay, labor compensation, and property compensation in section 5.3.

Nonmarket labor compensation is more than 80 percent of labor compensation since full compensation includes the value of nonmarket activities such as investment in education, household production, and leisure time. Full labor compensation is around 90 percent of factor outlay, while property compensation is close to 10 percent of the total. In our system of national accounts, the relative importance of labor compensation is much greater than in the U.S. national accounts.

Both property and labor compensation must be reduced by taxes and increased by subsidies to obtain incomes accruing to individuals. We define full labor income as the sum of market and nonmarket labor compensation after taxes. Similarly, we define full property income as the sum of market and nonmarket property compensation after taxes. Full income is defined as the sum of labor income and property income. We present measures for full income, labor income, and property income in section 5.4.

Receipts accruing to individuals include full income and government transfer payments to persons. Receipts are divided between consumption of market and nonmarket goods and services and saving in the form of human and nonhuman capital. We define full personal consumption expenditures as the sum of market goods and services consumed by households and nonprofit institutions, the services of human capital consumed directly through household production and leisure, and the services of nonhuman capital consumed directly in the form of services of consumers' durables and owner-occupied housing. We define full consumer outlays as the sum of personal consumption expenditures, personal transfer payments to foreigners, and personal non-tax payments. We present measures for full consumer outlays and saving in the form of human and nonhuman capital in section 5.4.

Since our system of accounts includes the consumption of both market and nonmarket goods and services, consumer outlays are much greater than in the U.S. national accounts. The market share of consumer outlays averages around 35 percent of total outlays. Similarly, our concept of human and nonhuman saving is much more comprehensive than the concept of saving in the U.S. national accounts. Human saving is between 80 and 90 percent of full saving. Nonhuman saving, the only portion included in the U.S. national accounts, is between 10 and 20 percent of the total.

The proportion of full saving to national expenditure ranges from 45 to 50 percent in our accounting system. This is far greater than the proportion of national saving to national expenditure in the U.S. national accounts. The saving proportion in our accounts rose to a peak in the year 1971 and has been gradually declining since then. The saving rate is lower in 1983 and 1984 than at any previous time in the postwar period.

To integrate our measures of income and expenditure with measures of human and nonhuman wealth, we require concepts of depreciation and revaluation for human and nonhuman capital. We define depreciation of human capital in terms of changes in the lifetime labor incomes of individuals with age. Depreciation on human capital is the sum of changes in lifetime labor incomes with age for all individuals who remain

in the population and lifetime labor incomes of all individuals who die or emigrate. Similarly, we define depreciation for nonhuman capital in terms of changes in asset values with age. Depreciation on nonhuman capital is the sum of changes in asset values for all investment goods remaining in the capital stock and the asset values of all investment goods that are retired from the capital stock. We define full depreciation as the sum of depreciation for human and nonhuman capital.

Depreciation is a very large component of saving in the form of both human and nonhuman capital. Depreciation was a fairly stable proportion of full gross saving at around 35 percent until the mid-1960s. Since that time, the relative importance of depreciation has risen steadily to almost 50 percent of saving. By contrast, net saving has declined from nearly 65 percent of saving at the beginning of the postwar period to slightly over 50 percent at the end of the period.

We define revaluation for human capital in terms of changes in lifetime labor incomes from period to period for individuals with a given set of demographic characteristics—age, sex, and education. Revaluation of human wealth is the sum of changes in lifetime incomes for all individuals initially in the population, holding age, sex, and education for each individual constant. Similarly, we define revaluation for nonhuman capital in terms of changes in asset values from period to period for individual investment goods. Revaluation of nonhuman capital is the sum of changes in asset values for all investment goods initially in the capital stock, holding the age of each investment good constant. We define full revaluation as the sum of revaluation for human and nonhuman capital.

We conclude the development of a new system of national accounts for the United States by defining full wealth as the sum of human and nonhuman wealth. The change in wealth from period to period is the sum of investment in human and nonhuman capital, net of depreciation, and the revaluation of human and nonhuman capital. We present measures of full investment, depreciation, revaluation, and changes in wealth in section 5.5 below. Finally, we present measures of full wealth in section 5.5.

Human wealth greatly predominates in the value of wealth, amounting to more than 90 percent of the total throughout the postwar period. The U.S. national accounts do not include wealth accounts. Only investment in the form of physical or nonhuman wealth is included in the national accounts. Wealth accounts consistent with the U.S. national accounts would exclude human wealth altogether. Obviously, the exclusion of investment in the form of human wealth is an extremely important omission.

It is necessary to emphasize that our study is exploratory in character. Unlike the U.S. national accounts, which are firmly rooted in

market transactions, our system of accounts involves very sizable imputations for the value of nonmarket activities. This disadvantage must be weighed against the important advantage that we provide a comprehensive view of capital formation. Judgments about the relative importance of investment and consumption, labor and property income, or different forms of saving require information of the type presented in our new system of national accounts.

5.2 Methodology

The implementation of our system of accounts for human capital requires a new data base for measuring lifetime labor incomes for all individuals in the U.S. population.² Our system includes demographic accounts that incorporate population data from the U.S. Bureau of the Census. Our demographic accounts include annual estimates of mid-year population by sex and age for individuals under seventy-five years of age. Using data from the censuses of population for 1940, 1950, 1960, 1970, and 1980, we have distributed the population of each sex by individual years of age and individual years of educational attainment. The estimation of changes in the numbers of individuals classified by age, sex, and education from year to year requires data on enrollment in formal schooling and on births, deaths, and migration.³

The starting point for the measurement of lifetime labor incomes for all individuals in the U.S. population is the data base on market labor activities assembled by Gollop and Jorgenson (1980, 1983). This data base includes the number of employed persons, hours worked, and labor compensation for the United States on an annual basis, cross-classified by sex, age, education, employment class, occupation, and industry. We have derived annual estimates of hours worked and labor compensation required for measuring incomes from market labor activities by summing over employment class, occupation, and industry and by distributing the work force of each sex by individual years of age from fourteen to seventy-four and individual years of educational attainment from no education to one to seventeen or more. We obtain average hourly labor compensation annually for individuals classified by the two sexes, sixty-one age groups, eighteen education groups for a total of 2,196 groups by dividing market labor compensation by hours worked by each group.

The second step in the measurement of lifetime labor incomes is to impute labor compensation and hours devoted to nonmarket activities. Six types of nonmarket activities are commonly distinguished in studies of time allocation—production of goods and services within the household unit, volunteer work outside the household unit, commuting to work, formal education, leisure, and the satisfaction of physiological

needs such as eating and sleeping.⁴ We classify time spent satisfying physiological needs as maintenance and exclude this time from our measure of time spent in nonmarket activities. We assume that the time available for all market and nonmarket activities has been constant over time and is equal to fourteen hours per day for all individuals.

We allocate the annual time available for all individuals in the population among work, schooling, household production and leisure, and maintenance. Our system of demographic accounts includes the enrollment status for individuals of each sex between five and thirty-four years of age. We estimate the time spent in formal schooling for all individuals by assigning 1,300 hours per year to each person enrolled in school. We allocate time spent in schooling to investment. Similarly, our demographic accounts include employment status for individuals of each sex between fourteen and seventy-four years of age. Hours worked for all employed individuals, classified by sex, age, and education, are included in our data base for market labor activities. We allocate time that is not spent working or in formal schooling directly to consumption. For all individuals, this time is equal to the difference between fourteen hours per day and time spent working or in school.

The third step in the measure of lifetime labor incomes is to impute the value of labor compensation for nonmarket activities.⁵ For this purpose, we first obtain average hourly labor compensation for all employed persons classified by sex, age, and education from our data base for market labor activities. Second, we estimate marginal tax rates for all employed persons, again classified by sex, age, and education. We multiply compensation per hour by one minus the marginal tax rate to obtain imputed hourly labor compensation for nonmarket activities other than formal schooling. Since individuals under fourteen years of age do not participate in the labor force, their imputed hourly labor compensation is set equal to zero. Individuals over seventy-four years of age are also assigned zero as their hourly labor compensation.

To estimate lifetime labor incomes for all individuals in the U.S. population, we distinguish among three stages in the life cycle. In the first stage, individuals may participate in formal schooling but not in the labor market. In the second stage, individuals may enroll in school and also work. In the third stage, individuals may participate in the labor market but not in formal schooling. For individuals in the third stage of the life cycle, total labor compensation is the sum of compensation for market labor activities after taxes and imputed compensation for nonmarket labor activities. For individuals in the second stage of the life cycle, total labor compensation also includes imputed labor compensation for schooling. For individuals in the first stage of the life cycle, labor compensation includes only the imputed value of time spent in schooling.

For an individual in the third stage of the life cycle, we assume that expected incomes in future time periods are equal to the incomes of individuals of the same sex and education, but with the age that the individual will have in the future time period, adjusted for increases in real income. We assume that real incomes rise over time at the rate of Harrod-neutral technical change, which we estimate at 2 percent per year. We weight income for each future year by the probability of survival, given the initial age of the individual. We obtain these probabilities by sex from publications of the National Center for Health Statistics. Where necessary, these survival functions, giving probability of survival by age and sex, are interpolated by means of standard demographic techniques. Finally, we discount expected future incomes at a real rate of return of 4 percent per year to obtain the lifetime labor income of an individual of a given sex, age, and education.

For an individual at the second stage of the life cycle, combining formal schooling with the possibility of participation in the labor market, we impute the value of time spent in schooling through its effect on lifetime labor income. For an individual of a given sex and age who is completing the highest level of schooling, grade seventeen or over, lifetime labor income is the discounted value of expected future labor incomes for a person of that sex and age and seventeen or more years of schooling. The imputed labor compensation for the time spent in formal schooling is equal to the difference between the lifetime labor incomes of an individual with seventeen years of education and an individual with the same sex and age and one less year of education, less tuition and fees for that grade of schooling. Total labor compensation is equal to the value of time spent in formal schooling plus labor compensation for market and nonmarket activities other than formal schooling.

For an individual completing grade 16, lifetime labor income is equal to the lifetime labor income of an individual of the same sex and education, but one year older, plus expected labor compensation for one year, discounted back to the present and multiplied by the probability of survival for one year. Expected labor compensation is equal to the probability of enrollment in grade 17 or higher, multiplied by market and nonmarket labor compensation for a person enrolled in that grade, and one minus the probability of enrollment, multiplied by market and nonmarket labor compensation for a person with sixteen years of education, not enrolled in school. As before, the imputed labor compensation for the time spent in formal schooling is equal to the difference between the lifetime incomes of an individual with sixteen years of education and an individual with the same sex and age and one less year of education, less tuition and fees. Using the same approach to defining lifetime labor incomes for individuals completing earlier grades,

lifetime incomes and imputed labor compensation for the time spent in formal schooling can be determined for individuals completing fifteen years of education, fourteen years of education, and so on.

For an individual in the first stage of the life cycle, where participation in the labor market is ruled out, the value of labor compensation is limited to the imputed value of schooling. Lifetime incomes for individuals at this stage of the life cycle can be determined for individuals completing one year of education, two years of education, and so on, working back from higher levels of education as outlined above. For individuals too young to be enrolled in school, imputed labor compensation is zero, but lifetime labor incomes are well defined. The value of a newborn entrant into the population is equal to the lifetime labor income of that individual at age zero. Investment in human capital in any year is the sum of lifetime incomes for all individuals born in that year and all immigrants plus the imputed labor compensation for formal schooling for all individuals enrolled in school.

The implementation of our new system of national accounts for the United States begins with the accounting system presented by Fraumeni and Jorgenson (1980). That accounting system includes a production account, an income and expenditure account, an accumulation account, and a wealth account—all in current and constant prices;⁶ however, their accounts for capital services, investment, and wealth are limited to nonhuman capital. We have incorporated their estimates for nonhuman capital into our system of U.S. national accounts. We have added estimates of the services of human capital, investment in human capital, and human wealth.

Our system of U.S. national accounts includes a production account that divides the national product between investment and consumption and divides national factor input between the services of human and nonhuman capital. The system also includes an income and expenditure account that divides income between compensation for human and nonhuman capital services and divides expenditures between saving and current consumption. Changes in wealth are divided between investment and revaluation of human and nonhuman capital in an accumulation account. The system is completed by a wealth account incorporating human and nonhuman wealth.

As a basis for comparison of measurements of human capital based on lifetime labor incomes with alternative approaches, we can compare our estimates of human wealth and investment in human capital with those of Kendrick (1976). Like Machlup (1962), Nordhaus and Tobin (1972), Schultz (1961), and others, Kendrick employs costs of education, including earnings forgone by students, as a basis for measuring investment through education. He employs costs of rearing as a basis

for measuring investment through addition of new members of the population. Since his estimates of human capital are based on costs of education and rearing rather than lifetime labor incomes, he omits the value of nonmarket activities from his estimates of human capital. Our estimates of human capital are much larger than those of Kendrick. Our estimates of nonhuman wealth are also higher than Kendrick's, and our estimates of total wealth are much higher than his.⁷

5.3 Production

In implementing our production account for the United States, we limit our attention to the private domestic sector of the U.S. economy, following Fraumeni and Jorgenson (1980). The total product of the private domestic sector of the U.S. economy includes investment in human and nonhuman capital and consumption of market and nonmarket goods and services. We add to consumption of market goods and services, as defined by Fraumeni and Jorgenson, our estimates of consumption of nonmarket goods and services. Similarly, we add to their estimates of investment in nonhuman capital our estimates of investment in human capital.

The value of total product is equal to the value of total factor outlay for the production account. Total factor outlay in the U.S. economy includes market labor compensation for activities involving employment through the labor market and nonmarket labor compensation for activities resulting in investment in education and direct consumption of labor services. We add to market labor compensation, as defined by Fraumeni and Jorgenson (1986), our estimates of the value of nonmarket labor compensation. We incorporate their estimates of property compensation into our factor outlay account.

We present the production account in current prices for the private domestic sector of the U.S. economy for the year 1982 in table 5.1. We first observe that the value of time spent in household production and leisure, which is assigned to consumption, is larger than the gross private domestic product, as defined by Fraumeni and Jorgenson. The value of investment in human capital is comparable in magnitude to gross private domestic product. Considering the value of time spent in household production and leisure and investment in human capital together, we find that outlay on human capital services is more than twice the size of gross private domestic factor outlay, as defined by Fraumeni and Jorgenson.

Our next objective is to allocate the value of total product for the private domestic sector of the U.S. economy between consumption and investment for the period 1948–84. We first estimate the value of

Table 5.1 **Production Account, Gross Private Domestic Product and Factor Outlay, United States, 1982 (billions of current dollars)**

Product		
1.	Private gross national product (table 1.7, line 1 minus line 12)	2,822.1
2.	- Compensation of employees in government enterprises (table 6.4, lines 81, 86)	39.6
3.	- Rest-of-the-world gross national product (table 1.7, line 15)	51.2
4.	- Federal indirect business tax and nontax accruals (table 3.2, line 9)	48.1
5.	+ Capital stock tax (table 3.1, n. 2)	. . .
6.	- State and local indirect business tax and nontax accruals (table 3.3, line 7)	210.8
7.	+ Business motor vehicle licenses (table 3.5, line 25)	2.1
8.	+ Business property taxes (table 3.3, line 9)	85.3
9.	+ Business other taxes (table 3.5, lines 26, 27)	14.8
10.	+ Subsidies less current surplus of federal government enterprises (table 3.2, line 27)	16.0
11.	+ Subsidies less current surplus of state and local government enterprises (table 3.3, line 22)	- 7.3
12.	+ Imputation for nonhuman capital services	<u>338.7</u>
13.	= Gross private domestic product	2,921.9
14.	+ Time in household production and leisure	3,944.5
15.	+ Investment in human capital	<u>4,568.6</u>
16.	= Full gross private domestic product	11,435.0
Factor Outlay		
1.	Capital consumption allowances (table 1.9, line 2)	383.2
2.	+ Business transfer payments (table 1.9, line 7)	14.3
3.	+ Statistical discrepancy (table 1.9, line 8)	- .1
4.	+ Certain indirect business taxes (product account above, 5 + 7 + 8 + 9)	102.2
5.	+ Income originating in business (table 1.12, line 14)	2,010.6
6.	- Compensation of employees in government enterprises (table 6.4, lines 81, 86)	39.6
7.	+ Income originating in households and institutions (table 1.12, line 19)	112.7
8.	+ Imputation for nonhuman capital services	<u>338.7</u>
9.	= Gross private domestic factor outlay	2,921.9
10.	+ Imputations for human capital services (14 + 15 above)	<u>8,513.1</u>
11.	= Full gross private domestic factor outlay	11,435.0

Note: All table references are to the NIPA tables in the March 1986 *Survey of Current Business*, with the exception of capital stock tax, which refers to Bureau of Economic Analysis (1966).

investment in human and nonhuman capital for all years. The value of investment in human capital is equal to the value of investment in education and the value of new members of the population resulting from births and migration. Our estimates of investment in nonhuman capital are based on those of Fraumeni and Jorgenson. We present estimates of investment in human capital, investment in nonhuman

capital, and full investment in current prices in table 5.2 and in constant prices in table 5.3.

The value of investment in human capital is by far the largest part of full investment, varying from 0.812 to 0.869 as a proportion of investment during the period 1948–84. The share of investment in nonhuman capital fell over the period from 0.166 in 1948 to 0.131 in 1971. The nonhuman share then rose to 0.167 in 1984, almost the same level as in 1948. The price of investment in human capital has risen much more rapidly than the price of investment in nonhuman capital. By

Table 5.2 Full Investment (billions of current dollars)

Year	Full Investment	Human Investment	Nonhuman Investment	Human Share	Nonhuman Share
1948	471.0	392.9	78.1	.834	.166
1949	488.4	415.5	72.9	.851	.149
1950	536.5	441.3	95.2	.823	.177
1951	587.8	477.2	110.5	.812	.188
1952	619.9	508.9	111.0	.821	.179
1953	679.9	563.7	116.3	.829	.171
1954	720.7	607.6	113.0	.843	.157
1955	768.1	635.9	132.3	.828	.172
1956	816.7	678.6	138.1	.831	.169
1957	896.4	755.2	141.2	.843	.157
1958	951.4	819.5	132.0	.861	.139
1959	997.4	846.5	150.9	.849	.151
1960	1,034.5	884.7	149.8	.855	.145
1961	1,102.9	952.5	150.4	.864	.136
1962	1,163.8	996.1	167.7	.856	.144
1963	1,209.6	1,031.3	178.3	.853	.147
1964	1,331.1	1,140.5	190.6	.857	.143
1965	1,406.9	1,193.2	213.7	.848	.152
1966	1,504.6	1,268.3	236.3	.843	.157
1967	1,596.1	1,355.7	240.4	.849	.151
1968	1,728.5	1,466.7	261.8	.849	.151
1969	1,864.0	1,582.9	281.0	.849	.151
1970	2,074.1	1,796.2	277.9	.866	.134
1971	2,335.9	2,029.6	306.3	.869	.131
1972	2,413.7	2,068.3	345.5	.857	.143
1973	2,568.9	2,170.2	398.7	.845	.155
1974	2,809.0	2,397.1	411.9	.853	.147
1975	3,143.7	2,722.2	421.5	.866	.134
1976	3,316.0	2,817.4	498.5	.850	.150
1977	3,626.9	3,047.3	579.6	.840	.160
1978	3,794.1	3,121.1	673.0	.823	.177
1979	4,287.2	3,545.2	741.9	.827	.173
1980	4,724.9	3,974.7	750.1	.841	.159
1981	5,129.4	4,289.4	839.9	.836	.164
1982	5,354.4	4,568.6	785.8	.853	.147
1983	5,701.5	4,843.1	858.4	.849	.151
1984	6,153.2	5,123.2	1,030.0	.833	.167

Table 5.3 Full Investment (billions of constant dollars)

Year	Full Investment		Human Investment		Nonhuman Investment	
	Quantity	Price	Quantity	Price	Quantity	Price
1949	2,899.1	.168	2,669.1	.156	282.0	.259
1950	3,025.0	.177	2,686.5	.164	353.8	.269
1951	3,144.1	.187	2,756.9	.173	389.3	.284
1952	3,207.0	.193	2,812.6	.181	396.8	.280
1953	3,293.1	.206	2,878.3	.196	414.0	.281
1954	3,349.0	.215	2,956.1	.206	400.5	.282
1955	3,487.9	.220	3,032.9	.210	450.0	.294
1956	3,552.8	.230	3,106.6	.218	446.1	.310
1957	3,658.0	.245	3,226.6	.234	439.3	.321
1958	3,706.2	.257	3,312.7	.247	412.5	.320
1959	3,805.1	.262	3,356.2	.252	458.0	.330
1960	3,872.9	.267	3,438.3	.257	448.9	.334
1961	3,991.1	.276	3,556.0	.268	452.6	.332
1962	4,091.0	.284	3,606.4	.276	495.2	.339
1963	4,209.2	.287	3,694.2	.279	523.0	.341
1964	4,338.5	.307	3,790.0	.301	553.9	.344
1965	4,402.0	.320	3,797.7	.314	604.2	.354
1966	4,443.3	.339	3,786.3	.335	652.6	.362
1967	4,508.5	.354	3,851.1	.352	653.3	.368
1968	4,625.5	.374	3,941.8	.372	679.2	.385
1969	4,767.4	.391	4,072.2	.389	690.9	.407
1970	4,876.0	.425	4,218.3	.426	654.6	.425
1971	5,020.9	.465	4,335.4	.468	682.4	.449
1972	5,010.3	.482	4,268.6	.485	741.0	.466
1973	5,066.4	.507	4,240.4	.512	829.1	.481
1974	5,045.1	.557	4,253.6	.564	792.4	.520
1975	5,046.8	.623	4,323.7	.630	718.7	.587
1976	5,124.4	.647	4,328.4	.651	794.7	.627
1977	5,286.1	.686	4,418.0	.690	868.6	.667
1978	5,385.0	.705	4,447.7	.702	938.0	.718
1979	5,434.5	.789	4,487.8	.790	947.3	.783
1980	5,439.3	.869	4,560.3	.872	878.7	.854
1981	5,468.9	.938	4,575.7	.937	892.9	.941
1982	5,354.4	1.000	4,568.6	1.000	785.8	1.000
1983	5,395.4	1.057	4,543.7	1.066	853.4	1.006
1984	5,501.4	1.118	4,510.4	1.136	1,002.9	1.027

contrast, investment in human capital has grown much more slowly than investment in nonhuman capital. Investment in human capital reached a peak in 1971 that was not surpassed until 1977. The level of investment in human capital in 1984 was below the peak for the period as a whole, which was reached in 1981.

Our final step in allocating the value of total product of the private sector of the U.S. economy between consumption and investment for

the period 1948–84 is to estimate the value of consumption for all years. The value of full consumption is equal to the value of consumption of market goods and services plus the value of nonmarket consumption in the form of time spent in household production and leisure. Our estimates of consumption of market goods and services are based on those of Fraumeni and Jorgenson. We present estimates of full consumption, investment, and product in current prices in table 5.4 and

Table 5.4 Full Gross Private Domestic Product (billions of current dollars)

Year	Full Product	Full Consumption	Full Investment	Consumption Share	Investment Share
1948	988.4	517.4	471.0	.523	.477
1949	1,037.7	549.3	488.4	.529	.471
1950	1,113.3	576.8	536.5	.518	.482
1951	1,203.0	615.2	587.8	.511	.489
1952	1,262.8	642.9	619.9	.509	.491
1953	1,379.3	699.4	679.9	.507	.493
1954	1,462.0	741.3	720.7	.507	.493
1955	1,531.8	763.6	768.1	.499	.501
1956	1,617.5	800.8	816.7	.495	.505
1957	1,759.1	862.7	896.4	.490	.510
1958	1,877.6	926.2	951.4	.493	.507
1959	1,951.5	954.2	997.4	.489	.511
1960	2,027.8	993.3	1,034.5	.490	.510
1961	2,162.8	1,059.9	1,102.9	.490	.510
1962	2,273.7	1,109.9	1,163.8	.488	.512
1963	2,360.4	1,150.8	1,209.6	.488	.512
1964	2,587.4	1,256.2	1,331.1	.486	.514
1965	2,765.8	1,358.9	1,406.9	.491	.509
1966	2,980.1	1,475.5	1,504.6	.495	.505
1967	3,168.4	1,572.4	1,596.1	.496	.504
1968	3,401.3	1,672.8	1,728.5	.492	.508
1969	3,651.7	1,787.7	1,864.0	.490	.510
1970	4,056.9	1,982.8	2,074.1	.489	.511
1971	4,538.8	2,202.9	2,335.9	.485	.515
1972	4,785.5	2,371.8	2,413.7	.496	.504
1973	5,184.1	2,615.1	2,568.9	.504	.496
1974	5,670.2	2,861.2	2,809.0	.505	.495
1975	6,335.6	3,191.9	3,143.7	.504	.496
1976	6,790.7	3,474.7	3,316.0	.512	.488
1977	7,382.5	3,755.7	3,626.9	.509	.491
1978	7,911.4	4,117.3	3,794.1	.520	.480
1979	8,918.2	4,631.0	4,287.2	.519	.481
1980	9,731.1	5,006.2	4,724.9	.514	.486
1981	10,620.7	5,491.4	5,129.4	.517	.483
1982	11,435.0	6,080.6	5,354.4	.532	.468
1983	12,272.2	6,570.7	5,701.5	.535	.465
1984	13,254.7	7,101.5	6,153.2	.536	.464

in constant prices in table 5.5. The share of consumption in total product is almost the same as the share of investment, falling from 0.523 in 1948 to a low of 0.485 in 1971 and rising to a peak of 0.536 in 1984 at the end of the period. The price of investment has risen more rapidly than the price of consumption. By contrast, investment has grown more slowly than consumption.

Table 5.5 Full Gross Private Domestic Product (billions of constant dollars)

Year	Full Product		Full Consumption		Full Investment	
	Quantity	Price	Quantity	Price	Quantity	Price
1949	5,597.2	.185	2,696.7	.204	2,899.1	.168
1950	5,755.8	.193	2,736.6	.211	3,025.0	.177
1951	5,944.0	.202	2,809.1	.219	3,144.1	.187
1952	6,062.9	.208	2,865.2	.224	3,207.0	.193
1953	6,234.7	.221	2,950.5	.237	3,293.1	.206
1954	6,321.0	.231	2,982.3	.249	3,349.0	.215
1955	6,524.7	.235	3,051.4	.250	3,487.9	.220
1956	6,648.6	.243	3,110.6	.257	3,552.8	.230
1957	6,830.7	.258	3,188.7	.271	3,658.0	.245
1958	6,943.8	.270	3,252.6	.285	3,706.2	.257
1959	7,105.9	.275	3,317.3	.288	3,805.1	.262
1960	7,240.1	.280	3,383.7	.294	3,872.9	.267
1961	7,464.4	.290	3,490.1	.304	3,991.1	.276
1962	7,643.6	.297	3,570.3	.311	4,091.0	.284
1963	7,858.7	.300	3,667.9	.314	4,209.2	.287
1964	8,101.9	.319	3,782.4	.332	4,338.5	.307
1965	8,280.5	.334	3,895.2	.349	4,402.0	.320
1966	8,444.5	.353	4,014.5	.368	4,443.3	.339
1967	8,620.3	.368	4,123.3	.381	4,508.5	.354
1968	8,833.0	.385	4,219.7	.396	4,625.5	.374
1969	9,060.5	.403	4,306.9	.415	4,767.4	.391
1970	9,286.4	.437	4,424.0	.448	4,876.0	.425
1971	9,561.0	.475	4,554.2	.484	5,020.9	.465
1972	9,700.9	.493	4,701.3	.504	5,010.3	.482
1973	9,848.5	.526	4,791.9	.546	5,066.4	.507
1974	9,929.0	.571	4,890.0	.585	5,045.1	.557
1975	10,129.2	.625	5,085.7	.628	5,046.8	.623
1976	10,345.4	.656	5,223.9	.665	5,124.4	.647
1977	10,643.1	.694	5,360.3	.701	5,286.1	.686
1978	10,872.9	.728	5,490.7	.750	5,385.0	.705
1979	11,027.5	.805	5,638.3	.821	5,434.5	.789
1980	11,223.5	.867	5,783.3	.866	5,439.3	.869
1981	11,375.0	.934	5,905.6	.930	5,468.9	.938
1982	11,435.0	1.000	6,080.6	1.000	5,354.4	1.000
1983	11,584.5	1.059	6,189.0	1.062	5,395.4	1.057
1984	11,811.5	1.122	6,310.0	1.125	5,501.4	1.118

We next analyze changes in the structure of full gross private domestic product for the U.S. economy over the period 1948–84. We present growth rates of full product, investment, and consumption for the period as a whole and for eight subperiods in table 5.6. We give growth rates for each measure of output in current and constant prices and a growth rate for the corresponding price index. We also provide growth rates for each output measure in per capita terms.

The growth rate of full investment was at its maximum during the period 1948–53 at 3.19 percent per year. The growth rate of investment per capita was only 0.54 percent per year for the period as a whole and was negative for the last of the eight subperiods. By contrast, the growth rate of full consumption per capita was positive for all eight subperiods with a rising trend, reaching a maximum in the period 1973–79 at 1.87 percent. The growth rate of full product showed little trend through 1960–66 after an initial burst of growth in full product at 2.70 percent per year in 1948–53. Since 1966, the growth rate of full product has gradually declined, exhibiting the much-discussed slowdown in U.S. economic growth.

Our next objective is to allocate the value of total factor outlay for the private domestic sector of the U.S. economy between labor and property services for the period 1948–84. We first estimate the value of outlay on the services of human capital for all years. The value of outlay on the services of human capital is the sum of outlay on market and nonmarket labor activities. Our estimates of market labor outlays are based on those of Fraumeni and Jorgenson. We present estimates of market labor outlay, nonmarket labor outlay, and full labor outlay in current prices in table 5.7 and in constant prices in table 5.8. The share of nonmarket labor outlay has been by far the largest part of labor outlay, varying relatively little from 0.835 at the beginning of the postwar period. The prices of market and nonmarket labor outlay move in parallel throughout the period, as do the corresponding quantities.

We combine our estimates of the services of human capital with estimates of the services of nonhuman capital, which are based on those of Fraumeni and Jorgenson. We present the value of full factor outlay, property outlay, and labor outlay in current prices in table 5.9 and in constant prices in table 5.10. Labor has had a predominant share in full factor outlay, averaging around 90 percent throughout the period. The share of property has averaged close to 10 percent, rising slightly from 0.112 at the beginning of the period to 0.119 at the end of the period. The price of labor outlay has risen relative to the price of property outlay, while capital services have risen relative to labor services. Capital services have grown more rapidly than output throughout the period.

Table 5.6 Full Gross Private Domestic Product, Rates of Growth, 1949–84

	1949–84	1949–53	1953–57	1957–60	1960–66	1966–69	1969–73	1973–79	1979–84
Full product:									
Current prices	7.28	7.11	6.08	4.74	6.42	6.77	8.76	9.04	7.93
Constant prices	2.13	2.70	2.28	1.94	2.56	2.35	2.08	1.95	1.29
Constant prices per capita	.84	1.04	.51	.13	1.11	1.25	1.12	1.11	.24
Price index	5.15	4.45	3.87	2.73	3.86	4.42	6.66	7.09	6.64
Full investment:									
Current prices	7.24	8.27	6.91	4.78	6.24	7.14	8.02	8.54	7.23
Constant prices	1.83	3.19	2.63	1.90	2.29	2.35	1.52	1.17	.24
Constant prices per capita	.54	1.52	.86	.10	.84	1.25	.55	.33	-.80
Price index	5.42	5.10	4.33	2.87	3.98	4.76	6.50	7.37	6.97
Full consumption:									
Current prices	7.31	6.04	5.25	4.70	6.60	6.40	9.51	9.52	8.55
Constant prices	2.43	2.25	1.94	1.98	2.85	2.34	2.67	2.71	2.25
Constant prices per capita	1.13	.59	.17	.17	1.40	1.25	1.70	1.87	1.20
Price index	4.88	3.75	3.35	2.72	3.74	4.01	6.86	6.80	6.30

Table 5.7 Full Labor Outlay (billions of current dollars)

Year	Full Labor Outlay	Market Labor Outlay	Nonmarket Labor Outlay	Market Share	Nonmarket Share
1948	877.6	144.8	732.8	.165	.835
1949	929.5	144.1	785.3	.155	.845
1950	988.6	156.9	831.7	.159	.841
1951	1,062.7	180.5	882.2	.170	.830
1952	1,123.4	194.1	929.3	.173	.827
1953	1,235.2	208.9	1,026.3	.169	.831
1954	1,316.8	209.9	1,106.9	.159	.841
1955	1,360.7	219.2	1,141.5	.161	.839
1956	1,445.7	234.7	1,211.0	.162	.838
1957	1,585.2	250.6	1,334.6	.158	.842
1958	1,710.0	257.2	1,452.8	.150	.850
1959	1,756.6	270.1	1,486.5	.154	.846
1960	1,832.8	282.7	1,550.1	.154	.846
1961	1,961.8	292.4	1,669.3	.149	.851
1962	2,052.4	309.8	1,742.6	.151	.849
1963	2,118.4	320.5	1,797.9	.151	.849
1964	2,321.5	339.5	1,982.0	.146	.854
1965	2,465.1	363.0	2,102.1	.147	.853
1966	2,655.7	401.7	2,254.1	.151	.849
1967	2,838.7	427.3	2,411.4	.151	.849
1968	3,056.5	470.7	2,585.8	.154	.846
1969	3,296.7	519.1	2,777.6	.157	.843
1970	3,698.9	556.2	3,142.6	.150	.850
1971	4,145.7	594.2	3,551.5	.143	.857
1972	4,342.8	652.7	3,690.2	.150	.850
1973	4,706.6	745.2	3,961.4	.158	.842
1974	5,181.2	816.1	4,365.1	.158	.842
1975	5,763.2	858.8	4,904.4	.149	.851
1976	6,139.3	957.3	5,181.9	.156	.844
1977	6,630.6	1,063.0	5,567.6	.160	.840
1978	7,068.3	1,214.7	5,853.5	.172	.828
1979	8,010.9	1,375.3	6,635.6	.172	.828
1980	8,758.3	1,493.9	7,264.4	.171	.829
1981	9,485.9	1,635.5	7,850.4	.172	.828
1982	10,205.1	1,692.0	8,513.1	.166	.834
1983	10,908.4	1,790.5	9,117.8	.164	.836
1984	11,682.8	1,968.6	9,714.1	.169	.831

To analyze changes in the structure of gross private domestic factor outlay, we present growth rates of full factor output, labor outlay, and property outlay for the period 1948–84 and for eight subperiods in table 5.11. The growth rate of labor input or full labor outlay at constant prices was only slightly greater than the growth of population. The per capita

Table 5.8 Full Labor Outlay (billions of constant dollars)

Year	Full Labor Outlay		Market Labor Outlay		Nonmarket Outlay	
	Quantity	Price	Quantity	Price	Quantity	Price
1949	5,739.7	.162	1,000.7	.144	4,743.8	.166
1950	5,808.1	.170	1,031.5	.152	4,783.8	.174
1951	5,939.0	.179	1,087.3	.166	4,862.6	.181
1952	6,042.6	.186	1,108.3	.175	4,945.5	.188
1953	6,150.2	.201	1,100.2	.190	5,059.5	.203
1954	6,253.9	.211	1,084.5	.194	5,176.4	.214
1955	6,381.8	.213	1,119.4	.196	5,270.7	.217
1956	6,509.0	.222	1,144.2	.205	5,373.5	.225
1957	6,675.1	.237	1,141.7	.220	5,539.6	.241
1958	6,786.4	.252	1,099.9	.234	5,687.5	.255
1959	6,885.2	.255	1,140.0	.237	5,748.2	.259
1960	7,031.9	.261	1,166.2	.242	5,868.9	.264
1961	7,208.8	.272	1,150.6	.254	6,057.9	.276
1962	7,329.5	.280	1,183.3	.262	6,147.0	.283
1963	7,476.7	.283	1,191.6	.269	6,284.7	.286
1964	7,620.4	.305	1,196.7	.284	6,422.2	.309
1965	7,708.4	.320	1,238.4	.293	6,470.9	.325
1966	7,779.6	.341	1,275.3	.315	6,507.6	.346
1967	7,919.3	.358	1,286.4	.332	6,635.2	.363
1968	8,101.1	.377	1,322.2	.356	6,781.7	.381
1969	8,331.4	.396	1,371.5	.379	6,963.6	.399
1970	8,535.9	.433	1,353.8	.411	7,183.0	.438
1971	8,728.4	.475	1,328.5	.447	7,397.1	.480
1972	8,784.8	.494	1,384.1	.472	7,400.8	.499
1973	8,867.1	.531	1,443.4	.516	7,425.8	.533
1974	8,990.3	.576	1,458.5	.560	7,533.8	.579
1975	9,132.7	.631	1,405.9	.611	7,726.1	.635
1976	9,269.8	.662	1,461.2	.655	7,808.8	.664
1977	9,493.2	.698	1,527.9	.696	7,965.7	.699
1978	9,674.1	.731	1,632.3	.744	8,041.5	.728
1979	9,851.9	.813	1,672.3	.822	8,179.2	.811
1980	10,037.7	.873	1,692.9	.882	8,344.5	.871
1981	10,150.4	.935	1,718.3	.952	8,431.7	.931
1982	10,205.1	1.000	1,692.0	1.000	8,513.1	1.000
1983	10,254.0	1.064	1,710.4	1.047	8,543.6	1.067
1984	10,324.7	1.132	1,794.2	1.097	8,532.6	1.138

growth rate of labor input was only 0.38 per year for the period as a whole. This growth rate was negative or zero for two of the eight subperiods.

The growth rate of capital input or full property outlay at constant prices exceeded the growth of population by a considerable margin. The per capita growth rate of capital input was 2.02 percent per year. This growth rate was positive throughout the period. The growth rate of total input, full factor outlay in constant prices, is a weighted average

Table 5.9 Full Gross Private Domestic Factor Outlay (billions of current dollars)

Year	Full Factor Outlay	Full Property Outlay	Full Labor Outlay	Property Share	Labor Share
1948	988.4	110.8	877.6	.112	.888
1949	1,037.7	108.3	929.5	.104	.896
1950	1,113.3	124.7	988.6	.112	.888
1951	1,203.0	140.3	1,062.7	.117	.883
1952	1,262.8	139.4	1,123.4	.110	.890
1953	1,379.3	144.1	1,235.2	.104	.896
1954	1,462.0	145.2	1,316.8	.099	.901
1955	1,531.8	171.1	1,360.7	.112	.888
1956	1,617.5	171.8	1,445.7	.106	.894
1957	1,759.1	173.9	1,585.2	.099	.901
1958	1,877.6	167.6	1,710.0	.089	.911
1959	1,951.5	195.0	1,756.6	.100	.900
1960	2,027.8	195.0	1,832.8	.096	.904
1961	2,162.8	201.0	1,961.8	.093	.907
1962	2,273.7	221.3	2,052.4	.097	.903
1963	2,360.4	242.0	2,118.4	.103	.897
1964	2,587.4	265.9	2,321.5	.103	.897
1965	2,765.8	300.7	2,465.1	.109	.891
1966	2,980.1	324.4	2,655.7	.109	.891
1967	3,168.4	329.8	2,838.7	.104	.896
1968	3,401.3	344.8	3,056.5	.101	.899
1969	3,651.7	354.9	3,296.7	.097	.903
1970	4,056.9	358.0	3,698.9	.088	.912
1971	4,538.8	393.1	4,145.7	.087	.913
1972	4,785.5	442.7	4,342.8	.092	.908
1973	5,184.1	477.5	4,706.6	.092	.908
1974	5,670.2	489.0	5,181.2	.086	.914
1975	6,335.6	572.3	5,763.2	.090	.910
1976	6,790.7	651.4	6,139.3	.096	.904
1977	7,382.5	752.0	6,630.6	.102	.898
1978	7,911.4	843.2	7,068.3	.107	.893
1979	8,918.2	907.3	8,010.9	.102	.898
1980	9,731.1	972.7	8,758.3	.100	.900
1981	10,620.7	1,134.9	9,485.9	.107	.893
1982	11,435.0	1,229.9	10,205.1	.108	.892
1983	12,272.2	1,363.8	10,908.4	.111	.889
1984	13,254.7	1,571.9	11,682.8	.119	.881

of growth rates of labor and capital inputs and averaged 0.55 per year in per capita terms for the period as a whole.

Comparing the growth rates of input and output, we find that output grew at 2.13 percent per year for the period as a whole and that input grew at 1.84 percent. Input growth has accounted for 86 percent of output growth. This proportion has increased in recent subperiods. For

Table 5.10 Full Gross Domestic Factor Outlay (billions of constant dollars)

Year	Full Factor Outlay		Property Outlay		Labor Outlay	
	Quantity	Price	Quantity	Price	Quantity	Price
1949	6,081.7	.171	399.0	.271	5,739.7	.162
1950	6,170.2	.180	413.5	.302	5,808.1	.170
1951	6,334.3	.190	437.8	.320	5,939.0	.179
1952	6,464.5	.195	457.5	.305	6,042.6	.186
1953	6,586.8	.209	470.4	.306	6,150.2	.201
1954	6,706.3	.218	484.4	.300	6,253.9	.211
1955	6,847.2	.224	496.8	.344	6,381.8	.213
1956	7,001.9	.231	519.0	.331	6,509.0	.222
1957	7,188.8	.245	538.2	.323	6,675.1	.237
1958	7,317.7	.257	554.4	.302	6,786.4	.252
1959	7,423.3	.263	561.7	.347	6,885.2	.255
1960	7,587.1	.267	578.1	.337	7,031.9	.261
1961	7,777.2	.278	591.9	.340	7,208.8	.272
1962	7,910.1	.287	604.0	.366	7,329.5	.280
1963	8,075.3	.292	621.1	.390	7,476.7	.283
1964	8,241.1	.314	640.9	.415	7,620.4	.305
1965	8,357.3	.331	664.0	.453	7,708.4	.320
1966	8,466.7	.352	694.0	.467	7,779.6	.341
1967	8,645.3	.366	727.2	.453	7,919.3	.358
1968	8,857.9	.384	755.5	.456	8,101.1	.377
1969	9,120.3	.400	786.1	.452	8,331.4	.396
1970	9,359.4	.433	819.7	.437	8,535.9	.433
1971	9,577.8	.474	845.7	.465	8,728.4	.475
1972	9,664.5	.495	875.9	.505	8,784.8	.494
1973	9,785.1	.530	914.0	.522	8,867.1	.531
1974	9,953.7	.570	961.4	.509	8,990.3	.576
1975	10,130.2	.625	997.6	.574	9,132.7	.631
1976	10,288.3	.660	1,018.8	.639	9,269.8	.662
1977	10,543.0	.700	1,050.2	.716	9,493.2	.698
1978	10,764.6	.735	1,090.2	.773	9,674.1	.731
1979	10,988.1	.812	1,135.5	.799	9,851.9	.813
1980	11,214.6	.868	1,176.8	.827	10,037.7	.873
1981	11,353.6	.935	1,203.2	.943	10,150.4	.935
1982	11,435.0	1.000	1,229.9	1.000	10,205.1	1.000
1983	11,502.6	1.067	1,248.5	1.092	10,254.0	1.064
1984	11,597.4	1.143	1,271.7	1.236	10,324.7	1.132

example, input growth was 99 percent of output growth in the period 1973–79 and 84 percent in 1979–84.

5.4 Income and Expenditure

In this section, we integrate the estimates of income and expenditure associated with market activities by Fraumeni and Jorgenson (1980) with our estimates of income and expenditure for nonmarket activities.

Table 5.11 Gross Private National Labor and Property Income, Rates of Growth, 1949–84

	1949–84	1949–53	1953–57	1957–60	1960–66	1966–69	1969–73	1973–79	1979–84
Full factor outlay:									
Current prices	7.28	7.11	6.08	4.74	6.42	6.77	8.76	9.04	7.93
Constant prices	1.84	1.99	2.19	1.80	1.83	2.48	1.76	1.93	1.08
Constant prices ^a	.55	.33	.41	–.01	.38	1.38	.79	1.09	.03
Price index	5.43	5.02	3.97	2.87	4.61	4.26	7.04	7.11	6.84
Full labor outlay:									
Current prices	7.23	7.11	6.24	4.84	6.18	7.21	8.90	8.86	7.55
Constant prices	1.68	1.73	2.05	1.74	1.68	2.28	1.56	1.76	.94
Constant prices ^a	.38	.07	.28	–.07	.23	1.19	.59	.91	–.11
Price index	5.55	5.39	4.12	3.22	4.46	4.98	7.33	7.10	6.62
Full property outlay:	7.64	7.14	4.70	3.82	8.48	3.00	7.42	10.70	10.99
Current prices									
Constant prices	3.31	4.12	3.37	2.38	3.05	4.15	3.77	3.62	2.27
Constant prices ^a	2.02	2.45	1.59	.58	1.59	3.06	2.80	2.77	1.22
Price index	4.34	3.04	1.35	1.41	5.44	–1.09	3.60	7.09	8.73

^aThis data calculated on a per capita basis.

Following Fraumeni and Jorgenson, we present accounts for the private national sector of the U.S. economy. The income of the private national sector includes compensation for the services of human and nonhuman capital in the private domestic sector, the government sector, and the rest of the world. Income from the services of human capital for the private national sector includes all incomes generated from human capital for individuals in the U.S. population.

The value of income is equal to the value of expenditure for the income and expenditure account. Expenditure in the U.S. economy includes the consumption of market and nonmarket goods and services and saving in the form of human and nonhuman capital. We add to the consumption of market goods and services, as defined by Fraumeni and Jorgenson, our estimates of the value of consumption of nonmarket goods and services. Similarly, we add to estimates of saving in the form of nonhuman capital by Fraumeni and Jorgenson our estimates of saving in the form of human capital.

We present the income side of the income and expenditure account in current prices for the private national sector of the U.S. economy for the year 1982 in table 5.12. We have estimated labor compensation after taxes for individual workers cross-classified by sex, single year of education, and single year of age. Labor compensation after taxes is the sum of labor compensation for all groups of individual workers. For market labor compensation, we estimate personal income taxes attributed to labor income by the methods of Jorgenson and Yun (1986). Income tax not allocated to labor income is allocated to property income to obtain property compensation after taxes. Following Fraumeni and Jorgenson, we treat social insurance funds as part of the private sector of the U.S. national economy. Contributions to social insurance are included and transfers from social insurance funds excluded from labor income. Property income includes the investment income of social insurance funds, less transfers to general government by these funds.

Our next objective is to allocate the value of income for the private national sector of the U.S. economy between labor and property income for the period 1948–84. We first estimate the value of compensation for market and nonmarket labor activities for all years. The value of labor compensation for nonmarket activities is equal to the value of time spent in household production and leisure and the value of time spent on investment in human capital. Our estimates of market labor compensation after taxes are based on those of Fraumeni and Jorgenson. We present estimates of market labor income, nonmarket labor income, and full labor income in current prices in table 5.13 and in constant prices in table 5.14.

The share of nonmarket labor income is far larger than that of market labor income, varying from 0.817 to 0.842 as a proportion of full labor

Table 5.12 Gross Private National Labor and Property Income, 1982 (billions of current dollars)

Labor Income		
1.	Private domestic outlay for labor services (table 6.4, line 3, plus our imputation for proprietors)	1,692.0
2.	+ Income originating in general government (table 1.7, line 12)	343.9
3.	+ Compensation of employees in government enterprises (table 6.4, lines 81, 86)	39.6
4.	+ Compensation of employees, rest of world (table 6.4, line 87)	- .1
5.	- Personal income taxes attributed to labor income (our imputation)	<u>263.1</u>
6.	= Private national labor income	1,812.3
7.	+ Nonmarket labor income	<u>8,513.1</u>
8.	= Full private national labor income	10,325.4
Property Income		
1.	Gross private domestic outlay for capital services (our imputation)	1,229.9
2.	+ Corporate profits and net interest, rest of world (table 6.1, line 82)	51.2
3.	+ Investment income of social insurance funds less transfers to general government (table 3.13, lines 7, 9, 18, 20)	33.0
4.	+ Net interest paid by government (table 1.9, line 16 plus line 12, minus table 3.1, line 18, and table 2.1, line 28)	39.0
5.	- Corporate profits tax liability (tables 3.2, line 6, and 3.3, line 6)	63.0
6.	- Business property taxes (table 3.5, lines 24, 25, 26, 27)	102.2
7.	- Personal income taxes attributed to property income (our imputation)	85.4
8.	- Federal estate and gift taxes (table 3.2, line 4)	7.6
9.	- State and local estate and gift taxes (table 3.4, line 11)	2.6
10.	- State and local personal motor vehicle licenses, property taxes, and other taxes (table 3.4, lines 12, 13, 14)	<u>7.3</u>
11.	= Gross private national property income	1,085.1

Note: All table references are to the NIPA tables in the March 1986 *Survey of Current Business*.

income during the period 1948–84. The share of market labor income is nearly constant over the period. The prices of market and nonmarket components of labor income have risen in proportion with a slightly greater increase in the price of nonmarket income since around 1958.

Our final step in allocating the value of income for the private national sector of the U.S. economy between labor and property income for the period 1948–84 is to estimate the value of property compensation for all years. Our estimates of property compensation are based on those of Fraumeni and Jorgenson. We present estimates of full labor income, property income, and income in current prices in table 5.15 and in constant prices in table 5.16. The property share of national income has risen from a minimum of 0.066 in 1974 to a maximum for the period as a whole of 0.107 in 1984.

The price of property income rose less rapidly than the price of labor income until around 1960. The price of property income then fell during

Table 5.13 Full Labor Income (billions of current dollars)

Year	Full Labor Income	Market Labor Income	Nonmarket Labor Income	Market Share	Nonmarket Share
1948	884.2	151.4	732.8	.171	.829
1949	940.5	155.2	785.3	.165	.835
1950	1,000.5	168.9	831.7	.169	.831
1951	1,073.8	191.7	882.2	.178	.822
1952	1,134.6	205.4	929.3	.181	.819
1953	1,246.3	220.0	1,026.3	.177	.823
1954	1,331.6	224.7	1,106.9	.169	.831
1955	1,375.4	233.9	1,141.5	.170	.830
1956	1,460.2	249.2	1,211.0	.171	.829
1957	1,600.7	266.2	1,334.6	.166	.834
1958	1,729.3	276.5	1,452.8	.160	.840
1959	1,775.6	289.1	1,486.5	.163	.837
1960	1,852.8	302.7	1,550.1	.163	.837
1961	1,984.6	315.3	1,669.3	.159	.841
1962	2,076.5	333.8	1,742.6	.161	.839
1963	2,144.6	346.7	1,797.9	.162	.838
1964	2,355.3	373.3	1,982.0	.159	.841
1965	2,500.2	398.1	2,102.1	.159	.841
1966	2,694.1	440.1	2,254.1	.163	.837
1967	2,881.9	470.5	2,411.4	.163	.837
1968	3,100.7	514.9	2,585.8	.166	.834
1969	3,339.0	561.4	2,777.6	.168	.832
1970	3,756.1	613.4	3,142.6	.163	.837
1971	4,216.1	664.5	3,551.5	.158	.842
1972	4,410.1	719.9	3,690.2	.163	.837
1973	4,781.5	820.1	3,961.4	.172	.828
1974	5,258.3	893.1	4,365.1	.170	.830
1975	5,864.1	959.7	4,904.4	.164	.836
1976	6,239.6	1,057.6	5,181.9	.170	.830
1977	6,730.2	1,162.6	5,567.6	.173	.827
1978	7,166.3	1,312.8	5,853.5	.183	.817
1979	8,102.0	1,466.5	6,635.6	.181	.819
1980	8,858.3	1,593.9	7,264.4	.180	.820
1981	9,583.9	1,733.5	7,850.4	.181	.819
1982	10,325.4	1,812.4	8,513.1	.176	.824
1983	11,055.7	1,937.9	9,117.8	.175	.825
1984	11,840.4	2,126.3	9,714.1	.180	.820

the period 1966–69 and resumed its rise during 1969–73. Since that time, the price of property income has been rising more rapidly with a substantial acceleration, relative to the price of labor income, after 1979. The stability of the share of property income through 1980 was the consequence of a steady increase in property income relative to labor income in constant prices. Property income in constant prices

Table 5.14 Full Labor Income (billions of constant dollars)

Year	Full Labor Income		Market Labor Income		Nonmarket Labor Income	
	Quantity	Price	Quantity	Price	Quantity	Price
1949	5,692.5	.165	948.0	.164	4,743.8	.166
1950	5,774.5	.173	990.4	.171	4,783.8	.174
1951	5,900.3	.182	1,037.5	.185	4,862.6	.181
1952	6,013.7	.189	1,067.7	.192	4,945.5	.188
1953	6,146.3	.203	1,086.4	.202	5,059.5	.203
1954	6,260.3	.213	1,083.1	.207	5,176.4	.214
1955	6,369.1	.216	1,097.5	.213	5,270.7	.217
1956	6,490.3	.225	1,115.8	.223	5,373.5	.225
1957	6,660.5	.240	1,119.6	.238	5,539.6	.241
1958	6,809.8	.254	1,120.4	.247	5,687.5	.255
1959	6,894.3	.258	1,144.4	.253	5,748.2	.259
1960	7,056.7	.263	1,186.6	.255	5,868.9	.264
1961	7,244.0	.274	1,183.7	.266	6,057.9	.276
1962	7,368.1	.282	1,219.1	.274	6,147.0	.283
1963	7,522.8	.285	1,235.8	.281	6,284.7	.286
1964	7,686.1	.306	1,261.6	.296	6,422.2	.309
1965	7,768.0	.322	1,295.7	.307	6,470.9	.325
1966	7,855.2	.343	1,348.3	.326	6,507.6	.346
1967	8,010.2	.360	1,375.8	.342	6,635.2	.363
1968	8,186.9	.379	1,406.0	.366	6,781.7	.381
1969	8,402.5	.397	1,439.7	.390	6,963.6	.399
1970	8,636.6	.435	1,453.6	.422	7,183.0	.438
1971	8,858.5	.476	1,460.1	.455	7,397.1	.480
1972	8,889.5	.496	1,488.3	.484	7,400.8	.499
1973	8,966.5	.533	1,540.9	.532	7,425.8	.533
1974	9,097.8	.578	1,564.2	.571	7,533.8	.579
1975	9,313.6	.630	1,587.3	.605	7,726.1	.635
1976	9,429.8	.662	1,621.3	.652	7,808.8	.664
1977	9,624.0	.699	1,658.6	.701	7,965.7	.699
1978	9,765.6	.734	1,723.4	.762	8,041.5	.728
1979	9,903.9	.818	1,725.1	.850	8,179.2	.811
1980	10,073.8	.879	1,730.9	.921	8,344.5	.871
1981	10,213.6	.938	1,782.2	.973	8,431.7	.931
1982	10,325.4	1.000	1,812.4	1.000	8,513.1	1.000
1983	10,401.6	1.063	1,858.3	1.043	8,543.6	1.067
1984	10,443.1	1.134	1,911.9	1.112	8,532.6	1.138

corresponds to the services of physical or nonhuman capital, while labor income corresponds to the services of human capital.

We next analyze the structure of full private national income over the postwar period. In table 5.17 we present growth rates of full income, labor income, and property income for the period 1949–84 and for eight subperiods. We give growth rates for each measure of income in current

Table 5.15 Full Private National Income (billions of current dollars)

Year	Full Income	Full Property Income	Full Labor Income	Property Share	Labor Share
1948	974.8	90.6	884.2	.093	.907
1949	1,030.7	90.2	940.5	.087	.913
1950	1,096.9	96.4	1,000.5	.088	.912
1951	1,180.3	106.5	1,073.8	.090	.910
1952	1,242.0	107.4	1,134.6	.086	.914
1953	1,356.3	110.1	1,246.3	.081	.919
1954	1,445.2	113.6	1,331.6	.079	.921
1955	1,509.2	133.8	1,375.4	.089	.911
1956	1,592.9	132.7	1,460.2	.083	.917
1957	1,735.0	134.3	1,600.7	.077	.923
1958	1,858.9	129.6	1,729.3	.070	.930
1959	1,926.5	150.9	1,775.6	.078	.922
1960	2,002.8	150.1	1,852.8	.075	.925
1961	2,138.0	153.4	1,984.6	.072	.928
1962	2,247.7	171.2	2,076.5	.076	.924
1963	2,332.8	188.2	2,144.6	.081	.919
1964	2,565.4	210.1	2,355.3	.082	.918
1965	2,739.3	239.1	2,500.2	.087	.913
1966	2,950.6	256.5	2,694.1	.087	.913
1967	3,141.8	259.9	2,881.9	.083	.917
1968	3,364.3	263.6	3,100.7	.078	.922
1969	3,605.2	266.2	3,339.0	.074	.926
1970	4,029.9	273.8	3,756.1	.068	.932
1971	4,517.6	301.6	4,216.1	.067	.933
1972	4,749.3	339.2	4,410.1	.071	.929
1973	5,149.4	367.9	4,781.5	.071	.929
1974	5,632.3	374.0	5,258.3	.066	.934
1975	6,319.3	455.2	5,864.1	.072	.928
1976	6,756.8	517.3	6,239.5	.077	.923
1977	7,331.1	600.9	6,730.2	.082	.918
1978	7,846.5	680.2	7,166.3	.087	.913
1979	8,846.1	744.1	8,102.0	.084	.916
1980	9,666.9	808.6	8,858.3	.084	.916
1981	10,555.8	972.0	9,583.9	.092	.908
1982	11,410.5	1,085.1	10,325.4	.095	.905
1983	12,268.7	1,212.9	11,055.7	.099	.901
1984	13,251.8	1,411.4	11,840.4	.107	.893

and constant prices and in per capita terms. The growth rate of national income in constant prices was positive throughout the period, averaging 1.89 percent per year. The growth rate of property income in constant prices was considerably greater than that of labor income. The growth rate of property income averaged 3.64 percent per year, while the growth rate of labor income averaged only 1.73 percent.

Table 5.16 Full Private National Income (billions of constant dollars)

Year	Full Income		Property Income		Labor Income	
	Quantity	Price	Quantity	Price	Quantity	Price
1949	6,013.2	.171	338.6	.266	5,692.5	.165
1950	6,110.8	.180	350.6	.275	5,774.5	.173
1951	6,243.7	.189	358.1	.297	5,900.3	.182
1952	6,367.0	.195	367.2	.292	6,013.7	.189
1953	6,511.1	.208	377.8	.291	6,146.3	.203
1954	6,638.8	.218	389.9	.291	6,260.3	.213
1955	6,761.8	.223	402.1	.333	6,369.1	.216
1956	6,896.3	.231	413.8	.321	6,490.3	.225
1957	7,076.3	.245	424.0	.317	6,660.5	.240
1958	7,238.2	.257	436.2	.297	6,809.8	.254
1959	7,333.4	.263	446.0	.338	6,894.3	.258
1960	7,504.8	.267	455.4	.330	7,056.7	.263
1961	7,700.4	.278	464.5	.330	7,244.0	.274
1962	7,836.4	.287	475.9	.360	7,368.1	.282
1963	8,007.2	.291	490.7	.384	7,522.8	.285
1964	8,187.1	.313	506.0	.415	7,686.1	.306
1965	8,295.0	.330	526.7	.454	7,768.0	.322
1966	8,409.4	.351	548.3	.468	7,855.2	.343
1967	8,595.2	.366	574.6	.452	8,010.2	.360
1968	8,806.3	.382	605.4	.436	8,186.9	.379
1969	9,049.6	.398	631.6	.421	8,402.5	.397
1970	9,304.2	.433	651.7	.420	8,636.6	.435
1971	9,553.2	.473	678.9	.444	8,858.5	.476
1972	9,614.8	.494	710.8	.477	8,889.5	.496
1973	9,717.0	.530	736.7	.499	8,966.5	.533
1974	9,881.6	.570	772.6	.484	9,097.8	.578
1975	10,130.2	.624	807.0	.564	9,313.6	.630
1976	10,302.8	.656	867.9	.596	9,429.8	.662
1977	10,540.1	.696	913.0	.658	9,624.0	.699
1978	10,711.6	.733	943.4	.721	9,765.6	.734
1979	10,877.8	.813	971.8	.766	9,903.9	.818
1980	11,076.1	.873	1,001.0	.808	10,073.8	.879
1981	11,257.5	.938	1,043.8	.931	10,213.6	.938
1982	11,410.5	1.000	1,085.1	1.000	10,325.4	1.000
1983	11,552.4	1.062	1,151.1	1.054	10,401.6	1.063
1984	11,655.9	1.137	1,212.6	1.164	10,443.1	1.134

To complete the income and expenditure account for the private national sector of the U.S. economy, we add government transfer payments to persons, other than benefits from social insurance funds, to full national income to obtain national receipts. To allocate the value of receipts between consumption and saving, we first estimate the value of full consumption. Full consumption is the sum of the consumption of market goods and services, as defined by Fraumeni and Jorgenson,

Table 5.17 Full Private National Income Rates of Growth, 1949–84

	1949–84	1949–53	1953–57	1957–60	1960–66	1966–69	1969–73	1973–79	1979–84
Full national income:									
Current prices	7.30	6.86	6.16	4.78	6.46	6.68	8.91	9.02	8.08
Constant prices	1.89	1.99	2.08	1.96	1.90	2.45	1.78	1.88	1.38
Constant prices ^a	.60	.33	.31	.15	.45	1.35	.81	1.04	.33
Price index	5.41	4.90	4.09	2.87	4.56	4.19	7.16	7.13	6.71
Full labor income:									
Current prices	7.24	7.04	6.26	4.88	6.24	7.15	8.98	8.79	7.59
Constant prices	1.73	1.92	2.01	1.93	1.79	2.25	1.62	1.66	1.06
Constant prices ^a	.44	.26	.24	.12	.34	1.15	.66	.81	.01
Price index	5.51	5.18	4.19	3.05	4.43	4.87	7.36	7.14	6.53
Full property income:									
Current prices	7.86	4.98	4.97	3.71	8.93	1.24	8.09	11.74	12.80
Constant prices	3.64	2.74	2.88	2.38	3.09	4.71	3.85	4.62	4.43
Constant prices ^a	2.35	1.08	1.11	.57	1.64	3.62	2.88	3.77	3.38
Price index	4.22	2.25	2.14	1.34	5.82	-3.53	4.25	7.14	8.37

^aThis data calculated on a per capita basis.

and our estimates of the value of household production and leisure. Next, we estimate the value of full savings. Full saving is the sum of saving in the form of nonhuman capital, again as defined by Fraumeni and Jorgenson, and our estimates of saving in the form of human capital. We present estimates of full receipts and expenditures for the year 1982 in table 5.18.

Our next objective is to allocate the value of full receipts for the private national sector of the U.S. economy between consumption and

Table 5.18 **Gross Private National Receipts and Expenditures, 1982 (billions of current dollars)**

Receipts		
1.	Gross private domestic factor outlay	2,921.9
2.	+ Income originating in general government (table 1.7, line 12)	343.9
3.	+ Compensation of employees in government enterprises (table 6.4, lines 81, 86)	39.6
4.	+ Income originating in rest of world (table 6.1, line 82)	51.2
5.	+ Investment income of social insurance funds (table 3.13, lines 7, 18)	39.9
6.	- Transfer to general government from social insurance funds (table 3.13, lines 9, 20)	6.9
7.	+ Net interest paid by government (table 1.9, line 16 plus line 12, minus table 3.1, line 18, and table 2.1, line 28)	39.0
8.	- Corporate profits tax liability (tables 3.2, line 6, and 3.3, line 6)	63.0
9.	- Business property taxes (table 3.5, lines 24, 25, 26, 27)	102.2
10.	- Personal tax and nontax payments (table 2.1, line 24)	409.3
11.	+ Personal nontax payments (tables 3.4, lines 8, 15)	43.5
12.	= Gross private national income	2,897.5
13.	+ Nonmarket labor income	8,513.1
14.	= Full gross private national income	11,410.7
15.	+ Government transfer payment to persons other than benefits from social insurance funds (table 3.11, lines 1, 3, 29)	99.6
16.	= Full gross private national consumer receipts	11,510.3
Expenditures		
1.	Personal consumption expenditures (table 1.1, line 2)	2,050.7
2.	- Personal consumption expenditures, durable goods (table 1.1, line 3)	252.7
3.	+ Imputation for nonhuman capital services	338.7
4.	= Private national consumption expenditure	2,136.7
5.	+ Consumption of nonmarket goods and services	3,944.5
6.	= Full private national consumption expenditure	6,081.2
7.	+ Personal transfer payments to foreigners (table 2.1, line 29)	1.3
8.	+ Personal nontax payments (table 3.4, lines 8, 15)	43.5
9.	= Full private national consumer outlays	6,126.0
10.	+ Full gross private national saving ^a	5,384.4
11.	= Full private national expenditures	11,510.3

Note: All table references are to the NIPA tables in the March 1986 *Survey of Current Business*.

^aSee table 5.26, line 14, below.

saving for the period 1948–84. We first estimate the value of consumer outlays for all years. We present estimates of market consumer outlays, nonmarket consumer outlays, and full consumer outlays in current prices in table 5.19 and in constant prices in table 5.20. The value of consumer outlays in nonmarket goods and services predominates in consumer outlays, averaging around 65 percent of outlays over the period 1948–84. The market share of full consumer outlays reached a

Table 5.19 Full Consumer Outlays (billions of current dollars)

Year	Full Consumer Outlays	Market Consumer Outlays	Nonmarket Consumer Outlays	Market Share	Nonmarket Share
1948	522.0	182.1	339.9	.349	.651
1949	553.6	183.8	369.9	.332	.668
1950	585.9	195.6	390.4	.334	.666
1951	620.1	215.1	404.9	.347	.653
1952	647.8	227.5	420.3	.351	.649
1953	702.0	239.3	462.6	.341	.659
1954	747.5	248.3	499.3	.332	.668
1955	770.6	265.0	505.6	.344	.656
1956	808.8	276.3	532.5	.342	.658
1957	868.8	289.5	579.3	.333	.667
1958	933.1	299.8	633.3	.321	.679
1959	962.3	322.3	640.0	.335	.665
1960	1,000.6	335.3	665.3	.335	.665
1961	1,065.6	348.8	716.8	.327	.673
1962	1,115.3	368.8	746.5	.331	.669
1963	1,157.0	390.4	766.6	.337	.663
1964	1,263.0	421.6	841.5	.334	.666
1965	1,366.6	457.6	909.0	.335	.665
1966	1,480.7	495.0	985.7	.334	.666
1967	1,575.7	520.0	1,055.7	.330	.670
1968	1,678.9	559.8	1,119.1	.333	.667
1969	1,797.8	603.1	1,194.7	.335	.665
1970	1,998.8	652.4	1,346.5	.326	.674
1971	2,220.6	698.7	1,521.9	.315	.685
1972	2,390.8	768.9	1,621.9	.322	.678
1973	2,634.3	843.0	1,791.2	.320	.680
1974	2,888.1	920.1	1,968.1	.319	.681
1975	3,213.3	1,031.1	2,182.2	.321	.679
1976	3,510.6	1,146.1	2,364.5	.326	.674
1977	3,800.6	1,280.3	2,520.3	.337	.663
1978	4,162.2	1,429.8	2,732.5	.344	.656
1979	4,685.4	1,595.1	3,090.3	.340	.660
1980	5,064.9	1,775.2	3,289.7	.350	.650
1981	5,550.6	1,989.6	3,561.0	.358	.642
1982	6,126.0	2,181.5	3,944.5	.356	.644
1983	6,635.5	2,360.9	4,274.7	.356	.644
1984	7,184.5	2,593.6	4,590.9	.361	.639

Table 5.20 Full Consumer Outlays (billions of constant dollars)

Year	Full Consumer Outlays		Market Consumer Outlays		Nonmarket Consumer Outlays	
	Quantity	Price	Quantity	Price	Quantity	Price
1949	2,727.1	.203	695.9	.264	2,076.9	.178
1950	2,784.7	.210	725.5	.270	2,098.9	.186
1951	2,828.5	.219	751.8	.286	2,110.1	.192
1952	2,885.0	.225	776.1	.293	2,138.2	.197
1953	2,958.2	.237	799.9	.299	2,186.7	.212
1954	3,014.8	.248	816.4	.304	2,226.8	.224
1955	3,091.4	.249	864.6	.306	2,246.1	.225
1956	3,152.1	.257	891.8	.310	2,276.4	.234
1957	3,223.8	.269	915.1	.316	2,324.3	.249
1958	3,295.0	.283	926.6	.324	2,386.5	.265
1959	3,363.7	.286	971.9	.332	2,404.2	.266
1960	3,424.6	.292	992.8	.338	2,443.7	.272
1961	3,523.3	.302	1,020.0	.342	2,515.8	.285
1962	3,606.9	.309	1,061.7	.347	2,554.6	.292
1963	3,701.4	.313	1,103.1	.354	2,605.3	.294
1964	3,815.9	.331	1,169.7	.360	2,648.0	.318
1965	3,932.4	.348	1,242.2	.368	2,687.9	.338
1966	4,044.1	.366	1,305.9	.379	2,733.8	.361
1967	4,152.6	.379	1,351.6	.385	2,796.1	.378
1968	4,258.3	.394	1,400.5	.400	2,852.6	.392
1969	4,358.2	.413	1,446.9	.417	2,905.6	.411
1970	4,487.3	.445	1,501.3	.435	2,980.4	.452
1971	4,621.9	.480	1,538.3	.454	3,077.4	.495
1972	4,771.3	.501	1,623.7	.474	3,144.0	.516
1973	4,875.9	.540	1,680.2	.502	3,194.0	.561
1974	4,964.4	.582	1,673.9	.550	3,285.3	.599
1975	5,151.4	.624	1,739.9	.593	3,406.3	.641
1976	5,312.1	.661	1,826.1	.628	3,483.1	.679
1977	5,460.0	.696	1,908.5	.671	3,550.5	.710
1978	5,584.0	.745	1,989.1	.719	3,596.0	.760
1979	5,729.4	.818	2,039.2	.782	3,691.1	.837
1980	5,841.7	.867	2,058.4	.862	3,783.5	.869
1981	5,962.0	.931	2,106.5	.944	3,855.6	.924
1982	6,126.0	1.000	2,181.5	1.000	3,944.5	1.000
1983	6,256.6	1.061	2,257.0	1.046	3,999.9	1.069
1984	6,398.0	1.123	2,378.5	1.090	4,022.1	1.141

minimum of 0.315 in 1971 and has risen to a maximum of 0.361 in 1984 at the end of the period, a rise of 15 percent; however, there is almost no trend in this share for the period as a whole. The price of nonmarket consumer outlays has increased more rapidly than the price of market outlays. Constancy of the market share has been maintained by a more rapid growth at market consumer outlays in constant prices.

We combine our estimates of saving in the form of human capital with estimates of saving in the form of nonhuman capital, based on those of Fraumeni and Jorgenson, to obtain the value of full saving. We present estimates of saving in the form of human capital, saving in the form of nonhuman capital, and full saving in current prices in table 5.21 and constant prices in table 5.22. The share of saving in the form of human capital greatly predominates, ranging from 0.881 in 1961 to 0.829 in 1984, a very modest decline. The price of saving in the form

Table 5.21 Full Gross Private National Saving (billions of current dollars)

Year	Full Saving	Nonhuman Saving	Human Saving	Nonhuman Share	Human Share
1948	460.3	67.4	392.9	.146	.854
1949	483.8	68.3	415.5	.141	.859
1950	518.6	77.3	441.3	.149	.851
1951	566.4	89.2	477.2	.157	.843
1952	600.2	91.3	508.9	.152	.848
1953	660.7	97.0	563.7	.147	.853
1954	704.1	96.5	607.6	.137	.863
1955	745.2	109.3	635.9	.147	.853
1956	791.0	112.4	678.6	.142	.858
1957	873.5	118.3	755.2	.135	.865
1958	933.9	114.4	819.5	.122	.878
1959	971.9	125.4	846.5	.129	.871
1960	1,010.4	125.7	884.7	.124	.876
1961	1,081.2	128.7	952.5	.119	.881
1962	1,141.4	145.3	996.1	.127	.873
1963	1,185.3	154.0	1,031.3	.130	.870
1964	1,312.7	172.2	1,140.5	.131	.869
1965	1,384.0	190.8	1,193.2	.138	.862
1966	1,482.0	213.7	1,268.3	.144	.856
1967	1,580.8	225.1	1,355.7	.142	.858
1968	1,702.7	236.0	1,466.7	.139	.861
1969	1,827.9	245.0	1,582.9	.134	.866
1970	2,056.0	259.8	1,796.2	.126	.874
1971	2,327.6	298.0	2,029.6	.128	.872
1972	2,392.7	324.4	2,068.3	.136	.864
1973	2,553.2	383.0	2,170.2	.150	.850
1974	2,789.8	392.7	2,397.1	.141	.859
1975	3,163.1	440.9	2,722.2	.139	.861
1976	3,306.7	489.3	2,817.4	.148	.852
1977	3,593.1	545.8	3,047.3	.152	.848
1978	3,752.7	631.6	3,121.1	.168	.832
1979	4,236.1	690.9	3,545.2	.163	.837
1980	4,691.4	716.7	3,974.7	.153	.847
1981	5,102.5	813.1	4,289.4	.159	.841
1982	5,384.4	815.8	4,568.6	.152	.848
1983	5,739.7	896.6	4,843.1	.156	.844
1984	6,178.7	1,055.5	5,123.2	.171	.829

Table 5.22 Full Gross Private National Saving (billions of constant dollars)

Year	Full Saving		Nonhuman Saving		Human Saving	
	Quantity	Price	Quantity	Price	Quantity	Price
1949	2,864.8	.169	239.5	.285	2,669.1	.156
1950	2,975.7	.174	299.4	.258	2,686.5	.164
1951	3,044.3	.186	301.2	.296	2,756.9	.173
1952	3,073.8	.195	287.4	.318	2,812.6	.181
1953	3,155.4	.209	300.3	.323	2,878.3	.196
1954	3,224.9	.218	298.0	.324	2,956.1	.206
1955	3,373.2	.221	350.3	.312	3,032.9	.210
1956	3,433.0	.230	343.2	.328	3,106.6	.218
1957	3,537.6	.247	336.7	.351	3,226.6	.234
1958	3,589.4	.260	315.6	.363	3,312.7	.247
1959	3,691.5	.263	360.2	.348	3,356.2	.252
1960	3,761.6	.269	353.7	.355	3,438.3	.257
1961	3,873.3	.279	352.8	.365	3,556.0	.268
1962	3,973.6	.287	392.8	.370	3,606.4	.276
1963	4,091.6	.290	419.0	.368	3,694.2	.279
1964	4,229.9	.310	455.7	.378	3,790.0	.301
1965	4,297.6	.322	506.2	.377	3,797.7	.314
1966	4,336.2	.342	549.4	.389	3,786.3	.335
1967	4,402.9	.359	552.1	.408	3,851.1	.352
1968	4,514.8	.377	572.6	.412	3,941.8	.372
1969	4,654.6	.393	582.6	.420	4,072.2	.389
1970	4,789.1	.429	572.9	.453	4,218.3	.426
1971	4,963.6	.469	629.0	.474	4,335.4	.468
1972	4,944.6	.484	676.9	.479	4,268.6	.485
1973	5,003.0	.510	764.6	.501	4,240.4	.512
1974	4,973.5	.561	720.9	.545	4,253.6	.564
1975	5,019.2	.630	696.2	.633	4,323.7	.630
1976	5,076.7	.651	748.6	.654	4,328.4	.651
1977	5,216.0	.689	798.5	.684	4,418.0	.690
1978	5,305.7	.707	857.6	.737	4,447.7	.702
1979	5,350.5	.792	862.2	.801	4,487.8	.790
1980	5,379.2	.872	818.9	.875	4,560.3	.872
1981	5,430.2	.940	854.3	.952	4,575.7	.937
1982	5,384.4	1.000	815.8	1.000	4,568.6	1.000
1983	5,428.9	1.057	886.8	1.011	4,543.7	1.066
1984	5,527.8	1.118	1,028.4	1.026	4,510.4	1.136

of human capital has risen more rapidly than the price of nonhuman saving, but the growth of nonhuman saving in constant prices has been much more rapid than the growth of human saving.

We combine our estimates of full consumer outlays with our estimates of saving in the form of human and nonhuman capital to obtain the value of full expenditures. We present estimates of full consumer outlays, saving, and expenditures in current prices in table 5.23 and in

Table 5.23 Full Private National Expenditures (billions of current dollars)

Year	Full Expenditures	Full Consumer Outlays	Full Saving	Outlays Share	Saving Share
1948	982.3	522.0	460.3	.531	.469
1949	1,037.4	553.6	483.8	.534	.466
1950	1,104.5	585.9	518.6	.530	.470
1951	1,186.5	620.1	566.4	.523	.477
1952	1,248.0	647.8	600.2	.519	.481
1953	1,362.6	702.0	660.7	.515	.485
1954	1,451.7	747.5	704.1	.515	.485
1955	1,515.8	770.6	745.2	.508	.492
1956	1,599.7	808.8	791.0	.506	.494
1957	1,742.3	868.8	873.5	.499	.501
1958	1,867.0	933.1	933.9	.500	.500
1959	1,934.2	962.3	971.9	.498	.502
1960	2,011.0	1,000.6	1,010.4	.498	.502
1961	2,146.8	1,065.6	1,081.2	.496	.504
1962	2,256.7	1,115.3	1,141.4	.494	.506
1963	2,342.3	1,157.0	1,185.3	.494	.506
1964	2,575.7	1,263.0	1,312.7	.490	.510
1965	2,750.5	1,366.6	1,384.0	.497	.503
1966	2,962.7	1,480.7	1,482.0	.500	.500
1967	3,156.5	1,575.7	1,580.8	.499	.501
1968	3,381.6	1,678.9	1,702.7	.496	.504
1969	3,625.7	1,797.8	1,827.9	.496	.504
1970	4,054.8	1,998.8	2,056.0	.493	.507
1971	4,548.2	2,220.6	2,327.6	.488	.512
1972	4,783.5	2,390.8	2,392.7	.500	.500
1973	5,187.5	2,634.3	2,553.2	.508	.492
1974	5,677.9	2,888.1	2,789.8	.509	.491
1975	6,376.4	3,213.3	3,163.1	.504	.496
1976	6,817.3	3,510.6	3,306.7	.515	.485
1977	7,393.7	3,800.6	3,593.1	.514	.486
1978	7,914.9	4,162.2	3,752.7	.526	.474
1979	8,921.5	4,685.4	4,236.1	.525	.475
1980	9,756.3	5,064.9	4,691.4	.519	.481
1981	10,653.1	5,550.6	5,102.5	.521	.479
1982	11,510.3	6,126.0	5,384.4	.532	.468
1983	12,375.3	6,635.5	5,739.7	.536	.464
1984	13,363.2	7,184.5	6,178.7	.538	.462

constant prices in table 5.24. The share of consumer outlays slightly predominates in full expenditures for most of the period, ranging from 0.490 in 1964 to 0.538 in 1984. The share of saving has trended downward since 1970. The price of saving has risen relative to the price of consumer outlays, but the growth rate of outlays in constant prices has been considerably greater than the growth rate of saving.

Table 5.24 Full Private National Expenditures (billions of constant dollars)

Year	Full Expenditures		Consumer Outlays		Full Saving	
	Quantity	Price	Quantity	Price	Quantity	Price
1949	5,592.9	.185	2,727.1	.203	2,864.8	.169
1950	5,756.8	.192	2,784.7	.210	2,975.7	.174
1951	5,867.3	.202	2,828.5	.219	3,044.3	.186
1952	5,955.5	.210	2,885.0	.225	3,073.8	.195
1953	6,110.0	.223	2,958.2	.237	3,155.4	.209
1954	6,235.4	.233	3,014.8	.248	3,224.9	.218
1955	6,456.3	.235	3,091.4	.249	3,373.2	.221
1956	6,576.9	.243	3,152.1	.257	3,433.0	.230
1957	6,751.8	.258	3,223.8	.269	3,537.6	.247
1958	6,875.7	.272	3,295.0	.283	3,589.4	.260
1959	7,045.2	.275	3,363.7	.286	3,691.5	.263
1960	7,175.9	.280	3,424.6	.292	3,761.6	.269
1961	7,385.8	.291	3,523.3	.302	3,873.3	.279
1962	7,569.1	.298	3,606.9	.309	3,973.6	.287
1963	7,780.8	.301	3,701.4	.313	4,091.6	.290
1964	8,032.8	.321	3,815.9	.331	4,229.9	.310
1965	8,218.8	.335	3,932.4	.348	4,297.6	.322
1966	8,371.8	.354	4,044.1	.366	4,336.2	.342
1967	8,548.3	.369	4,152.6	.379	4,402.9	.359
1968	8,765.7	.386	4,258.3	.394	4,514.8	.377
1969	9,004.4	.403	4,358.2	.413	4,654.6	.393
1970	9,267.8	.438	4,487.3	.445	4,789.1	.429
1971	9,576.2	.475	4,621.9	.480	4,963.6	.469
1972	9,709.0	.493	4,771.3	.501	4,944.6	.484
1973	9,873.1	.525	4,875.9	.540	5,003.0	.510
1974	9,934.8	.572	4,964.4	.582	4,973.5	.561
1975	10,168.4	.627	5,151.4	.624	5,019.2	.630
1976	10,386.6	.656	5,312.1	.661	5,076.7	.651
1977	10,673.7	.693	5,460.0	.696	5,216.0	.689
1978	10,887.9	.727	5,584.0	.745	5,305.7	.707
1979	11,080.0	.805	5,729.4	.818	5,350.5	.792
1980	11,221.6	.869	5,841.7	.867	5,379.2	.872
1981	11,392.7	.935	5,962.0	.931	5,430.2	.940
1982	11,510.3	1.000	6,126.0	1.000	5,384.4	1.000
1983	11,685.5	1.059	6,256.6	1.061	5,428.9	1.057
1984	11,925.9	1.121	6,398.0	1.123	5,527.8	1.118

We next analyze the structure of full private national expenditures by presenting growth rates of full expenditures, consumer outlays, and saving in current and constant prices for the period 1948–84 and for eight subperiods in table 5.25. We also give growth rates of expenditures, outlays, and saving in constant prices per capita. The growth rate of consumer outlays per capita averaged 1.14 percent per year for

Table 5.25 Full Private National Expenditures, Rates of Growth, 1949–84

	1949–84	1949–53	1953–57	1957–60	1960–66	1966–69	1969–73	1973–79	1979–84
Full expenditures:									
Current prices	7.30	6.82	6.15	4.78	6.46	6.73	8.96	9.04	8.08
Constant prices	2.16	2.21	2.50	2.03	2.57	2.43	2.30	1.92	1.47
Constant prices ^a	.87	.55	.73	.22	1.12	1.33	1.33	1.08	.42
Price index	5.15	4.67	3.64	2.73	3.91	4.32	6.61	7.12	6.62
Full consumer outlays:									
Current prices	7.32	5.94	5.33	4.71	6.53	6.47	9.55	9.60	8.55
Constant prices	2.44	2.03	2.15	2.01	2.77	2.49	2.81	2.69	2.21
Constant prices ^a	1.14	.37	.38	.21	1.32	1.40	1.84	1.85	1.16
Price index	4.89	3.87	3.17	2.73	3.76	4.03	6.70	6.92	6.34
Full saving:									
Current prices	7.28	7.79	6.98	4.85	6.38	6.99	8.35	8.44	7.55
Constant prices	1.88	2.42	2.86	2.05	2.37	2.36	1.80	1.12	.65
Constant prices ^a	.58	.75	1.09	.24	.92	1.26	.84	.28	-.40
Price index	5.40	5.31	4.18	2.84	4.00	4.63	6.52	7.34	6.89

^aThis data calculated on a per capita basis.

the period as a whole. Especially rapid growth has characterized the period since 1960, with only modest retardation after 1979. By contrast, the growth rate of saving per capita averaged only 0.58 percent per year for the period as a whole, with rapid growth in 1953–57 and 1966–69 and negative growth from 1979–84.

5.5 Accumulation and Wealth

Our final objective is to integrate our measures of saving in the form of human and nonhuman capital with measures of human and nonhuman wealth. For this purpose, we implement an accumulation account for the private national sector of the U.S. economy. This account includes saving in the form of human and nonhuman capital and depreciation on both forms of capital. Depreciation on human capital is due to aging, deaths, and emigration. Depreciation on nonhuman capital is due to deterioration and retirement of investment goods with age. The difference between saving and depreciation is the net saving of the private national sector.

The accumulation account also includes revaluation of human and nonhuman capital. Revaluation of human capital is due to changes in lifetime incomes for individuals of a given age, sex, and education. Revaluation of nonhuman capital is due to changes in asset values for investment goods of a given age. The change in the value of wealth from period to period is the sum of net saving and revaluation of capital. The value of saving in the form of human and nonhuman capital is equal to the value of capital formation in both forms. We add saving, depreciation, and revaluation in the form of nonhuman capital, as defined by Fraumeni and Jorgenson (1980), to our estimates of saving, depreciation, and revaluation in the form of human capital.

We present the accumulation account in current prices for the private national sector of the U.S. economy for the year 1982 in table 5.26. Human capital saving is very large by comparison with private national saving, which is very similar to the corresponding concept in the U.S. national accounts. Depreciation is a very large proportion of full gross private national saving, which includes human and nonhuman saving. Finally, in 1982, revaluation of human and nonhuman capital was far more important than net saving in the change in private national wealth. Saving in the accumulation account is equal to saving in the income and expenditure account; in the accumulation account saving is equal to capital formation.

Our next objective is to allocate change in wealth for the private national sector of the U.S. economy among revaluation, saving, and depreciation for the period 1948–84. We first estimate the value of saving and depreciation for all years. Our estimates of full gross saving,

Table 5.26 Gross Private National Capital Accumulation, 1982
(billions of current dollars)

Saving		
1.	Personal saving (table 5.1, line 3)	153.9
2.	+ Undistributed corporate profits (table 5.1, line 5)	39.6
3.	+ Corporate inventory valuation adjustment (table 5.1, line 6)	- 10.4
4.	+ Capital consumption adjustment (table 5.1, line 7)	- 9.2
5.	+ Corporate capital consumption allowances with capital consumption adjustment (table 5.1, line 8)	235.0
6.	+ Noncorporate capital consumption allowances with capital consumption adjustment (table 5.1, line 9)	148.2
7.	+ Private wage accruals less disbursements (table 5.1, line 10)	.0
8.	+ Personal consumption expenditures, durable goods (table 1.1, line 3)	252.7
9.	+ Surplus, social insurance funds (table 3.13, lines 11, 22)	6.1
10.	+ Government wage accruals less disbursements (table 3.2, line 30, and table 3.3, line 25)	.0
11.	+ Statistical discrepancy (table 1.9, line 8)	<u>- .1</u>
12.	= Gross private national saving	815.8
13.	+ Human capital saving	<u>4,568.6</u>
14.	= Full gross private national saving	5,384.4
15.	- Depreciation	<u>2,624.8</u>
16.	= Net private national saving	2,759.5
17.	+ Revaluation	<u>10,643.0</u>
18.	= Change in private national wealth	13,402.5
Capital Formation		
1.	Gross private domestic investment (table 1.1, line 6)	447.3
2.	+ Personal consumption expenditures, durable goods (table 1.1, line 3)	252.7
3.	+ Deficit of federal government (table 3.2, line 31)	145.9
4.	+ Deficit of state and local governments (table 3.3, line 26)	- 35.1
5.	- Deficit, federal social insurance funds (table 3.13, line 11)	30.8
6.	- Deficit, state and local social insurance funds (table 3.13, line 22)	- 36.9
7.	+ Wage accruals less disbursement, federal government (table 3.2, line 30)	.0
8.	+ Wage accruals less disbursement, state and local government (table 3.3, line 25)	.0
9.	+ Net foreign investment (table 5.1, line 17)	<u>- 1.0</u>
10.	= Gross private national capital formation	815.8
11.	+ Gross private national human capital formation	<u>4,568.6</u>
12.	= Full gross private national capital formation	5,384.4

Note: All table references are to the NIPA tables in the March 1986 *Survey of Current Business*.

net saving, and depreciation are given in current prices in table 5.27 and in constant prices in table 5.28. The share of net saving in gross saving has declined from 0.672 in 1964 to 0.503 in 1984. The share of depreciation has risen from 0.328 to 0.497 between these two years. The prices of net saving and depreciation are nearly proportional to each other so that the rise in the share of depreciation is due to a decline in net saving in constant prices from its peak level in 1971.

Table 5.27 Full Gross Private National Saving (billions of current dollars)

Year	Full Gross Saving	Full Net Saving	Depreciation	Net Share	Depreciation Share
1949	483.8	306.9	176.8	.634	.366
1950	518.6	327.6	191.0	.632	.368
1951	566.4	358.8	207.6	.634	.366
1952	600.2	379.7	220.5	.633	.367
1953	660.7	421.9	238.8	.639	.361
1954	704.1	451.3	252.8	.641	.359
1955	745.2	480.6	264.5	.645	.355
1956	791.0	508.5	282.4	.643	.357
1957	873.5	571.0	302.5	.654	.346
1958	933.9	614.7	319.2	.658	.342
1959	971.9	640.8	331.1	.659	.341
1960	1,010.4	670.4	340.1	.663	.337
1961	1,081.2	720.2	361.0	.666	.334
1962	1,141.4	762.8	378.6	.668	.332
1963	1,185.3	791.7	393.6	.668	.332
1964	1,312.7	882.7	430.0	.672	.328
1965	1,384.0	923.4	460.6	.667	.333
1966	1,482.0	980.1	501.9	.661	.339
1967	1,580.8	1,037.4	543.4	.656	.344
1968	1,702.7	1,109.1	593.6	.651	.349
1969	1,827.9	1,184.5	643.4	.648	.352
1970	2,056.0	1,339.9	716.1	.652	.348
1971	2,327.6	1,526.0	801.6	.656	.344
1972	2,392.7	1,515.0	877.7	.633	.367
1973	2,553.2	1,585.0	968.2	.621	.379
1974	2,789.8	1,689.6	1,100.2	.606	.394
1975	3,163.1	1,910.2	1,252.9	.604	.396
1976	3,306.7	1,929.9	1,376.9	.584	.416
1977	3,593.1	2,072.2	1,520.9	.577	.423
1978	3,752.7	2,099.5	1,653.2	.559	.441
1979	4,236.1	2,338.4	1,897.7	.552	.448
1980	4,691.4	2,514.9	2,176.5	.536	.464
1981	5,102.5	2,700.7	2,401.8	.529	.471
1982	5,384.4	2,759.5	2,624.8	.513	.487
1983	5,739.7	2,911.5	2,828.3	.507	.493
1984	6,178.7	3,107.6	3,071.0	.503	.497

Table 5.28 Full Gross Private National Saving (billions of constant dollars)

Year	Full Gross Saving		Full Net Saving		Full Depreciation	
	Quantity	Price	Quantity	Price	Quantity	Price
1949	2,864.6	.169	1,815.2	.169	1,073.1	.165
1950	2,975.5	.174	1,884.3	.174	1,105.7	.173
1951	3,044.2	.186	1,932.8	.186	1,136.3	.183
1952	3,073.6	.195	1,949.7	.195	1,157.2	.191
1953	3,155.3	.209	2,017.4	.209	1,174.0	.203
1954	3,224.7	.218	2,075.1	.217	1,190.6	.212
1955	3,373.1	.221	2,206.4	.218	1,202.7	.220
1956	3,432.9	.230	2,245.6	.226	1,224.3	.231
1957	3,537.5	.247	2,339.4	.244	1,241.5	.244
1958	3,589.4	.260	2,383.4	.258	1,255.2	.254
1959	3,691.4	.263	2,460.7	.261	1,266.3	.261
1960	3,761.5	.269	2,514.6	.267	1,279.7	.266
1961	3,873.2	.279	2,602.0	.277	1,305.0	.277
1962	3,973.5	.287	2,670.4	.286	1,326.3	.285
1963	4,091.4	.290	2,752.8	.288	1,353.2	.291
1964	4,229.7	.310	2,850.2	.310	1,384.8	.310
1965	4,297.4	.322	2,869.1	.322	1,423.9	.323
1966	4,336.0	.342	2,853.7	.343	1,473.0	.341
1967	4,402.6	.359	2,866.5	.362	1,526.8	.356
1968	4,514.6	.377	2,924.7	.379	1,579.9	.376
1969	4,654.4	.393	3,011.4	.393	1,634.4	.394
1970	4,788.8	.429	3,093.5	.433	1,689.2	.424
1971	4,963.3	.469	3,210.0	.475	1,746.4	.459
1972	4,944.4	.484	3,124.3	.485	1,816.9	.483
1973	5,002.8	.510	3,116.9	.508	1,893.3	.511
1974	4,973.3	.561	3,009.2	.561	1,978.7	.556
1975	5,019.1	.630	2,977.0	.642	2,056.3	.609
1976	5,076.5	.651	2,961.7	.652	2,130.0	.646
1977	5,215.8	.689	3,017.7	.687	2,212.1	.688
1978	5,305.6	.707	3,012.3	.697	2,306.7	.717
1979	5,350.3	.792	2,950.5	.793	2,407.0	.788
1980	5,379.0	.872	2,881.2	.873	2,498.1	.871
1981	5,430.0	.940	2,869.7	.941	2,560.4	.938
1982	5,384.2	1.000	2,759.3	1.000	2,624.8	1.000
1983	5,428.7	1.057	2,743.4	1.061	2,686.0	1.053
1984	5,527.6	1.118	2,773.5	1.120	2,755.1	1.115

Depreciation in constant prices has grown steadily throughout the post-war period.

We have analyzed the structure of full gross private national saving in table 5.29. We present gross saving, net saving, and depreciation in current and constant prices. We also give saving and depreciation in constant prices per capita. The growth rate of net saving in constant prices per capita has been slightly negative for the period as a whole.

Table 5.29 Full Gross Private National Saving, Rates of Growth, 1949–84

	1949–84	1949–53	1953–57	1957–60	1960–66	1966–69	1969–73	1973–79	1979–84
Full gross saving:									
Current prices	7.28	7.79	6.98	4.85	6.38	6.99	8.35	8.44	7.55
Constant prices	1.88	2.42	2.86	2.05	2.37	2.36	1.80	1.12	.65
Constant prices ^a	.58	.75	1.09	.24	.92	1.26	.84	.28	–.40
Price index	5.40	5.31	4.18	2.84	4.00	4.63	6.52	7.34	6.89
Full net saving:									
Current prices	6.61	7.96	7.57	5.35	6.33	6.31	7.28	6.48	5.69
Constant prices	1.21	2.64	3.70	2.41	2.11	1.79	.86	–.91	–1.24
Constant prices ^a	–.08	.98	1.93	.60	.66	.70	–.11	–1.76	–2.28
Price index	5.40	5.31	3.87	3.00	4.17	4.54	6.42	7.42	6.91
Full depreciation:									
Current prices	8.16	7.52	5.91	3.91	6.49	8.28	10.22	11.22	9.63
Constant prices	2.69	2.25	1.40	1.01	2.34	3.47	3.68	4.00	2.70
Constant prices ^a	1.40	.59	–.37	–.80	.89	2.37	2.71	3.16	1.65
Price index	5.46	5.18	4.60	2.88	4.14	4.82	6.50	7.22	6.94

^aThis data calculated on a per capita basis.

This growth rate was positive for the periods 1948–53 through 1966–69 and has been negative ever since. The growth rate of gross saving in constant prices per capita was only 0.58 percent per year for the period as a whole and has been negative for the period 1979–84.

The final step in integrating our measures of saving with measures of human and nonhuman wealth is the estimate of revaluation of human and nonhuman capital for all years. We present estimates of saving, depreciation, net saving, revaluation, and change in wealth for the period 1948–84 in table 5.30. Revaluation rose to a peak in 1979 and has declined since then. Both revaluation and change in wealth fluctuate substantially from period to period, reflecting variations in the rate of change of lifetime labor incomes and asset values from period to period. Revaluation has exceeded net capital formation as a proportion of change in wealth in every year since 1963.

We conclude our presentation of a new system of national accounts for the United States with an account for the wealth of the private national sector of the U.S. economy. The value of full wealth is the sum of nonhuman wealth, as defined by Fraumeni and Jorgenson (1980), and our estimate of human wealth. We present estimates of full wealth, human wealth, and nonhuman wealth for the year 1982 in table 5.31. The share of human wealth dwarfs the share of nonhuman wealth. We present estimates of full wealth, human wealth, and nonhuman wealth for the period 1948–84 in current prices in table 5.32 and in constant prices in table 5.33. The share of human wealth in full wealth ranges from 0.943 in 1971 to 0.921 in 1981. The price of human wealth rises more rapidly than that of nonhuman wealth so that constancy of the human share is due to the slower growth of human wealth in constant prices.

We have analyzed the structure of full private national wealth for the U.S. economy in table 5.34. We present growth rates of full wealth, human wealth, and nonhuman wealth in current and constant prices and constant prices per capita for the period 1949–84. The growth rate of human wealth per capita in constant prices has been only 0.49 percent per year during the postwar period. By contrast, the growth rate of nonhuman wealth per capita in constant prices has averaged 1.65 percent per year. The behavior of full wealth closely parallels that of human wealth, which greatly predominates in the total.

Our final objective is to compare our estimates of human and nonhuman wealth with those of Kendrick (1976). We have defined human wealth in terms of lifetime labor incomes for all individuals in the U.S. population. We have also incorporated nonmarket activities into our measures of lifetime income. These two innovations result in important differences between our estimates and those of Kendrick. Kendrick, following the classic studies of Machlup (1962) and Schultz (1961),

Table 5.30 Gross Private National Capital Accumulation (billions of current dollars)

Year	Gross Private National Saving	Depreciation	Net Capital Formation	Revaluation	Change in Wealth
1949	483.8	176.8	306.9	729.5	1,036.5
1950	518.6	191.0	327.6	739.5	1,067.1
1951	566.4	207.6	358.8	941.2	1,300.0
1952	600.2	220.5	379.7	623.3	1,003.0
1953	660.7	238.8	421.9	1,400.4	1,822.3
1954	704.1	252.8	451.3	798.5	1,249.8
1955	745.2	264.5	480.6	- 63.3	417.3
1956	791.0	282.4	508.5	927.5	1,436.1
1957	873.5	302.5	571.0	1,744.1	2,315.1
1958	933.9	319.2	614.7	1,783.9	2,398.6
1959	971.9	331.1	640.8	- 128.3	512.5
1960	1,010.4	340.1	670.4	838.7	1,509.1
1961	1,081.2	361.0	720.2	1,291.4	2,011.6
1962	1,141.4	378.6	762.8	743.3	1,506.1
1963	1,185.3	393.6	791.7	378.1	1,169.9
1964	1,312.7	430.0	882.7	2,360.0	3,242.7
1965	1,384.0	460.6	923.4	2,202.2	3,125.6
1966	1,482.0	501.9	980.1	2,925.1	3,905.2
1967	1,580.8	543.4	1,037.4	2,392.5	3,429.8
1968	1,702.7	593.6	1,109.1	2,312.3	3,421.4
1969	1,827.9	643.4	1,184.5	2,955.1	4,139.6
1970	2,056.0	716.1	1,339.9	5,424.9	6,764.8
1971	2,327.6	801.6	1,526.0	5,542.9	7,068.9
1972	2,392.7	877.7	1,515.0	3,378.8	4,893.8
1973	2,553.2	968.2	1,585.0	7,663.9	9,248.9
1974	2,789.8	1,100.2	1,689.6	5,834.0	7,523.6
1975	3,163.1	1,252.9	1,910.2	6,335.3	8,245.5
1976	3,306.7	1,376.9	1,929.9	6,937.3	8,867.2
1977	3,593.1	1,520.9	2,072.2	5,632.2	7,704.4
1978	3,752.7	1,653.2	2,099.5	11,069.9	13,169.4
1979	4,236.1	1,897.7	2,338.4	13,278.3	15,616.7
1980	4,691.4	2,176.5	2,514.9	5,053.2	7,568.1
1981	5,102.5	2,401.8	2,700.7	10,410.9	13,111.7
1982	5,384.4	2,624.8	2,759.5	10,643.0	13,402.5
1983	5,739.7	2,828.3	2,911.5	10,571.3	13,482.8
1984	6,178.7	3,071.0	3,107.6	12,048.5	15,156.1

employs costs of education, including income forgone by students, as a basis for measuring investment in education. Similarly, he employs costs of rearing as a basis for measuring investment in human capital through the addition of new members of the population. His estimates do not include measures of the returns to investment in education or additions to the population.

Table 5.31 Private National Wealth, 1982 (billions of current dollars)

1.	Private domestic tangible assets		12,791.8
2.	+ Net claims on the federal, state, and local governments		896.2
	a. Federal, monetary		182.6
	i) + Vault cash of commercial banks ^a	19.5	
	ii) + Member bank reserves ^a	26.5	
	iii) + Currency outside banks ^a	136.6	
	b. Federal, nonmonetary		644.1
	i) U.S. government total liabilities ^a	1,133.9	
	ii) – U.S. government financial assets ^a	292.0	
	iii) + Net liabilities, federally sponsored credit agencies ^a	– 5.9	
	iv) + Assets of social insurance funds ^b	65.7	
	v) – U.S. government liabilities to the rest of world ^c	172.0	
	vi) + U.S. government credits and claims abroad ^c	97.1	
	vii) – Monetary liabilities	182.6	
	c. State and local		69.4
	i) State and local government total liabilities ^a	315.8	
	ii) – State and local government financial assets ^a	246.5	
	iii) + Assets of cash sickness compensation fund (our imputation)	.1	
3.	+ Net claims on the rest of world		199.9
	a. Private U.S. assets and investments abroad ^c	716.6	
	b. – Private U.S. liabilities to foreigners ^c	516.6	
4.	= Private national nonhuman wealth		13,887.9
5.	+ Private national human wealth		166,990.4
6.	= Full private national wealth		180,878.3

^aBoard of Governors of the Federal Reserve System, *Flow of Funds Accounts*, various issues.

^bU.S. Department of the Treasury, *Treasury Bulletin*, February issues.

^c“The International Investment Position of the United States,” *Survey of Current Business*, October issues.

In table 5.35, we present estimates of private national human wealth in current and constant prices from the present study and the study by Kendrick (1976). For comparability between the two studies, we have used the same year as a base for the price system as that employed by Kendrick, namely, 1958. Our estimates range from 14.64 to 16.67 times those of Kendrick in current prices and from 13.15 to 18.68 those of Kendrick in constant prices. It is important to note that Kendrick deflates his estimates on the basis of cost indexes for education and rearing of children, while our estimates are deflated by an index of lifetime incomes for all individuals in the U.S. population.

Table 5.32 Full Private National Wealth (billions of current dollars)

Year	Full Wealth	Human Wealth	Nonhuman Wealth	Human Share	Nonhuman Share
1949	16,710.1	15,536.7	1,173.5	.930	.070
1950	17,777.2	16,512.9	1,264.3	.929	.071
1951	19,077.2	17,687.9	1,389.3	.927	.073
1952	20,080.2	18,618.4	1,461.8	.927	.073
1953	21,902.5	20,372.5	1,530.0	.930	.070
1954	23,152.3	21,574.4	1,577.9	.932	.068
1955	23,569.7	21,904.1	1,665.5	.929	.071
1956	25,005.7	23,209.8	1,795.9	.928	.072
1957	27,320.9	25,417.2	1,903.7	.930	.070
1958	29,719.4	27,737.3	1,982.2	.933	.067
1959	30,232.0	28,174.9	2,057.1	.932	.068
1960	31,741.0	29,603.6	2,137.4	.933	.067
1961	33,752.7	31,551.9	2,200.8	.935	.065
1962	35,258.8	32,971.7	2,287.1	.935	.065
1963	36,428.7	34,056.3	2,372.4	.935	.065
1964	39,671.4	37,187.6	2,483.8	.937	.063
1965	42,797.0	40,171.4	2,625.6	.939	.061
1966	46,702.1	43,886.3	2,815.8	.940	.060
1967	50,132.0	47,137.4	2,994.6	.940	.060
1968	53,553.4	50,331.7	3,221.7	.940	.060
1969	57,693.0	54,184.1	3,508.9	.939	.061
1970	64,457.8	60,722.1	3,735.7	.942	.058
1971	71,526.6	67,478.3	4,048.3	.943	.057
1972	76,420.4	71,999.6	4,420.8	.942	.058
1973	85,669.3	80,686.5	4,982.7	.942	.058
1974	93,192.9	87,523.0	5,669.9	.939	.061
1975	101,438.4	95,046.5	6,391.9	.937	.063
1976	110,305.6	103,214.4	7,091.2	.936	.064
1977	118,010.0	110,041.7	7,968.2	.932	.068
1978	131,179.4	122,024.2	9,155.2	.930	.070
1979	146,796.0	136,287.5	10,508.5	.928	.072
1980	154,364.1	142,516.4	11,847.7	.923	.077
1981	167,475.8	154,259.9	13,215.9	.921	.079
1982	180,878.3	166,990.4	13,887.9	.923	.077
1983	194,361.1	179,555.3	14,805.8	.924	.076
1984	209,517.2	193,829.2	15,688.0	.925	.075

Our estimates of nonhuman wealth are based on those of Jorgenson and Fraumeni (1980). In table 5.36, we compare our estimates with those of Kendrick in current and constant prices, using 1958 as the base year for the price system. Our estimates are a fairly constant proportion of Kendrick's, amounting to about twice the level of Kendrick's estimates. In table 5.37, we present a comparison of our estimates of full wealth and those of Kendrick in current and constant prices. Since full wealth is dominated by human wealth, we find that our estimates greatly exceed those of Kendrick in both current and constant prices.

Table 5.33 Full Private National Wealth (billions of constant dollars)

Year	Full Wealth		Human Wealth		Nonhuman Wealth	
	Quantity	Price	Quantity	Price	Quantity	Price
1949	96,884.8	.172	91,689.0	.169	5,213.6	.225
1950	98,785.0	.180	93,314.3	.177	5,446.9	.232
1951	100,730.0	.189	95,024.7	.186	5,650.5	.246
1952	102,664.9	.196	96,789.4	.192	5,805.2	.252
1953	104,650.1	.209	98,603.6	.207	5,962.4	.257
1954	106,679.5	.217	100,472.2	.215	6,113.7	.258
1955	108,896.9	.216	102,441.8	.214	6,338.5	.263
1956	111,142.0	.225	104,468.7	.222	6,538.3	.275
1957	113,477.8	.241	106,624.7	.238	6,708.3	.284
1958	115,805.9	.257	108,833.5	.255	6,827.6	.290
1959	118,302.2	.256	111,134.8	.254	7,013.7	.293
1960	120,844.0	.263	113,506.4	.261	7,178.5	.298
1961	123,408.8	.274	115,910.1	.272	7,335.6	.300
1962	126,098.6	.280	118,390.3	.278	7,537.6	.303
1963	128,874.3	.283	120,934.3	.282	7,760.7	.306
1964	131,693.1	.301	123,489.4	.301	8,015.5	.310
1965	134,505.5	.318	125,992.3	.319	8,319.8	.316
1966	137,273.7	.340	128,423.9	.342	8,657.3	.325
1967	140,060.0	.358	130,911.8	.360	8,959.3	.334
1968	142,922.6	.375	133,470.4	.377	9,269.0	.348
1969	145,801.8	.396	136,048.7	.398	9,575.7	.366
1970	148,666.3	.434	138,650.8	.438	9,843.1	.380
1971	151,669.2	.472	141,342.5	.477	10,170.0	.398
1972	154,569.2	.494	143,901.4	.500	10,536.2	.420
1973	157,173.3	.545	146,113.0	.552	10,970.0	.454
1974	159,869.7	.583	148,492.6	.589	11,310.0	.501
1975	162,721.7	.623	151,071.3	.629	11,593.2	.551
1976	165,344.2	.667	153,376.0	.673	11,927.8	.595
1977	168,111.2	.702	155,791.4	.706	12,295.5	.648
1978	170,556.4	.769	157,858.0	.773	12,689.8	.721
1979	173,039.8	.848	159,991.9	.852	13,049.7	.805
1980	175,753.0	.878	162,424.8	.877	13,331.7	.889
1981	178,384.4	.939	164,751.3	.936	13,634.3	.969
1982	180,878.3	1.000	166,990.4	1.000	13,887.9	1.000
1983	183,323.4	1.060	169,120.6	1.062	14,204.0	1.042
1984	185,734.0	1.128	171,121.4	1.133	14,622.0	1.073

5.6 Conclusion

In this paper, we have presented a new system of national accounts for the United States, based on comparable measures of investment in human and nonhuman capital. Our accounting system incorporates four major innovations. First, we have defined human capital in terms of lifetime labor income for all individuals in the U.S. population. Second, we have integrated demographic accounts for the U.S. population with

Table 5.34 Full Private National Wealth, Rates of Growth, 1949–84

	1949–84	1949–53	1953–57	1957–60	1960–66	1966–69	1969–73	1973–79	1979–84
Full wealth:									
Current prices	7.23	6.76	5.53	5.00	6.44	7.04	9.88	8.98	7.12
Constant prices	1.86	1.93	2.02	2.10	2.12	2.01	1.88	1.60	1.42
Constant prices ^a	.56	.27	.25	.29	.67	.91	.91	.76	.37
Price index	5.37	4.87	3.56	2.91	4.28	5.08	7.98	7.37	5.71
Human wealth:									
Current prices	7.21	6.77	5.53	5.08	6.56	7.03	9.95	8.74	7.04
Constant prices	1.78	1.82	1.96	2.08	2.06	1.92	1.78	1.51	1.35
Constant prices ^a	.49	.16	.18	.28	.61	.82	.82	.67	.30
Price index	5.44	5.07	3.49	3.07	4.50	5.05	8.18	7.23	5.70
Nonhuman wealth:									
Current prices	7.41	6.63	5.46	3.86	4.59	7.34	8.77	12.44	8.01
Constant prices	2.95	3.36	2.95	2.26	3.12	3.36	3.40	2.89	2.28
Constant prices ^a	1.65	1.69	1.18	.45	1.67	2.26	2.43	2.05	1.23
Price index	4.46	3.32	2.50	1.60	1.45	3.96	5.39	9.55	5.75

^aThis data calculated on a per capita basis.

Table 5.35 Private National Human Wealth, 1949–69

Year	Billions of Current Dollars			Billions of 1958 Dollars		
	Jorgenson and Fraumeni	Kendrick	Ratio	Jorgenson and Fraumeni	Kendrick	Ratio
1949	15,536.7	938.9	16.55	23,214.7	1,242.9	18.68
1950	16,512.9	991.3	16.66	23,576.8	1,280.5	18.41
1951	17,687.9	1,097.7	16.11	24,051.8	1,322.2	18.19
1952	18,618.4	1,172.6	15.88	24,412.9	1,366.9	17.86
1953	20,372.5	1,236.8	16.47	25,051.4	1,413.3	17.73
1954	21,574.4	1,294.4	16.67	25,551.2	1,460.0	17.50
1955	21,904.1	1,364.2	16.06	26,061.8	1,509.9	17.26
1956	23,209.8	1,462.7	15.87	26,510.7	1,565.6	16.93
1957	25,417.2	1,576.8	16.12	27,104.6	1,623.7	16.69
1958	27,737.3	1,682.6	16.48	27,737.3	1,682.6	16.48
1959	28,174.9	1,786.9	15.77	28,285.0	1,744.7	16.21
1960	29,603.6	1,901.4	15.57	28,928.2	1,615.1	17.91
1961	31,551.9	2,012.8	15.68	29,594.3	1,888.4	15.67
1962	32,971.7	2,137.4	15.43	30,263.3	1,962.5	15.42
1963	34,056.3	2,273.0	14.98	30,927.5	2,041.9	15.15
1964	37,187.6	2,423.9	15.34	31,751.5	2,126.8	14.93
1965	40,171.4	2,594.4	15.48	32,465.6	2,218.8	14.63
1966	43,886.3	2,818.7	15.57	33,172.9	2,323.4	14.28
1967	47,137.4	3,049.7	15.46	33,838.9	2,434.0	13.90
1968	50,331.7	3,344.4	15.05	34,494.0	2,550.1	13.53
1969	54,184.1	3,699.9	14.64	35,164.9	2,674.4	13.15

economic accounts for the private sector of the U.S. economy. Third, we have incorporated the value of nonmarket activities in our measures of labor incomes and human capital. Fourth, we have measured the services of both human and nonhuman capital in a comparable way.

To implement our system of accounts for the United States, we have constructed a new data base for measuring lifetime labor incomes for all individuals in the U.S. population. Our data base includes demographic accounts in each year for the population by each sex, cross-classified by individual years of age and individual years of educational attainment. Our demographic accounts include data on the number of individuals enrolled in formal schooling and births, deaths, and migration. These accounts are based on annual population data from the U.S. Bureau of the Census. We have incorporated data from the decennial census of population to obtain estimates of the population cross-classified by sex, age, and education.

To measure lifetime labor incomes for all individuals in the U.S. population, we begin with the data base on market labor activities assembled by Gollop and Jorgenson (1980, 1983). We have derived estimates of hours worked and labor compensation for each sex by

Table 5.36 Private National Nonhuman Wealth, 1949–69

Year	Billions of Current Dollars			Billions of 1958 Dollars		
	Jorgenson and Fraumeni	Kendrick	Ratio	Jorgenson and Fraumeni	Kendrick	Ratio
1949	1,173.5	571.1	2.05	1,512.5	717.6	2.11
1950	1,264.3	621.4	2.03	1,580.4	750.1	2.11
1951	1,389.3	711.3	1.95	1,637.8	789.6	2.07
1952	1,461.8	749.1	1.95	1,682.2	819.6	2.05
1953	1,530.0	771.4	1.98	1,726.5	844.5	2.04
1954	1,577.9	782.2	2.02	1,773.6	868.3	2.04
1955	1,665.5	827.2	2.01	1,836.5	899.8	2.04
1956	1,795.9	898.1	2.00	1,893.9	938.6	2.02
1957	1,903.7	958.2	1.99	1,943.9	971.3	2.00
1958	1,982.2	989.7	2.00	1,982.2	989.7	2.00
1959	2,057.1	1,031.4	1.99	2,036.0	1,005.9	2.02
1960	2,137.4	1,057.6	2.02	2,080.0	1,030.4	2.02
1961	2,200.8	1,077.7	2.04	2,127.4	1,049.4	2.03
1962	2,287.1	1,115.6	2.05	2,189.0	1,072.2	2.04
1963	2,372.4	1,164.3	2.04	2,248.4	1,102.8	2.04
1964	2,483.8	1,222.6	2.03	2,323.6	1,138.2	2.04
1965	2,625.6	1,292.4	2.03	2,409.6	1,183.5	2.04
1966	2,815.8	1,383.4	2.04	2,512.6	1,235.0	2.03
1967	2,994.6	1,475.5	2.03	2,600.1	1,274.6	2.04
1968	3,221.7	1,549.7	2.08	2,684.8	1,300.8	2.06
1969	3,508.9	1,644.1	2.13	2,780.3	1,332.4	2.09

sixty-one age groups and eighteen education groups for a total of 2,196 groups for each year. We impute wage rates for nonmarket activities from wage rates for employed individuals. We allocate the total time endowment for all individuals in the population among work, schooling, household production and leisure, and maintenance. We exclude maintenance through the satisfaction of physiological needs from our accounts for lifetime labor incomes. We assign the value of time spent in household production and leisure to consumption and time spent in schooling to investment.

Our final step in measuring lifetime labor incomes for all individuals in the U.S. population is to project incomes for future years and to discount incomes for all future years back to the present, weighting income by the probability of survival. We combine estimates of lifetime labor incomes by sex, age, and education with demographic accounts for the numbers of individuals to obtain estimates of human wealth, investment in human capital, and human capital services. We have presented these estimates in current prices for the period 1948–84 for all individuals in the U.S. population. Combining these estimates with measures of nonhuman capital services by Fraumeni and Jorgenson

Table 5.37 Full Private National Wealth, 1949-69

Year	Billions of Current Dollars			Billions of 1958 Dollars		
	Jorgenson and Fraumeni	Kendrick	Ratio	Jorgenson and Fraumeni	Kendrick	Ratio
1949	16,710.1	1,510.0	11.07	24,968.0	1,960.5	12.74
1950	17,777.2	1,612.7	11.02	25,381.9	2,030.8	12.50
1951	19,077.2	1,809.0	10.55	25,941.0	2,111.8	12.28
1952	20,080.2	1,921.7	10.45	26,329.6	2,186.5	12.04
1953	21,902.5	2,008.2	10.91	26,932.7	2,257.8	11.93
1954	23,152.3	2,076.6	11.15	27,420.0	2,328.3	11.78
1955	23,569.7	2,191.4	10.76	28,043.6	2,409.7	11.64
1956	25,005.7	2,360.8	10.59	28,562.1	2,504.2	11.41
1957	27,320.9	2,535.0	10.78	29,134.7	2,595.0	11.23
1958	29,719.4	2,672.3	11.12	29,719.4	2,672.3	11.12
1959	30,232.0	2,818.3	10.73	30,350.1	2,750.6	11.03
1960	31,741.0	2,959.0	10.73	31,016.9	2,845.5	10.90
1961	33,752.7	3,090.5	10.92	31,658.6	2,937.8	10.78
1962	35,258.8	3,253.0	10.84	32,362.5	3,034.7	10.66
1963	36,428.7	3,437.3	10.60	33,081.9	3,144.7	10.52
1964	39,671.4	3,646.5	10.88	33,872.3	3,265.0	10.37
1965	42,797.0	3,886.8	11.01	34,587.5	3,402.3	10.17
1966	46,702.1	4,202.1	11.11	35,301.3	3,558.4	9.92
1967	50,132.0	4,525.2	11.08	35,988.6	3,708.6	9.70
1968	53,553.4	4,894.1	10.94	36,701.9	3,850.9	9.53
1969	57,693.0	5,344.0	10.80	37,442.2	4,006.8	9.34

(1980, 1986), we obtain a complete system of national accounts for the United States.

Our new system of U.S. national accounts results in a dramatic change in perspective on the role of wealth, investment, and capital services in economic activity. We have employed the resulting system of accounts to describe economic growth by means of a production account, the allocation of income between consumption and saving by means of an income and expenditure account, and the accumulation of wealth by means of accumulation and wealth accounts. Even as an accounting exercise, our results have important limitations. Perhaps the most significant is the exclusion of the government sector, including public education, from the production account. This is an important gap that we hope to fill.⁸

Our system of accounts could be extended in the direction of a measure of economic welfare, taking the concept of consumption employed in our income and expenditure account as a point of departure. Our concept includes consumption of nonmarket goods and services, including household production and the enjoyment of leisure, as well as market goods and services. This concept of consumption could be augmented by consumption provided by the business sector, but not

included in our expenditure account, and diminished by work-related outlays that are included in our account. Our concept could also be increased by government services, excluding instrumental or defensive outlays. Finally, additional imputations could be made for amenities and disamenities associated with changes in the social and physical environment.⁹

Another task that remains is to employ the new accounting framework in exploring the determinants of saving and wealth, including human and nonhuman capital. The production account could be modeled by means of a production function, giving output as a function of inputs of human and nonhuman capital services. The income and expenditure account could be modeled by means of a model of household behavior, generating income from the supply of human and nonhuman capital services, and allocating this income between consumption and saving. Current consumption would enter into an intertemporal utility function that also includes future consumption. Finally, the accumulation and wealth accounts could be modeled by means of a model of portfolio choice.

Notes

1. See, e.g., Gorman et al. (1985) and Bureau of Economic Analysis (1976).
2. Estimates of lifetime labor incomes for men based on market labor activities have been presented in Weisbrod (1961), Miller (1965), Miller and Hornseth (1967), Bureau of the Census (1968, 1974), and Graham and Webb (1979).
3. Demographic accounting is discussed in detail in Stone (1971) and United Nations (1975). This approach and its relation to economic accounts are reviewed by Stone (1981). A system of demographic accounts has been implemented for the United States by McMillen and Land (1980) and by McMillen (1980). The results of this research are reviewed by Land and McMillen (1981).
4. An economic theory of time allocation is presented by Becker (1965). Detailed references to more recent literature on time allocation are given by Murphy (1980). Results of a comprehensive and recent empirical study for the United States are presented by Juster et al. (1978). Kendrick (1979) summarizes the results of an unpublished paper by Wehle (1979), comparing seventeen studies of time allocation for the United States, covering the period 1924–76.
5. Nineteen empirical studies of the valuation of nonmarket labor activities for the United States are surveyed by Murphy (1980). Kendrick (1979) provides recent estimates covering the period 1929–73. An excellent summary of current research on demographic and time use accounting is provided by a recent volume edited by Juster and Land (1981a). Overviews of research in both areas are provided by House (1981), Juster and Land (1981b), and Ruggles (1981), all of which appear in Juster and Land (1981a). Time use accounting has been discussed by Fox and Ghosh (1981), Juster, Courant, and Dow (1981a, 1981b), and Terleckj (1981). Gates and Murphy (1982) presented detailed time use accounts for the United States for 1975–76 based on data collected by the Survey Research Center of the University of Michigan.

6. A system of vintage accounts for nonhuman capital is presented by Jorgenson (1980). This system of accounts has been implemented for the U.S. economy by Fraumeni and Jorgenson (1980). A preliminary form of vintage accounts for human and nonhuman capital has been presented by Jorgenson and Pachon (1983a, 1983b). Additional details are provided by Christensen and Jorgenson (1969, 1970, 1973a, 1973b). Campbell and Peskin (1979) have summarized accounting systems developed by Kendrick (1976, 1979), Ruggles and Ruggles (1970, 1973), and Eisner (1978, 1980). Kendrick's accounting system is similar in scope to our own since it includes production, income and expenditure, accumulation, and wealth accounts. Kendrick's accounting system is also discussed by Engerman and Rosen (1980). Further references to the literature are given by Campbell and Peskin (1979). Ruggles and Ruggles (1982) have recently presented a system of integrated economic accounts for the United States that combines income and product accounts, flow-of-funds accounts, and balance sheets for nonhuman capital.

7. Kendrick's estimates of human capital have been compared with estimates based on lifetime labor incomes for males between the ages of fourteen and seventy-four for the United States, excluding the value of nonmarket activities, for the year 1969 by Graham and Webb (1979). A very detailed survey of nonmarket labor time and its value has been presented by Murphy (1980). Murphy (1982) provides detailed estimates of the value of household work in the United States for 1976.

8. A complete account for the educational sector is needed to estimate rates of return to educational investment. Estimates of investment in education have been presented by Schultz (1961). Rates of return are given by Becker (1975). Kendrick (1976) provides estimates covering the period 1929–69. Detailed references to recent literature are provided by Campbell and Peskin (1979). Gates (1982) provides time-series estimates of education and training costs for 1965–79.

9. Welfare measures of aggregate economic activity for the United States have been presented by Sametz (1968) and Nordhaus and Tobin (1972). Proposals for measuring welfare have been reviewed by Campbell and Peskin (1979), United Nations (1977), and Beckerman (1978). Measurement of environmental amenities and disamenities is discussed by Cremeans (1977) and by Peskin and Peskin (1978). Detailed references to the literature are given by Campbell and Peskin (1979).

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Comment Sherwin Rosen

This pioneering paper is one of the most comprehensive studies ever undertaken for imputing values of human capital investment and of nonmarket production in national income and product accounts. A project of this scope and importance will be studied, discussed, and refined for many years. My comments are focused on a few points to help get the professional dialogue started.

The imputations for nonmarket production are based on the concept of full income familiar from time allocation theory, under which it is maintained that a person can work as much or as little as desired at a fixed hourly wage rate. The proper shadow price for nonmarket time is the (after-tax) alternative *marginal* market value of a unit of time, assumed here to equal the average hourly wage rate. However, most workers are restricted in their choices of hours on existing jobs. Most jobs offer all-or-nothing fixed hours–wage packages, and a change in hours must be implemented by changing jobs. Since the market equilibrium wage-hours locus is probably nonlinear, the average hourly wage rate does not necessarily equal the marginal product of an additional hour of market work required for the imputation. This point is important because the imputed value of nonmarket time is much larger than the value of market time.

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Most direct studies (e.g., commuting time) suggest that the value of time is significantly smaller than the (after-tax) wage rate. Moreover, the choice of working hours depends on how a person's productivity varies over the time unit. At the optimal choice, the marginal product of an additional work hour is less than or equal to its marginal disutility. This leads to well-known selectivity biases for people who do not work at all. For people who work substantial amounts, the solution probably lies in the region where average productivity is falling and the marginal product is less than the average. Exceptions occur when either fixed costs of market participation or increasing returns to additional work hours in market production are large, but these are unlikely to dominate the data. We do not know enough about this problem to quantify the bias, and the authors can hardly be faulted for that state of affairs. Nonetheless, these qualifications should be kept in mind in interpreting their numbers. It also would be useful to present estimates of the value of nonmarket production by sex because of the enormous changes in fertility and labor-force behavior of women over the period studied. Labor economists think that the most important component of nonmarket production is the value of housewives' time associated with the rearing of children. It would be interesting to know if the imputations are consistent with this point.

The estimates of human capital investment rival the magnitude of conventional gross domestic product (their table 5.1). To put Jorgenson and Fraumeni's numbers in perspective, consider that there were about 93 million persons aged zero to twenty-five in the population who were eligible for human capital investment as they define it. Then their 1982 estimate amounts to a very large sum of \$25,000 worth of investment for each of these people in that year, and this is a lower bound because many of them were not enrolled in school. These numbers are much larger than either Kendrick's (1976) cost-based estimates or Mincer's (1962) internal-rate-of-return estimates. One reason for the difference is that Jorgenson and Fraumeni's estimates include the value of *both* market and nonmarket time. Kendrick and Mincer did not value nonmarket time, which is more than half the total because it includes such things as weekends and holidays. Market time accounts for about three-eighths of total time in Jorgenson and Fraumeni's table 5.2 calculations, so a more conventional market value estimate would reduce the \$2.36 trillion total to \$.9 trillion in 1982, still a substantial sum of about \$9,500 in that year for each person aged zero to twenty-five in the population. This raises a question related to the first point. Should all nonmarket time be imputed to human capital investment? How is it that investments in specialized market skills affect the productivity of such nonmarket activities as watching television or reading the newspaper?

These questions have been raised before but are not yet answered in the literature.

Another reason for the large size of the human investment estimates is that they are based on gross discounted full incomes in the zero to twenty-five age groups. The actual procedure is more complicated, but the following artificial example illustrates how it works. Suppose everyone were alike, stayed in school exactly sixteen years, and did not work at all while in school. At age twenty-one, the representative person graduates and enters the labor market, earning, say, a flat \$30,000 per year thereafter. This is increased to \$80,000 per year by the non-market time value imputation and amounts to about \$2 million in present discounted value at age twenty-one using a 4 percent discount rate and ignoring mortality. In this example, investment equals the number of people graduating from grade 16 in a given year times \$2 million. The actual method includes births, immigration, and mortality, and it spreads personal investment over the whole schooling period rather than concentrating it on a single age, but the example illustrates the logic. These estimates are gross of the costs of investment: neither the costs of maintenance during working life nor the considerable time and money costs of raising children (including accumulated interest) are considered. Similarly, the human wealth figures in Jorgenson and Fraumeni's table 5.32 are gross discounted lifetime full earnings summed across the entire U.S. population. If costs were netted out, as they are for physical capital, both investment and stock estimates would be much smaller. I hope the authors subsequently will clarify the questions these imputations are supposed to answer.

The revaluation estimates in their table 5.30 are very large (e.g., the 1982 figure exceeds conventional gross national product by a factor of three), and they show substantial variability. The computational algorithms for this and the other price indexes are not presented in enough detail to clarify these sources of variation, yet age-earnings profiles on which they rest are fairly stable over both time and place. The most important variation for human capital valuation is the intercept, not the slope of the profile, and the four censuses of 1950–80 provide a basis for a smooth year-to-year interpolation. The revaluation estimates would show much less variation had it been done in this way. Finally, the depreciation estimates in Jorgenson and Fraumeni's tables 5.27 and 5.28 seem to include gross on-the-job investment as one of its components. It would be of substantial interest to present those estimates separately.

In conclusion, it is worth emphasizing that these comments do not detract from the conceptual and practical importance of this paper. Jorgenson and Fraumeni have done a great service in proving the im-

portance of human capital and nonmarket production for national income accounting. Their estimates will stand as a benchmark and make it difficult for economists to ignore these issues from now on.

References

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