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Chapter Title: The Effects of Demographic Trends on Consumption, Saving, and Government Expenditures in the United States

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2 The Effects of Demographic Trends on Consumption, Saving, and Government Expenditures in the United States

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2.1 Introduction

The developed countries are all forecast to experience a demographic shift to older populations as the combined result of the temporarily high fertility rates that produced the baby boom and falling mortality rates that have increased both the probability of living to age 65 and life expectancy at age 65. Table 2.1 shows the percentage of the population aged 65 or over (elderly) in seven developed countries for 1990 and projected percentages for 2000 and 2020. In the United States, the percentage is expected to increase from 12 percent in 1990 to 16 percent in 2020. Compared with some other countries, this change is rather modest: in Japan, for example, the percentage is expected to increase from 11 percent to 21 percent.

In the United States after 2020 the fraction of the population over age 65 is expected to increase further as the baby boom generation fully ages past 65. However, the growth in the oldest-old population (age 85 or over) is expected to be much larger: the percentage of the population age 85 or over is forecast to double by 2020 and to increase by 275 percent by 2040 (Advisory Council on Social Security 1991a).

These demographic changes may have profound effects on the economy because the economic behavior of the elderly is very different from that of the nonelderly. The most obvious difference is in labor force participation: an older population will have fewer workers per person, and so, ceterus paribus, the economy will have lower output per person. The elderly tend to dissave whereas the working-age population saves. Thus, an older population will have

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Table 2.1 **International Population Aging (percentage of population 65 or older)**

Year	Canada	France	Germany	Italy	Japan	U.K.	U.S.
1990	11	14	16	14	11	15	12
2000	13	15	17	15	15	15	12
2020	19	20	22	19	21	16	16

Source: Advisory Council on Social Security (1991a).

a lower saving rate. The pattern of consumption by the elderly is different: they consume more medical services and less private transportation. To the extent that these goods are purchased in a normally functioning market, the economy should accommodate a change in the pattern of consumption. In the United States, however, the elderly are substantially supported by the government through the tax-and-transfer system, in particular, through Social Security (the public pension system in the United States), Medicare (the government health insurance system for the elderly), and Medicaid (the government health insurance system for the poor, whose primary users are the elderly). Therefore, part of their income and some of their consumption arise, not from market transactions, but rather from taxation and subsidized spending. Not only may there be deadweight losses from this system, but an aging population will require increasing taxation, which may strain the political consensus underlying the programs. Thus, for example, the future of the Social Security system has been questioned.

This development is especially troubling for the elderly because of the importance to them of Social Security income. Table 2.2 shows the sources of income of the elderly in the United States. Ninety-three percent of households in which an elderly person lived received Social Security income, compared with just 31 percent with income from private pensions.[1] Social Security accounts for 38 percent of the total income of the elderly, but the distribution of income is such that it is much more important to some households than this figure would suggest. The fraction of households that receive more than 20 percent of their income from Social Security is 0.82; the fraction that receive more than half of their income from Social Security is 0.55. That is, more than half the households receive more than half of their income from Social Security. These figures suggest than any uncertainty about the future of the Social Security system is a matter of concern to the elderly.

The goal of this paper is analyze some projections for the U.S. economy to the year 2020. The focus will be the effects of population aging arising from compositional effects and from increased life expectancy at age 65. However, in the United States, the effects of rapidly rising medical expenditures interact with an aging population and dominate the composition of consumption and

1. These pensions are almost all associated with previous employment in the private sector.

Table 2.2 Sources of Income of Elderly Family Units, 1988

	Earnings	Social Security	Other Public Pensions	Private Pensions	Assets	Public Assistance	Other
Fraction with income from source	0.22	0.93	0.16	0.31	0.72	0.05	
Fraction of total income from source	0.17	0.38	0.10	0.08	0.25	0.01	0.02
Fraction with more than 20% of total income from source	0.16	0.82	0.10	0.15	0.19	0.05	
Fraction with more than half of total income from source	0.09	0.55	0.05	0.02	0.06	0.02	

Source: Grad (1990).

government spending in the year 2020, so they will be the subject of considerable analysis. The analysis will find the effects on households, firms, and government and how the effects interact at the macrolevel.

2.2 Social Security Administration Forecasts

The Office of the Actuary of the Social Security Administration (SSA) makes detailed forecasts of the future of the Social Security system. The greatest effort is made for the demographic variables, principally fertility rates and mortality rates, because in the long run, trends in demographics have the greatest impact on the system. Earnings, unemployment, inflation, and other macrovariables are also forecast, and these variables enter a complicated forecasting model that incorporates the Social Security law. The results are forecasts of the income and expenditures of the Social Security system, as well as a great number of other variables. These forecasts will be the basis of the analysis in this section.

2.2.1 Demographic Aspects of the Social Security Forecasts

There are three groups of forecasts. Forecast I is a high-income, low-cost projection based on assumptions of high fertility and low increases in life expectancy. Forecast III is a low-income, high-cost projection based on low fertility and high increases in life expectancy. Forecast II, which is normally used, is a medium-level projection.

The forecasts depend critically on the assumptions about fertility and mortality. Table 2.3 summarizes the main assumptions. Between forecasts I and III, there is substantial variation in the assumptions, which has led many users

Table 2.3 **Assumptions for Alternative SSA Demographic Projections**

	Fertility Rate[a]			Age-Adjusted Death Rate[b]		
Year	I	II	III	I	II	III
1990	2.05	2.05	2.05	785	792	800
2000	2.12	2.00	1.87	754	723	739
2020	2.20	1.90	1.60	714	633	560
2040	2.20	1.90	1.60	679	573	475

Source: Board of Trustees of the Federal OASDI Trust Funds (1991).

[a]Births per woman.

[b]Deaths per 100,000.

Table 2.4 **Life Expectancy at Age 65**

	Males			Females		
Year	I	II	III	I	II	III
1990	15.2	15.3	15.3	18.9	19.0	19.0
2000	15.3	15.9	16.4	18.9	19.6	20.2
2020	15.6	16.7	18.0	19.1	20.4	21.9
2040	15.9	17.5	19.5	19.5	21.3	23.5

Source: Board of Trustees of the Federal OASDI Trust Funds (1991).

of the forecasts to assume that I and III bound the possible outcomes. However, there is no reason to suppose this. For example, Manton, Stallard, and Singer (1994) and Vaupel and Lundström (1994) have population-forecasting models that under some circumstances predict much larger elderly populations than the population under forecast III.

Table 2.4 has life expectancies conditional on reaching age 65. The fiscal stability of the Social Security system depends critically on conditional life expectancy: a 1 percent increase in life expectancy at age 65 increases expected costs by 1 percent. There is considerable variation between forecasts I and III: for example, the life expectancy of women in 2040 is 20 percent higher under III than under I. This implies that costs under III will be 20 percent higher than under I.

We cannot assess the reasonableness of the demographic assumptions that underlie the forecasts by comparing the predictions with actual outcomes because we have not observed the process for enough years. However, if the forecasts vary considerably from year to year, it would suggest that even small amounts of new information have large effects on the forecasts. This, in turn, would suggest that the forecasts are not very reliable. Table 2.5 compares two forecasts for the years 2000, 2020, and 2040 of life expectancy at age 65. The predictions were made in 1989 and 1993, so we can see how they evolved with

Table 2.5 Forecasts of Life Expectancy at Age 65

Relevant Year	Year of Forecast	I		II		III	
		Men	Women	Men	Women	Men	Women
2000	1989	15.0	18.9	15.6	19.6	16.2	20.4
	1993	15.0	18.8	15.4	19.4	15.8	19.9
2020	1989	15.3	19.2	16.4	20.5	17.8	22.0
	1993	15.2	18.9	16.3	20.2	17.4	21.5
2040	1989	15.7	19.6	17.1	21.4	19.3	23.7
	1993	15.5	19.2	17.1	21.1	19.0	23.2

Source: Board of Trustees of the Federal OASDI Trust Funds (1989, 1993).

Table 2.6 Four-Year-Ahead Forecasts

Variable	Observations	Percentage			
		Within[a]	On Boundary[b]	Outside[c]	Total
Unemployment	11	36	18	46	100
GNP change	11	18	0	82	100
Wage change	9	33	0	56	100
Inflation	11	36	9	55	100

Source: Advisory Council on Social Security (1991b).

[a]Between forecasts I and III.

[b]Equal to either forecast I or forecast III.

[c]Outside of range bounded by forecasts I and III.

new information. Especially for forecast III, there were rather large declines in predicted life expectancy. Take the year 2000 for example. The forecasted life expectancy of women 10 years in the future changed by about 3 percent in just four years.

Although we cannot compare the demographic forecasts with actual outcomes, we can compare some of the economic forecasts with outcomes because of the shorter time scale. Table 2.6 summarizes such a comparison for four-year-ahead forecasts of some economic variables. The table gives the number of observations (comparisons between predicted and realized outcomes), the percentage of the realizations that fell between forecasts I and III, the percentage that were exactly the same as either I or III (on the boundary), and the percentage that fell outside the range bounded by I and III. For example, there were 11 comparisons of the actual unemployment rate with the four-year-ahead forecast unemployment rate. Thirty-six percent of the realizations fell within the range bounded by forecasts I and III, 18 percent were equal to I or III, and 46 percent fell outside the range. Therefore, one would estimate that forecasts I and III form a 36 percent confidence interval for four-year-ahead forecasts of the unemployment rate. From this point of view, it is

apparent that forecasts I and III do not bound high-level confidence intervals for forecasts of the economic variables. Whether this will prove to be true for the demographic variables as well will be seen in 20 or 30 years, but in the meantime we should probably not treat forecasts I and III as giving high-level confidence bounds. Although I will not repeat this caution later in this paper, it should be assumed that I have this in mind.

The assumptions about fertility and mortality, along with other economic and demographic assumptions, are used in a complicated forecasting model to find future income, costs, and so forth, and the number of Social Security beneficiaries and the number of workers paying into the system (covered workers). The ratio of beneficiaries to covered workers is important because it gives the number of retirees each worker supports through the Social Security tax-and-transfer system. Table 2.7 shows that even under forecast II, the intermediate forecast, the ratio rises from 0.30 to 0.41 in 2020 to 0.51 in 2040. Without any accompanying changes the implication is that the tax rate on each worker will have to be raised substantially. Under forecast III the ratio increases to 0.62 by 2040, implying that the tax rate would have to double.

2.2.2 Financial Aspects of the Social Security Forecasts

The Social Security system is composed of three funds:

The Old-Age Survivors Insurance and Disability Insurance Fund (OASDI). This fund has two parts: Old-Age Survivors Insurance (OASI) and Disability Insurance (DI). OASI primarily supports retired workers and their spouses and widows. It provides the old-age public pensions in the United States, and it is what most people think of when they refer to Social Security. DI supports disabled workers. It is a much smaller program than OASI.

The Federal Hospital Insurance Fund (HI). This is part A of the Medicare system, which provides health insurance to the elderly.

The Federal Supplementary Medical Insurance Fund (SMI). This is part B of the Medicare system. It differs from HI in that the retired elderly

Table 2.7 **Beneficiaries per 100 Covered Workers**

Year	I	II	III
1991	30	30	30
2000	29	31	32
2010	31	33	36
2020	37	41	46
2030	43	49	56
2040	42	51	62
2050	41	52	67

Source: Board of Trustees of the Federal OASDI Trust Funds (1991).

Table 2.8 Income Rate, Cost Rate, and Trust Fund Balance of OASDI

	I			II			III		
Year	Income	Cost	Balance	Income	Cost	Balance	Income	Cost	Balance
1991	12.6	11.0	83	12.6	11.1	82	12.6	11.3	82
2000	12.6	9.7	303	12.7	10.9	229	12.7	12.3	139
2010	12.8	9.8	641	12.8	11.3	392	12.9	12.9	160
2020	12.9	11.8	769	13.0	14.0	387	13.1	16.1	60
2030	13.0	13.3	772	13.1	16.3	235	13.3	19.5	–
2040	13.0	12.8	844	13.2	16.6	40	13.4	21.1	–
2050	13.0	12.3	981	13.2	16.7	–	13.4	22.7	–

Source: Board of Trustees of the Federal OASDI Trust Funds (1991).

voluntarily pay a premium to be enrolled. The premium is normally set to cover 25 percent of the cost of the program, with the other 75 percent of the cost coming from general Treasury funds. Almost all elderly persons subscribe to SMI.

The financial status of OASDI and HI is generally stated in terms of the income rate and the cost rate. The income rate is the percentage of the taxable payroll paid into the funds through Social Security taxes.[2] The cost rate is the percentage of the taxable payroll paid out in Social Security benefits. These are good measures because they are invariant with respect to scale effects and, if they differ, they show directly how tax rates would have to change to balance the funds.

Table 2.8 presents income and cost rates under forecasts I, II, and III and the balance, which is the percentage of annual expenditures in the fund. In 1991 the income rate was 12.6 and the cost rate was 11.0, indicating that the OASDI fund was accumulating monies at the rate of 1.6 percent of taxable payroll. The balance in the fund was 83 percent of annual expenditures.

Over the next 60 years the income rate is forecast to be approximately stable, but the cost rate will increase. Under forecast I, which is based on assumptions of high fertility and high mortality, the fund remains positive over the forecast horizon, and even in 2040, when the baby boom generation is aged 80–90, the cost rate is only marginally greater than the income rate.

Under forecast II the cost rate exceeds the income rate sometime between 2015 and 2020 (not shown), but because of accumulations the fund has a positive balance until sometime between 2040 and 2045 (not shown). The changes required to bring the fund into balance are not particularly large: in 2020 the tax rate would have to be increased by 1 percent of taxable payroll to match income with cost.

2. The taxable payroll includes most earnings and has a maximum ($57,000 in 1993). The combined OASI and DI tax rate is 6.20 percent paid by the employee and 6.20 percent paid by the employer. A self-employed person pays both.

Table 2.9 **Cost Rate of HI**

Year	I	II	III
1991	2.59	2.61	2.65
2000	2.99	3.52	4.16
2010	3.28	4.56	6.43
2020	3.73	6.20	10.50
2030	4.17	7.84	14.95
2040	4.37	8.55	16.93
2050	4.46	8.72	17.29

Source: Board of Trustees of the Federal OASDI Trust Funds (1991).
Note: Income rate is 2.90.

Even under forecast III, which is based on assumptions of low fertility and low mortality, the tax increases in the early part of the forecast period are rather small: an increase of 3.0 in the income rate would make income and expenditures the same in 2020.

The long-run financial situation of the funds can be found from the summarized income and cost rates. These are the expected present values of the income and cost streams normalized by the expected present value of taxable payroll. Over the period 1991–2040, the summarized income rate under forecast II is 13.10, and the summarized cost rate is 13.80. This means that the fund would just be in balance in 2040 if today the tax rate were permanently increased by 0.7 percent of taxable payroll. Even under forecast III the summarized cost rate is just 2.3 percent of taxable payroll higher than the income rate. These figures indicate that as far as the retirement part of Social Security is concerned, the aging of the population will increase costs but the increase is manageable.

Table 2.9 shows the cost rates for HI, and they have a rather different time path than the cost rates for OASDI. (The income rate is constant under current law at 2.90.) Even under forecast II the cost rate more than doubles by 2020. Under forecast III, the increase is 7.9 percent of taxable payroll: this is larger than the increase under forecast III in OASDI, even though OASDI is a much larger program.[3]

The income and cost rates are normalized by taxable payroll, which is about 45 percent of GNP. Table 2.10 shows OASDI and HI expenditures under forecast II as percentages of GNP. What is striking is how large the increase in HI is forecast to be compared with the forecast for OASDI: by 2040, HI is forecast to consume an additional 2.4 percent of GNP. Even these forecasts are conservative, however, compared with some other expert forecasts that I will discuss below.

3. A comparison of the cost rates shows that HI is only about one-fourth the size of OASDI.

Table 2.10 **Ratio of Expenditures to GNP under Forecast II**

Year	OASDI	HI	Total
1991	4.8	1.2	6.1
2000	4.7	1.6	6.3
2010	4.8	2.0	6.8
2020	5.8	2.7	8.5
2030	6.7	3.3	10.0
2040	6.6	3.6	10.2
2050	6.6	3.6	10.1

Source: Board of Trustees of the Federal OASDI Trust Funds (1991).

2.3 Forecasts by the Expert Panel

The 1991 Advisory Council on Social Security convened a panel of economists and actuaries (the Expert Panel) to study the impact of population aging on households, government, firms, and the macroeconomy. It was evident, however, that such a study would be incomplete without considering the evolution of health care costs because of their high rate of growth and because of the interaction between health care costs and population aging. This section will analyze some of the findings of the Expert Panel.[4]

The panel requested that the Health Care Financing Administration (HCFA) make four forecasts or scenarios of health care costs. These forecasts used the main demographic and economic assumptions of the SSA's forecast II but used assumptions about the evolution of health care costs different from those imbedded in forecasts I, II, and III. The four health care forecasts all were based on estimating the future cost and use of 18 different types of health care resources. They all were based on use by age categories, so they included changes in cost due to changes in age composition. The main differences in the four scenarios come from differences in assumptions about the real rate of inflation of medical services and about the rate of use and intensity of use holding age constant.[5]

Table 2.11 gives examples of the differences in assumptions and use for the four scenarios. Scenario 1 is the highest cost forecast. It assumes that the real rate of health care inflation from 1970 to 1990 (1.4 percent) will continue until 2000 and then fall to 1.2 percent. The rate of increase in real consumption per person will continue at the 1970–90 rate (4.7 percent per year). Scenario 2 is the same as scenario 1 except that the rate of increase in per capita consumption falls to about 4 percent after 2000. Scenario 3 has lower rates of inflation

4. I was a member of the panel, and I did some of the calculations reported in this section, particularly on the macroeconomy and saving rates.

5. Intensity of use refers to the cost of a specific encounter with the health care system. For example, holding prices constant, a visit to a doctor may change because the visit takes longer or because more procedures are used.

Table 2.11 **Medical Expenditures: Sources of Growth, Historical and Projected**

Period and Scenario	Real Medical Inflation (%)	Real Per Capita Medical Spending (%)	Percentage of GNP (end of period)
1970–80	0.3	4.1	9.1
1980–85	2.1	4.4	
1985–90	2.0	5.0	12.2
1990–2000			
1	1.4	4.7	17.4
2	1.4	4.7	17.4
3	1.2	4.2	16.4
4	0.0	1.8	13.1
2000–2020			
1	1.2	4.7	36.0
2	1.2	4.0–4.1	31.5
3	0.8–0.9	2.7–2.6	22.7
4	0.0	1.3–1.1	13.7

Source: Advisory Council on Social Security (1991a).

and increase in use than have been observed over the last 20 years. The assumptions about health care costs in scenario 3 are approximately the same as those in SSA forecasts I, II, and III, discussed in section 2.2. Scenario 4 has no real medical cost inflation and no increase in use or intensity given age. That is, it shows the effects of population aging only.

In 1990 about 12.2 percent of GNP was consumed in medical expenditures. By 2020 this is forecast to rise to 36.0 percent under scenario 1, 31.5 percent under 2, 22.7 percent under 3, and 13.7 percent under 4. A comparison of scenario 4 with the others shows that most of the increase in these scenarios comes from assuming that past increases in cost and use will continue into the future: holding real prices and age-adjusted use and intensity of use per person constant, spending for medical care will increase by just 1.5 percent of GNP. This is the ceterus paribus aging component. Of course, increasing prices and use of medical services along with population aging will have effects that are greater than the marginal increases because of interactions. Here, the increases are great enough that the interactions are not just second-order effects.

It is already clear that scenario 3 and possibly scenario 2 are not wildly improbable and that scenario 4 will be a substantial underestimate. The estimate of 1993 medical care expenditures is 14 percent of GNP, compared with 12.2 percent in 1990. If this rate of increase continues until 2000, medical care expenditures will be about 19 percent of GNP, which is larger than under any of the scenarios.

In the rest of the paper I will give outcomes under scenarios 2 and 3. Neither the panel nor I thought, however, that they necessarily bound the medical care expenditure outcomes. The other forecasting assumptions (unemployment, general inflation, demographics, and so forth) are those of SSA forecast II.

2.3.1 Impact on Government

Table 2.12 has OASDHI income and cost rates for the two scenarios. Income is roughly constant, but costs increase substantially: even under scenario 3 the tax rate would have to increase by 6.7 percent of payroll. As we have already seen, less than half of this is caused by OASDI (2.9 percent in table 2.8, forecast II).

The impact on governmental budgets from increasing health care costs and demographics is shown in table 2.13. It shows a decline in federal government purchases. This is caused by a decline in defense spending from 5.8 percent of GNP to 3.9 percent and some decrease in spending for education resulting from the changing age structure of the population. These decreases more than offset an increase in direct expenditures for health care by the federal government. Of course, the increases in OASDI and HI are much greater than the fall in government purchases so that the total federal budget as a percentage of GNP will increase. A larger fraction of the federal government budget will be transfers rather than direct purchases.

Under either scenario, state and local government spending will increase as a result of higher medical care expenditures even though there is some offset from reduced education expenditures.

2.3.2 Impact on Households

Average real income of elderly households is forecast to increase by 47 percent by 2020, mainly due to increases in Social Security benefits and pension

Table 2.12 **OASDHI Income and Cost Rates**

		2020	
Rate	1989	Scenario 2	Scenario 3
Income	15.5	15.9	15.7
Cost	13.7	22.9	20.4

Source: Advisory Council on Social Security (1991a).

Table 2.13 **Government Expenditures (percentage of GNP)**

		2020	
Expenditure	1989	Scenario 2	Scenario 3
Federal	14.3	20.4	15.8
Purchases	7.7	6.5	6.2
HI and SMI	2.0	8.1	5.8
OASDI	4.6	5.8	5.8
State and local	12.0	13.7	12.7

Source: Advisory Council on Social Security (1991a).

Table 2.14 **Out-of-Pocket Medical Expenditures by the Elderly (percentage of median income)**

		2020	
	1989	Scenario 2	Scenario 3
Couples	17	30	23
Singles	21	40	29

Source: Advisory Council on Social Security (1991a).

income. Income of nonelderly households is forecast to increase by 39 percent. When combined with the growing elderly population, these forecasts imply that a substantially greater fraction of the income in the economy will go to elderly households, about 10.6 percent, compared with 7.4 percent in 1989.[6]

Medical expenditures by households will rise substantially under either scenario 2 or 3. Table 2.14 shows out-of-pocket medical care expenditures expressed as a percentage of median before-tax income. In 1989 a couple with median income would have spent about 17 percent of its income on out-of-pocket medical expenses. As the table shows, this percentage is expected to grow substantially, to 30 percent under scenario 2 and 23 percent under scenario 3. Expenditures are expected to grow even more for singles.

A major component of medical care expenditures by households is the premium for SMI, even though the premium is only 25 percent of actual cost. Current law establishes the SMI premium for each year until 1995. Panel A of table 2.15 shows what the premium would be in 2020 if there is no change in the law; in this case, the premium would cover a small fraction of actual costs. Because the historical aim has been for the premium to cover 25 percent of costs, as it did in 1989, the second part of the table shows the premium necessary to cover 25 percent of SMI costs. This is probably more relevant. The premium will increase under scenario 3 by 359 percent in real dollars and will require 7 and 9 percent of the median incomes of couples and singles, respectively. If this expenditure is added to the out-of-pocket medical expenditure in table 2.14, under scenario 3 costs for couples will increase from 20 percent of median income to 30 percent and for singles from 25 percent to 38 percent. This seems like a large burden indeed.

2.3.3 Impact on Firms

Firms will have increased liabilities for pensions because of the demographic changes, but unless coverage expands greatly the increased burden should be no more than what we have seen for OASDI. Furthermore, pension

6. Note that these figures cannot be used to make utility comparisons because elderly households are considerably smaller than nonelderly households and because no accounting is made of nonmoney income.

Table 2.15 SMI Premiums

Case	1989	2020	
		Scenario 2	Scenario 3
A. Current law			
Annual premium (1988$)	298	377	377
Percentage of SMI cost	25	7	10
B. Premium covers 25 percent of cost			
Annual premium (1988$)	298	1450	1070
Percentage of median income			
Couples	3	9	7
Singles	4	12	9

Source: Advisory Council on Social Security (1991a).

Table 2.16 Health Expenditure Paid by Private Insurance

Expenditure	1989	2020	
		Scenario 2	Scenario 3
Total amount (billion 1990$)	222	866	618
Per capita (1990$)	854	2,707	1,930

Source: Advisory Council on Social Security (1991a).

growth has been in defined-contribution plans, which place no liability on the firm once the contribution has been earned.

However, firms will have substantial exposure to risks associated with medical care expenditures. Table 2.16 shows estimated medical care expenditures paid for by private insurance: per capita, the increase under scenario 3 is 226 percent. In that about 80 percent of medical insurance is associated with employment, firms can expect sharply higher expenses for medical insurance. Of course, under this scenario, workers can expect that most, if not all, of growth in total compensation will be in fringe benefits to cover medical expenses.

2.3.4 Impact in the Aggregate

Sources of financing medical care expenditures should change. According to table 2.17, the percentage paid by Medicare will increase from 16.5 percent to 25.5 percent under scenario 3, mainly because of the demographic changes. This rise is equivalent to an increase from 2 percent of GNP to 5.8 percent of GNP. Similarly, Medicaid will increase to 3 percent of GNP. Even though the fraction of total expenses paid by private insurance and out-of-pocket payments will fall, they will still increase as a fraction of GNP because of the rapid increase in total medical costs. For example, private insurance will pay 6.7 percent of GNP in medical care expenditures, up from 4 percent in 1989.

The fraction of personal consumption by the elderly will change because of

Table 2.17 **Sources of Funds for Medical Spending (percentage distribution)**

Source	1989	2020	
		Scenario 2	Scenario 3
Medicare	16.5	25.8	25.5
Medicaid	11.2	13.4	13.3
Other government	14.4	11.2	11.8
Private insurance	33.1	29.7	29.4
Out-of-pocket	20.5	16.2	16.3
Other private	4.4	3.7	3.6
Total	100.0	100.0	100.0
Total medical (% of GNP)	12.2	31.5	22.7

Source: Advisory Council on Social Security (1991a).

demographic changes, income changes, and other reasons. To get a rough idea of the magnitude, the panel divided the population into the elderly and nonelderly. The 1988 Consumer Expenditure Survey was used to find differences between the consumption patterns of the two groups. If incomes do not change and consumption patterns are fixed, the population changes will indicate how consumption of different commodities will change. For example, the nonelderly consume more motor vehicles than the elderly, so aggregate consumption of motor vehicles should fall as the population ages. To account for income changes, the panel assumed the income elasticity of each commodity group was 1.0. Therefore, consumption by commodity group for each age group can be projected from the SSA II income and demographic forecasts. Consumption of medical services is not forecast in this way; it comes from the scenarios furnished by HCFA.

Table 2.18 shows the shares of personal consumption by the nonelderly and by the elderly. In 1989, nonhealth consumption by the elderly was 12 percent of the total, which was just their share in the population. However, they consumed 36 percent of the health care services, mainly through the transfers in Medicare and Medicaid. These transfers are, of course, not recorded as income; were they to be, the elderly would have a much larger share of total income than indicated by money income. In total, the elderly accounted for 15 percent of private consumption in 1989.

In 2020 the elderly are forecast to be 16 percent of the population. They will consume 15 percent of nonhealth personal consumption but 45 percent of the health care services. This increase is due to the demographic changes. In total, under scenario 3 the elderly will consume 21 percent of total personal consumption even though they will be just 16 percent of the population.

With such large predicted increases in medical care expenditures, it is natural to wonder where the increased consumption will come from. To understand the magnitude of the adjustment that would be required, the demands of gov-

Table 2.18 Shares of Personal Consumption (percent) by Age

	1989	2020	
		Scenario 2	Scenario 3
Nonhealth			
Under 65	88	85	85
65 or over	12	15	15
Health			
Under 65	64	55	55
65 or over	36	45	45
Total			
Under 65	85	77	79
65 or over	15	23	21

Source: Advisory Council on Social Security (1991a).

ernment, consumption, investment, and the foreign sector were either forecast or assumed. For example, as mentioned above, it was assumed that federal government purchases would fall from 7.7 percent of GNP to 6.2 percent (table 2.13, scenario 3). Personal consumption except for health care expenditures were calculated from the assumption of an income elasticity of 1.0. Health care expenditures come from the HCFA scenarios. The foreign sector is assumed to be in balance, and gross investment is assumed to return to its historic level of 13 percent of GNP.

Table 2.19 presents the result of these forecasts and assumptions. Personal consumption was 66.3 percent of GNP in 1989. Of this, 30.9 percent was in goods and 35.5 percent in services. Among consumption of services, consumption of housing was 14.3 percent of GNP and consumption of medical services was about 8.4 percent. Government purchases were 19.7 percent, gross investment was 14.8 percent, and exports were −0.9 percent. Under scenario 3, personal consumption will increase to 77 percent of GNP, with most of the increase coming from higher medical care expenditures. Government purchases and gross investment will fall slightly. Because there is no residual category that makes total demand equal total supply, demand does not have to equal supply, and indeed scenario 3 shows total demand at 108.9 percent of supply. Under scenario 2 demand will be 116.6 percent of supply.

Of course, adjustments will bring supply and demand into equality. One way to see the magnitude of the adjustments that will be required is to suppose that medical care expenditures, investment, government spending, and foreign sector demands are met; then all the adjustment will have to come from nonhealth personal consumption. Table 2.20 shows the allocation of per capita GNP under this assumption. Total per capita GNP increases from $20,340 to $27,890. Under scenario 2, $8,790 will be spent on health care expenses, $1,450 on education, and so forth. Nonhealth personal consumption, the residual category, will be $10,990, which is less than the 1989 level. That is, all the

Table 2.19 **Components of GNP (percentage of GNP)**

Component	1989	2020	
		Scenario 2	Scenario 3
Personal consumption	66.3	83.8	77.0
Goods	30.9	31.5	31.5
Durable	9.1	9.7	9.7
Nondurable	21.7	21.8	21.8
Services	35.5	51.8	45.5
Housing	14.3	15.2	15.2
Medical	8.4	22.6	16.3
Other	12.9	14.1	14.1
Government purchases	19.7	20.2	18.9
Federal	7.7	6.5	6.2
Health	0.4	1.1	0.8
Other	7.3	5.4	5.4
State and local	12.0	13.7	12.7
Health	1.4	3.7	2.6
Other	10.6	10.0	10.1
Gross investment	14.8	13.0	13.0
Net exports	−0.9	0.0	0.0
Total	100.0	116.6	108.9

Source: Advisory Council on Social Security (1991a).

Table 2.20 **Adjustment in Personal Consumption: Per Capita Allocation (1989$)**

Demand	1989	2020	
		Scenario 2	Scenario 3
Health	2,360	8,790	6,330
Education	1,220	1,450	1,450
Government (excl. medical)	2,600	3,040	3,040
Investment	3,010	3,630	3,630
Nonhealth personal consumption	11,080	10,990	13,450
Total	20,340	27,890	27,890

Source: Advisory Council on Social Security (1991a).

growth in per capita GNP between 1989 and 2020 (38 percent) will be used to finance increases in medical care expenditures. It is hard to believe that this outcome will be desired by the general population. Even under scenario 3, nonhealth consumption grows at a much smaller rate than GNP.

From two perspectives an older population could be expected to have a lower average saving rate than a younger population. In the first perspective, increasing the fraction of the population that is aged will increase the asset holdings of the aged population. At a constant rate of asset decumulation, a

Table 2.21 Asset Decumulation and the Saving Rate

	1989		2020	
	Amount	Source	Amount	Source
Assets of elderly	1.6×10^{12}	A.C.	3.7×10^{12}	Calculation[a]
Asset decumulation	0.04×10^{12}	Calculation: 2.9% rate of decumulation (Hurd 1991)	0.107×10^{12}	Calculation: 2.9% rate of decumulation (Hurd 1991)
After-tax earnings	2.1×10^{12}	A.C.	3.6×10^{12}	A.C.
Asset decumulation out of after-tax earnings (%)	2.2	Calculation	3.0	Calculation
Household saving rate (%)	4.6	A.C.	3.8	Calculation

Source: A.C. = Advisory Council on Social Security (1991a).

[a]Calculated as the product of 1989 assets, real per capita GNP growth of 1.01 percent per year, and 1.8 percent growth in the elderly population.

greater fraction of the savings of the working-age population will be used to purchase the assets that the elderly are selling. Thus, the average saving rate will fall.[7] In the second perspective, the life-cycle hypothesis of consumption implies that the working population saves and the retired population dissaves; therefore, ceterus paribus, increasing the fraction of the population that is elderly should reduce the saving rate out of income. Of course, these two perspectives are really two ways of saying the same thing.

Table 2.21 shows estimates of the assets of elderly in 1989 and 2020 and the resulting levels of asset decumulation. The most important assumption is about the rate of dissaving: it is taken to be 2.9 percent of bequeathable nonhousing wealth. This figure is estimated from observed wealth changes of elderly households in the 1984 Survey of Income and Program Participation (SIPP), Waves 4 and 7 (Hurd 1991). The economy was rather stable during the mid-1980s, so the rate of wealth change may well represent the desired long-run rate of change. Furthermore, the 10-year averages from the Retirement History Survey (3.2 percent) are very similar to the averages from SIPP even though the economic conditions during the years of the Retirement History Survey (1969–79) were quite different. Other panel data sets give estimates that overall are about this magnitude (for other estimates, see Hurd 1992).

In 1989, the elderly held about $1.6 trillion of nonhousing bequeathable wealth. At a rate of dissaving of 2.9 percent, they sold $46 billion of assets, which was 2.2 percent of after-tax earnings. Under the assumptions given in the table, nonhousing assets of the elderly will grow to $3.7 trillion by 2020, and the elderly will decumulate at a rate of $107 billion per year. This amount is 3.0 percent of after-tax earnings, requiring 0.8 percent more of household

7. It is of independent interest to estimate the increase in the stock of assets that will be put on the market as the population ages.

saving. Thus, the household saving rate is projected to fall from 4.6 percent to 3.8 percent.

An alternative calculation based on saving rates out of income is the following: The average one-year rate of wealth decumulation in SIPP was 2.9 percent from mean wealth of $75,900, implying an excess of consumption over income of $3,800. Net income of the elderly in 1984 was $13,200 (Bureau of Labor Statistics 1989), so the rate of saving out of income by the elderly was −16.6 percent. I will take this to be the desired, or steady state, rate of saving by the elderly. By assuming that the saving rates of the elderly and nonelderly are stable over time, the effects of population aging on the aggregate saving rate can be found simply by changing the weights on the saving rates of each group. In 1989 the elderly were 12 percent of the population, and their average household income was 62.3 percent of average household income of the population. The household saving rate out of after-tax income was 4.6 percent. Therefore, the saving rate of nonelderly households was 6.3 percent. In 2020 the elderly are forecast to be 16 percent of the population. Under the assumption that the average income of elderly households grows by 47 percent and the income of nonelderly households by 38 percent (Advisory Council on Social Security 1991b), the aggregate household saving rate will fall by 0.7 percentage points to 3.9 percent of after-tax household income. This is very close to the estimate from the method based on the change in asset holdings.

In view of the large variation over time in the household saving rate and the large international variation, the fall in the household saving rate from 4.6 percent to 3.8 or 3.9 percent does not seem like a large change.

2.4 Conclusion

Excluding increases in medical care expenditures, at least to the year 2020, the aging of the population in the United States seems to have effects that are manageable: the necessary increases in Social Security retirement benefits will require some tax increases, but not large ones; the change in the mix of consumption is rather modest; the estimated effects on the aggregate saving rate are within the bounds of historical variation. The effects beyond 2020 are greater, but they are not of crisis proportions. These demographic changes and the increased requirements for retirement income are dominated by increases in spending for health care. Even the forecasts to 2020 probably cannot be realized because of the required reduction in other spending.

Some of the reduction in other spending may be in saving and investment. We do not know enough about saving determination at the household level to predict how a large increase in medical care expenditures financed through Social Security taxation, out-of-pocket payments, and employers contributions will affect saving rates; but it may noted that the fall in the U.S. saving rate coincided with the large increase in health care spending.

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