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1 The Impact of the Demographic Transition on Government Spending

John B. Shoven, Michael D. Topper, and David A. Wise

1.1 Introduction

The goal of this research is to determine the impact on government budgets of predicted changes in demographic structure in the United States over the next 90 years. A major part of the demographic shifts is due to the aging of the post–World War II baby-boom generation. Another important factor is the decrease in the age-specific mortality rates that has occurred and is predicted to continue. Many government programs are targeted to specific age groups in our society, and therefore we feel that the impact of the population's changing age structure on these programs' budgetary costs is an interesting research question. We were motivated to look at this issue to help address the question of the ability of governments to sustain programs already in place and to implement new ones, within the general scale of government of the recent past.

Our basic approach identifies those government programs for which beneficiaries can be distinguished. Some of these are traditional transfer programs, but others (such as retirement programs and education) are often not characterized as such. We calculate the cost to taxpayers of maintaining the 1986 level of age/family-structure-specific payments for each of 22 government programs for which we could identify beneficiaries. We estimate these costs for 1990, and at 20-year intervals from 2000 to 2080. These programs include Social Security, Medicare, Medicaid, education, and a range of income support, welfare, and work-related government programs. Our estimates include payments

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made by federal, state, and local governments. In total, the programs we examine account for about 40 percent of all government expenditure. We find that maintaining the benefit levels for each age-specific family type would require quite dramatic increases in the total funds allocated to these programs.

1.2 Population Projections

The projected number of males and females in different age cohorts between 1990 and 2080 are shown in table 1.1. The data are based on Social Security Administration (SSA) population projections used to forecast the future income and expenditures of the Social Security system. The baseline for the projections is an estimate of the Social Security Area[1] population in 1987 by age, sex, and marital status and of the pattern of existing marriages by age of husband and wife. Finally, population projections for future years are simulated based on assumptions about future birth rates, death rates, marriage and divorce rates, and net immigration rates. The SSA considers three separate population projections. The data in table 1.1 are based on the intermediate "best guess" projection of the SSA.[2] We adopt this projection as a working hypothesis about population growth.

There is a great deal of uncertainty about the demographic projections contained in table 1.1. The SSA recognizes this uncertainty by producing three alternative scenarios, including an "optimistic" and a "pessimistic" forecast in addition to the "best guess" numbers we have used here. In contrast, Manton, Stallard, and Singer (chap. 2 in this volume) provide an alternative approach to handling the uncertainty about demographic trends, particularly that due to the uncertain evolution of age-specific mortality rates. They estimate the effect of 10 different risk factors (e.g., smoking, cholesterol level, pulse rate) on mortality and compute the age-specific death rates for people who optimally control these risk factors. They find that control of these risk factors can have a major impact on mortality and, hence, on the future age structure of the population.

Our basic calculations utilize the "best guess" demographic projections of the SSA. The population of different age cohorts with these forecasts are depicted in figures 1.1 and 1.2 for 1990–2080. Several important demographic changes are evident in these figures. First, the population aged 15–44 remains roughly constant between 1990 and 2080. Because of our constant payout assumption, government programs such as AFDC that focus on these age cohorts will experience little growth in total outlays. Similarly, the population aged 45–64 increases between 1990 and 2020 but then levels out and remains

1. The Social Security Area comprises residents of the 50 states, the District of Columbia, Puerto Rico, Virgin Islands, Guam, American Samoa, armed forces and armed forces dependents overseas, and other citizens overseas.

2. Described in U.S. SSA (1989). We use "alternative II," the middle case of the three developed by the SSA.

Table 1.1 **Population Projections (millions)**

	Age Cohort								
	15–24	25–34	35–44	45–54	55–64	65–74	75–84	85+	Total
Year 1990									
Single females	14.35	7.74	4.82	3.29	3.45	4.67	4.47	2.03	44.82
Single males	16.81	10.35	4.97	2.45	1.87	1.69	1.07	.43	39.64
Married females	4.00	14.61	14.42	9.89	7.98	5.47	1.83	.32	58.52
Married males	2.31	12.80	14.50	10.51	8.68	6.52	2.74	.46	58.52
Total	37.47	45.50	38.71	26.14	21.98	18.35	10.11	3.24	201.50
Year 2000									
Single females	14.66	6.49	6.44	5.48	4.01	4.47	4.97	2.77	49.29
Single males	17.09	9.17	7.42	4.57	2.19	1.74	1.36	.55	44.09
Married females	3.74	12.59	16.19	13.59	8.65	5.59	2.54	.42	63.31
Married males	2.13	10.63	15.58	14.30	9.76	6.72	3.49	.70	63.31
Total	37.62	38.88	45.63	37.94	24.61	18.52	12.36	4.44	220.00
Year 2020									
Single females	14.48	7.12	5.21	5.23	7.24	7.19	5.47	3.80	55.74
Single males	17.05	9.93	6.45	5.64	5.58	3.41	1.60	.81	50.47
Married females	3.97	13.26	14.27	14.07	14.34	9.13	3.14	.62	72.80
Married males	2.24	11.33	13.59	13.70	15.21	11.12	4.54	1.07	72.80
Total	37.74	41.64	39.52	38.64	42.37	30.85	14.75	6.30	251.81
Year 2040									
Single females	14.87	6.82	5.09	5.70	5.89	7.02	9.29	6.51	61.19
Single males	17.47	9.55	6.61	6.23	4.82	4.11	3.55	1.58	53.92
Married females	4.03	12.78	14.46	14.93	12.87	9.64	5.68	1.35	75.74
Married males	2.30	10.93	13.54	14.63	13.59	11.05	7.53	2.17	75.74
Total	38.67	40.08	39.70	41.49	37.17	31.82	26.05	11.61	266.59

Source: U.S. SSA (1989).

roughly constant between 2020 and 2080. Thus, employment-related programs that target the labor-force population will experience little growth in outlays beyond 2020.

Second, the aging of the postwar "baby boomers" is evident throughout the period of our analysis. Between 1990 and 2000, the 45–54 age cohort grows by 45 percent. Between 2000 and 2020, the 55–64 cohort grows by 72 percent, and the 65–74 cohort by 66 percent. Between 2020 and 2040, the 75–84 cohort grows by 77 percent, and the 85+ cohort by 84 percent. Beyond 2040, population growth remains roughly constant except for the 85+ cohort.

Third, the fraction of the adult population over age 65 grows in both absolute and relative terms. Table 1.2 shows the percentage of men and women over age 65, over 75, and over 85, relative to the adult population of men and women. Between 1990 and 2040, the fraction of adults over 65 relative to total adults increases from 18 to 29 percent for women and from 13 to 23 percent for men. The increase is even more dramatic for the "very old." Between 1990 and 2040, the fraction of adults over 85 relative to all adults increases from 2 to 6 percent

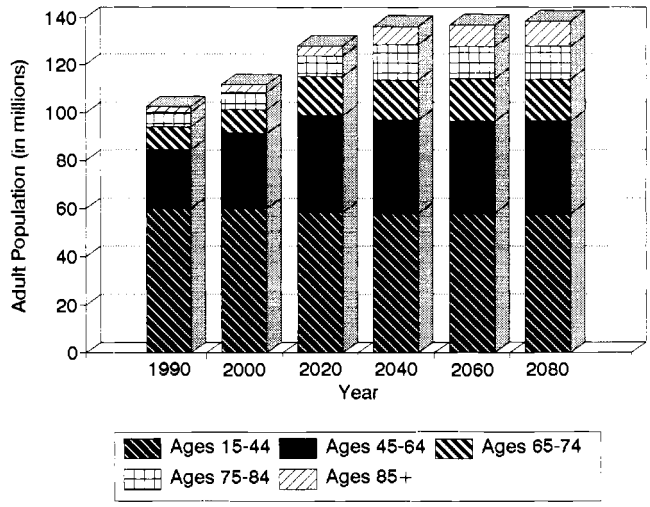

Fig. 1.1 Projected female population shares by age cohort

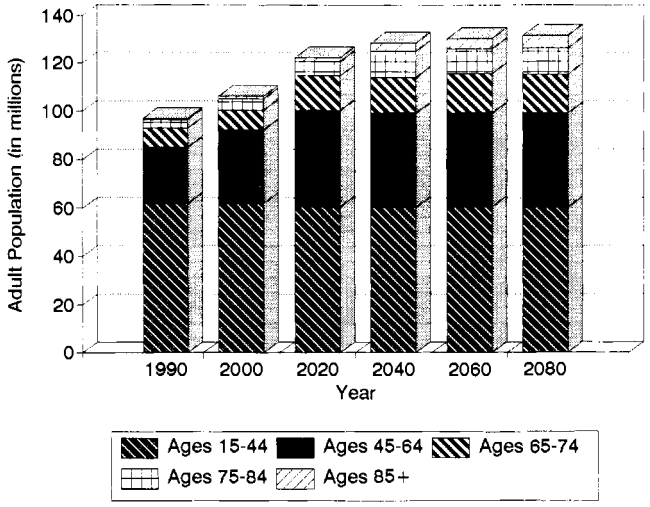

Fig. 1.2 Projected male population shares by age cohort

for women and from 1 to 3 percent for men. Thus, government programs that provide services for older individuals will experience substantial upward pressure on costs.

As an extreme alternative assumption, we can examine the implications of the Manton, Stallard, and Singer (hereafter MSS; chap. 2 in this volume) model in which people adopt optimal control of risk factors after 20 years (i.e., their

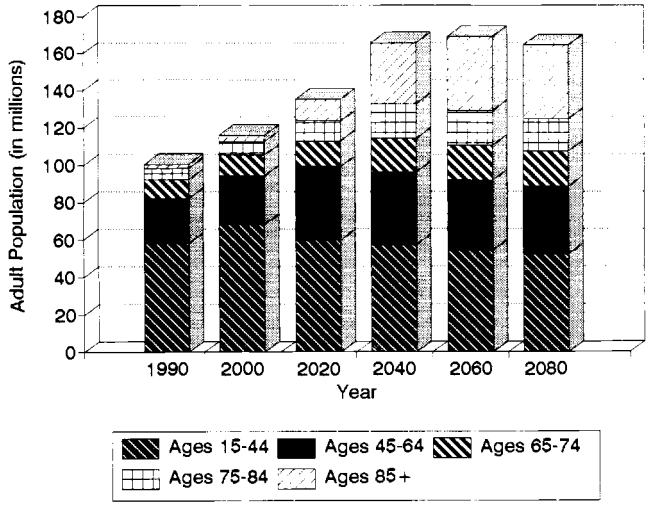

Fig. 1.3 Projected "optimal" female population shares by age cohort

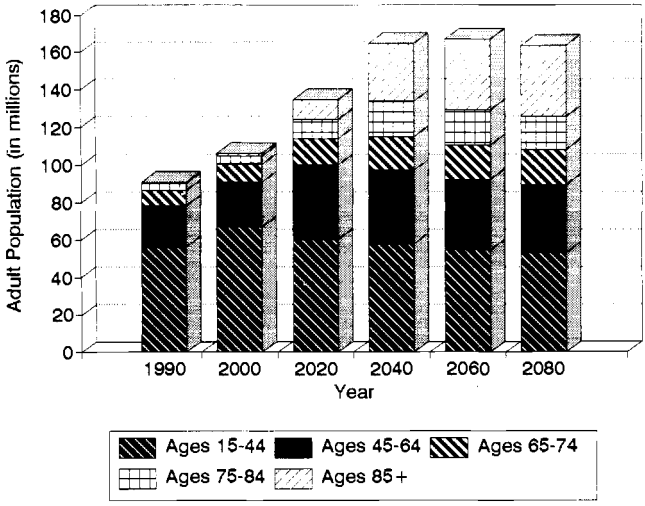

Fig. 1.4 Projected "optimal" male population shares by age cohort

behavior dramatically changes 20 years from now). The resulting population projections are shown in figures 1.3 and 1.4. Comparisons with figures 1.1 and 1.2 show dramatic differences, particularly for the very advanced ages. For example, whereas the middle SSA forecast projects a population of 11.1 million women aged 85 or older in 2080, the MSS forecast with optimal risk factor control is 39.7 million. The difference between the two types of forecasts is

even more dramatic for elderly males. The point of presenting the MSS numbers is not to suggest that they may represent the actual outcome but to illustrate how sensitive demographic projections are to the control of risk factors.

1.3 Expected Program Payments

Expected program payments from the government to households are shown in table 1.3 by age of household head, household marital status, and program category. These data are for 1986 and are expressed in dollars per household. The numbers thus combine participation probabilities with average receipt conditional on participation. Large values can arise from high program participation rates and/or large payments to program participants. Government transfer payments were grouped into eight categories: (1) Social Security, (2) other retirement income—includes federal civil service pensions, railroad retirement income, and pensions from state and local governments, (3) Medicare, (4) Medicaid, (5) work-related programs—includes workers compensation and state and other unemployment compensation, (6) welfare and income support programs—includes AFDC, WIC, food stamps, Supplemental Security Income, general assistance, and other welfare programs, (7) military programs—includes military retirement pensions, veterans' compensation, and GI bill benefits, (8) education—includes public provision of elementary and secondary schooling and federal, state, and local support of higher education. Appendix A contains a brief description of each program. Appendix B presents the expected transfer program data disaggregated by individual program.

The primary source for these estimates was 1986 data from the Survey of Income Programs and Participation (SIPP; U.S. Bureau of the Census 1986). Program participation rates and average payments per participant for Social Security, other retirement income, work-related programs, welfare programs,

Table 1.2 **Adult Population over Age 65 (%)**

	Age		
	Over 65	Over 75	Over 85
Year 1990			
Females	18	8	2
Males	13	5	1
Year 2000			
Females	18	10	3
Males	14	6	1
Year 2020			
Females	23	10	3
Males	18	7	2
Year 2040			
Females	29	17	6
Males	23	11	3

Source: Derived from table 1.1.

Table 1.3 **Expected Government Payments per Household by Program Category in 1986 (1986 $)**

	Age Cohort							
	15–25	25–35	35–45	45–55	55–65	65–75	75–85	85+
Single males								
Social Security	49.01	70.00	136.02	356.04	1,231.72	5,190.20	5,257.96	5,197.11
Other retirement	0.00	4.79	0.00	34.32	298.15	1,650.04	1,571.71	1,631.98
Medicare	5.58	19.00	39.25	152.00	282.06	1,785.21	2,648.10	3,128.68
Medicaid	94.93	118.47	162.70	184.02	203.53	294.64	700.66	1,742.00
Welfare	29.22	92.32	231.97	182.13	234.48	250.89	147.10	96.23
Work-related	58.35	182.97	271.32	224.50	116.53	1.26	0.00	0.00
Military	12.93	26.88	106.49	646.25	864.01	1,206.04	186.02	11.45
Total	250.02	514.43	947.75	1,779.25	3,230.48	10,378.28	10,511.55	11,807.45
Single females								
Social Security	43.22	82.88	296.7	340.7	1,426.83	4,590.14	4,647.54	4,279.27
Other retirement	0.00	1.63	13.68	183.9	575.44	989.36	992.31	470.00
Medicare	7.06	25.11	49.44	148.98	272.33	1,637.97	2,456.49	2,851.89
Medicaid	213.13	472.53	611.37	327.33	211.91	294.64	700.66	1,742.00
Welfare	320.80	1,121.65	1,744.98	954.82	298.12	283.83	232.82	286.65
Work-related	23.15	75.48	191.03	108.04	81.91	10.35	0.00	0.00
Military	5.92	13.18	37.21	118.43	177.76	146.96	95.12	93.45
Total	613.28	1,792.46	2,944.51	2,182.20	3,044.29	7,953.25	9,124.94	9,723.26
Married couples								
Social Security	11.79	44.87	105.55	437.76	3,064.57	9,237.4	8,847.57	8,582.22
Other retirement	0.00	5.1	51.36	301.77	1,741.77	2,202.79	2,471.99	1,242.88
Medicare	0.00	3.96	21.44	94.60	217.91	3,513.87	5,142.88	5,928.77
Medicaid	263.82	270.29	317.92	354.07	407.15	568.68	1,254.32	3,246.84
Welfare	247.7	266.72	250.38	123.99	107.36	97.62	164.97	708.81
Work-related	268.4	341.02	215.55	236.11	203.13	27.92	0.00	0.00
Military	66.12	82.15	208.26	756.57	800.14	705.47	132.72	149.54
Total	857.83	1,014.11	1,170.46	2,304.87	6,542.03	16,353.75	18,014.45	19,859.06

Note: Cell entries are expected program payments per household derived from the SIPP (U.S. Bureau of the Census 1986). Age cohort for married couples based on age of husband.

and military programs were obtained by averaging across all SIPP households in each age/marital-status class. In the averaging process, we utilized the population weight for each household in the survey. SIPP data on program participation rates in Medicare and Medicaid were supplemented by Health Care Financing Administration (HCFA) data on average age-group-specific Medicare and Medicaid payments.[3] Expected program payments for these seven categories were expressed on a per household basis.

The concentration of transfer payment receipts among the older age cohorts is evident in the "total" rows in table 1.3. For example, on average, single males aged 15–44 receive less than $1,000 from these transfer programs. Single

3. Medicaid payments obtained from data in U.S. Department of Health and Human Services (1989). Medicare payments obtained from U.S. Department of Health and Human Services (1986).

males over age 65 receive an average of over $10,000. Obviously, a change in the distribution of the population toward the more elderly age cohorts will cause current age-specific programs to become more expensive, if maintained.

The final category of program payments is education. The education data include expenditure for elementary, secondary, and higher education by the federal, state, and local governments. These data were obtained from the *Statistical Abstract of the United States, 1987* (U.S. Bureau of the Census 1988) by dividing government educational expenses by the number of children in the relevant age groups.[4] Expected per child education payments in 1987 were $2,875 for ages 5–9, $3,079 for ages 10–14, $2,326 for ages 15–19, and $1,501 for ages 20–24.

We have not been able to assign all government expenditure to specific households. The list of unallocated government expenditure includes such major categories as national defense, agricultural policies, interest, capital outlays, police and fire protection, public parks and land management, and general administration. While the programs that we do consider include most transfer programs, they do not include all, because of limited data availability. The largest missing transfer program is public housing; information on it is not available from the SIPP data source.

1.4 The "Constant Average Deal" Modeling Approach

Our modeling approach is to calculate the cost to taxpayers of maintaining program payments at 1986 levels as the demographic structure of the population changes. That is, we assume that the "average deal" that a household of a particular type receives in 1986 is a predictor of the average deal a household of the same type will receive in future years. Thus, there are two reasons that total outlays change in our calculations. First, there is general population growth. The SSA projects that the total adult population over age 15 will increase from 201.5 million in 1990 to 266.6 million in 2040, an increase of 32 percent. In the absence of any changes to the age structure of the population our assumption of a constant average deal would suggest that total program payments would also increase by 32 percent. In fact, as described in section 1.2, the relative number of older individuals is expected to increase throughout the period. Second, for those government programs where the pattern of payouts varies by age, the shift in the age distribution provides an additional source of change in total outlays.

4. We make the simple assumption that total elementary/secondary expenditures were evenly distributed across children aged 5–17 and that total higher education expenditures were evenly distributed across children aged 18–24. This provided an estimate of total educational expenditure for four age groups: ages 5–9, ages 10–14, ages 15–19, and ages 20–24. Per capita education payments were then calculated by dividing age-group total expenditures by the total 1987 population in each age group.

This modeling approach essentially assumes that there is no behavioral response on the part of either the government or households as population growth and demographic shifts alter the level and distribution of total outlays. That is, we assume that program funding levels are maintained in real terms at 1986 levels and that a household in a specific age/marital class in each future year is identical to a household in that age/marital class in 1986. Thus, this procedure provides a simple baseline for evaluating the consequences of maintaining program benefits in the face of dramatic demographic changes. We certainly are not forecasting that government budgets will evolve along the time path that our numbers indicate. Rather, our approach is the standard "what if" approach, which is useful in debating the appropriate responses to the changing demographic and economic environment.

1.5 Estimates of Future Government Payments

We calculate the total payments for each program to each family structure/age cohort in future years by multiplying the 1986 expected program payment matrix by the population matrix in each year. The results of this procedure for each forecast year are shown separately for each age/family-structure group in Appendix C. Table 1.4 aggregates these data across age cohorts and family structures. With the SSA population forecasts, the total cost of all of the programs is projected to grow from $669 billion in 1990 to $1,106 billion in 2040. This 65.4 percent increase in cost compares with the anticipated 32.2 percent growth in the age 15+ population and an increase of 27.5 percent in the total population. Clearly the expected changes in the age structure of the population have large cost consequences. We can examine the projected cost changes by major program category.

1.5.1 Social Security

Table 1.4 indicates that the Old Age, Survivors, and Disability portion of Social Security accounts for about $209 billion of the $437.4 billion increase in the total cost increase of maintaining age-specific benefits. That still leaves the other programs accounting for 52 percent of the expenditure increase. Contrary to our assumption, the SSA does not intend to maintain its age-specific deal. In particular, the age of eligibility for full retirement benefits will gradually increase from 65 to 67. This will provide a relatively small offset against the increasing costs faced by this program.

1.5.2 Medicare

Medicare costs show a significantly higher growth rate than Social Security costs and contribute almost $100 billion to the increase. The more rapid rate of increase in Medicare costs is due to its higher concentration of benefits

Table 1.4 **Projected Total Payments by Program Category (billion 1986 $)**

Category	1990	2000	2020	2040	2060	2080
Social Security	203.41	229.39	337.75	412.44	428.34	442.97
Other retirement	59.34	67.32	99.33	114.86	117.76	120.83
Medicare	77.94	89.86	128.84	175.50	183.07	192.57
Medicaid	50.55	57.95	69.49	86.34	90.10	95.22
Welfare	44.03	49.78	52.61	55.44	55.87	56.44
Work-related	20.05	22.10	23.62	23.32	23.24	23.25
Military	33.29	39.82	53.32	54.56	55.69	56.00
Education	180.18	189.29	183.83	183.93	183.93	183.09
Total	668.80	745.52	948.79	1,106.38	1,138.00	1,170.37

Sources: Alternative II from U.S. SSA (1989); U.S. Bureau of the Census (1986).

among the elderly. Recall that Social Security includes disability benefits and survivor benefits, which are often received by the nonelderly.

Our calculation assumes that the age-specific cost of Medicare remains at 1986 levels. Therefore, we do not project that the relative cost of medical care will increase (even though most forecasters would predict that), and we implicitly assume that the average health status of individuals of a particular age will remain constant. Both assumptions are made for simplicity and to provide a baseline for discussion. However, both are open to question and may not be realistic. The relative cost of health care has been increasing at something like a 4 percent rate for at least a decade, and that trend is likely to continue. Part of the reason is that new and more expensive treatment procedures are constantly being developed. Second, one might think, for example, that the average 75-year-old male will be healthier in 2040 than in 1990, corresponding to his increase in life expectancy and improvements that can be anticipated in medical technology. However, the improvement in medical technology cuts both ways in terms of the average health status of elderly individuals. While it is reasonable to assume that some elderly will be healthier and have health status equivalent to that of younger individuals in the previous generation, others may survive into the older age cohorts because of improved medical technology, but their health status may still be relatively poor for their age. There is some evidence (Poterba and Summers 1987) that the two tendencies offset each other and that the average age-specific health status remains constant even as the life expectancies of men and women increase.

1.5.3 Medicaid

Medicaid is a state-administered, largely federally funded, program of health insurance for those in poverty. As displayed in table 1.3, the expected payments do not differ dramatically by age, with the exception of the two oldest age categories, 75–85 and 85+. Medicaid pays for a great deal of the long-term care for many of the institutionalized elderly. The costs of institutionalized care are such that if you are not in poverty at the time of admission, you

may well be after a period of residence. The result of Medicaid's high expected payments to the very old and of the projected growth in the number of people in these age cohorts is a 70.8 percent increase in the cost of Medicaid between 1990 and 2040.

1.5.4 Education

Federal, state, and local expenditure on education remains roughly constant at $180–$190 billion between 1990 and 2040. This is a direct consequence of the projection that the number of children aged 5–19 will change very little during this period. Some observers have noted that reduced spending on education will partially offset increases in government spending for the elderly. Our projections suggest that educational spending will remain stable and will not offer such an offset. We do find that projected growth in spending for programs like Social Security, Medicare, and Medicaid will reduce education's share of total government outlays between 1990 and 2040.

1.5.5 Other Programs

Welfare and work-related programs show slower growth rates than Social Security and the medical programs, with spending on welfare growing by 25 percent and spending on work-related programs growing by 16 percent between 1990 and 2040. The largest expected welfare payments are received by single female heads of household aged 25–45. The largest expected work-related payments are received by married couples and single male heads of household aged 25–65. Because these groups are not projected to grow as rapidly as the population over age 65, welfare and work-related programs do not have a major impact on the overall trend in government spending. In 1990, total payments for Social Security were 4.6 times greater than total payments for welfare and 10.1 times greater than total payments for work-related programs. By 2040, the gap between Social Security and the other programs widens; Social Security payments are 7.4 times greater than welfare payments and 17.7 times greater than work-related payments. These trends suggest that even major cutbacks in welfare and work-related programs will do little to stem the projected increase in government program payments to households.

The results of table 1.4 are illustrated in figure 1.5. The graph highlights the importance of Social Security, Medicare, and Medicaid in the "constant-deal" cost growth between 1990 and 2040. The three programs account for $343 billion of the total increase of $437 billion.

The potential for even larger increases in the cost of these three programs if elderly populations exceed the SSA's "best guess" forecast is shown in table 1.5 and also in figure 1.6, which show the implications of the Manton, Stallard, and Singer "optimal risk factor" population projections. Reiterating the caveat that these are extreme upper bounds of what might happen, one sees that the cost of the programs examined goes from $651.4 billion in 1990 to almost $1.8 trillion by 2040. Both population forecasts imply that the cost of these pro-

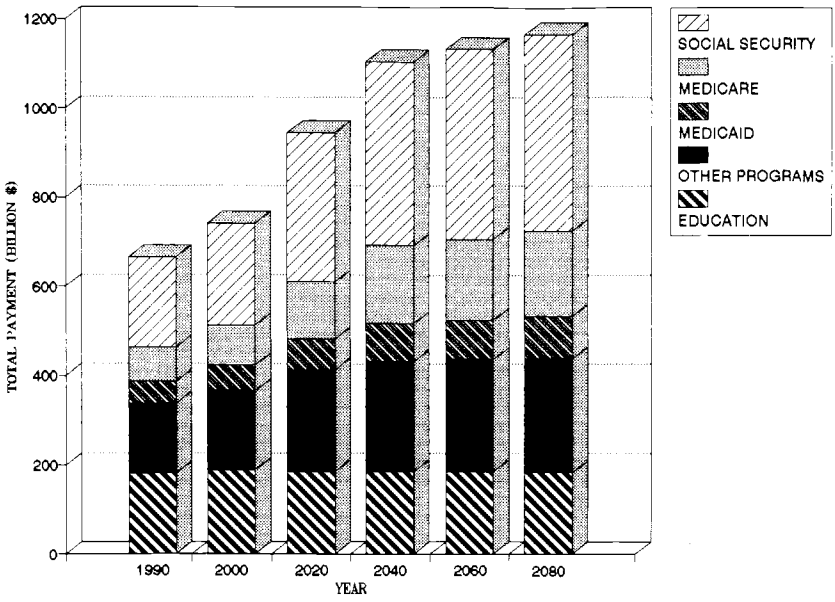

Fig. 1.5 Projected total payments by program category

Table 1.5 Projected Total Outlays Using "Optimal" Population Projections (billion 1986 $)

Category	1990	2000	2020	2040	2060	2080
Social Security	193.603	227.551	407.986	707.589	770.832	759.473
Medicare	73.586	89.200	182.868	360.909	403.388	398.329
Medicaid	49.628	59.573	100.413	180.567	202.319	200.398
Welfare, work-related, and military	154.443	176.882	251.845	335.974	347.857	340.258
Education	180.176	189.294	183.834	183.927	183.931	183.092
Total	651.436	742.499	1,126.946	1,768.967	1,908.329	1,881.551

Sources: "Optimal" population projection from U.S. SSA (1989); U.S. Bureau of the Census (1986).

grams levels off after 2040, but there is no projected reduction in the required total outlays.

Tables 1.6 and 1.7 show the projected per capita outlays in each forecast year for the two alternative population projections. The per capita basis in both tables is the projected number of adults between the ages of 20 and 64. In table 1.6, based on the SSA's "best guess" population forecasts, per capita outlays grow 37.7 percent between 2000 and 2040. The per capita expenditure grows "only" 6 percent in the 40 years from 2040 to 2080. The jump in per capita

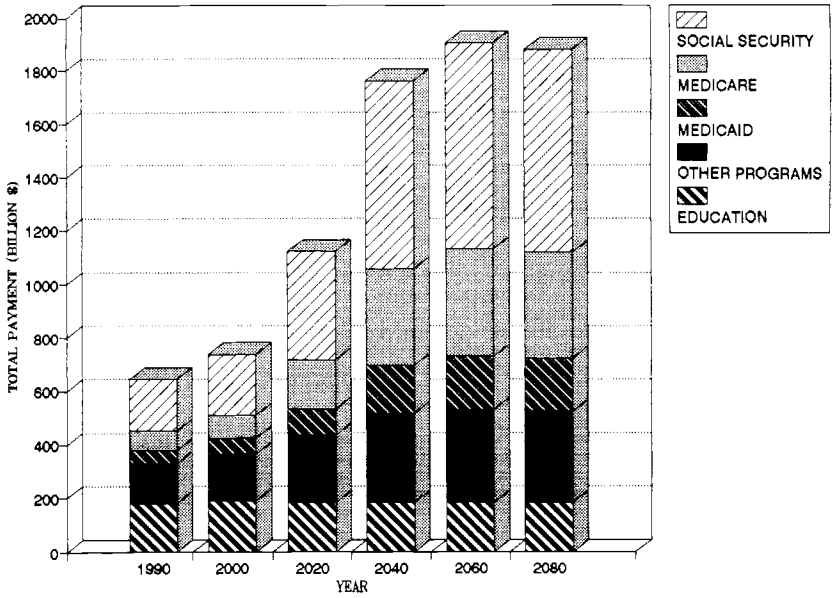

Fig. 1.6 Projected total payments by program category for "optimal" population projection

Table 1.6 Projected per Capita Outlays by Program Category (1986 $)

Category	1990	2000	2020	2040	2060	2080
Social Security	1,340	1,388	1,862	2,316	2,418	2,494
Medicare	513	544	710	985	1,033	1,084
Medicaid	333	351	383	485	509	536
Welfare, work-related, and military	1,033	1,083	1,262	1,393	1,426	1,444
Education	1,187	1,146	1,014	1,033	1,038	1,031
Total	4,406	4,512	5,232	6,212	6,423	6,589

Note: Projected per capita outlays were calculated by dividing projected total outlays from table 1.4 by the total population between ages 20–64 in each year.

costs is much sharper with the Manton, Stallard, and Singer numbers, growing 126.5 percent between 2000 and 2040 and 15 percent thereafter (between 2040 and 2080).

1.6 Summary

The U.S. federal government has found it impossible to balance its budget in recent years. Our conclusion is that the budgetary pressure caused by the

Table 1.7 **Projected per Capita Outlays by Program Category Using "Optimal" Population Projection (1986 $)**

Category	1990	2000	2020	2040	2060	2080
Social Security	1,349	1,368	2,279	4,044	4,607	4,692
Medicare	513	536	1,022	2,063	2,411	2,461
Medicaid	346	358	561	1,032	1,209	1,238
Welfare, work-related, and military	1,076	1,063	1,407	1,920	2,079	2,102
Education	1,255	1,138	1,027	1,051	1,099	1,131
Total	4,538	4,463	6,296	10,110	11,404	11,623

Note: Projected per capita outlays were calculated by dividing projected total outlays from table 1.5 by the total population between ages 20–64 in each year.

aging of the population over the next 50 years will exacerbate this problem. The ability of the government to embark on new spending programs will undoubtedly be impeded.

We have purposely made the unrealistic assumption that the age-specific per capita cost of government health programs will remain constant. Even with that assumption and with the relatively conservative demographic assumptions in the SSA's "best guess" population forecasts, we calculate a 65.4 percent ($437 billion) increase in the cost of the programs we examine, by 2040. With the extreme "optimal risk factor" population projections, the total cost of our programs grows by well over $1 trillion in the next 50 years. Clearly, with either scenario, these projections have serious consequences. First, the constant age-specific generosity of these programs will be difficult to maintain. There will be strong pressures to cut the benefits of these programs, many of which are referred to as "entitlements." Second, new initiatives with budgetary costs will be crowded out by the growing expense of the existing programs.

The growth in expenditures of these programs is dominated by Social Security, Medicare, and Medicaid. Even if age-specific costs can be contained for these programs (a big "if"), their total costs will grow enormously as a result of the aging of our society. While it is conceivable that economic growth will permit us to afford these programs, most, if not all, of the fiscal dividend provided by growth over the next 50 years will have to be devoted to financing these programs. If we do not contain age-specific costs or if we do not experience robust economic growth, then the pressures to curtail these government programs will be overwhelming.

Appendix A
Government Transfer Program Descriptions

Name[5]	Description
Social Security Income	Federal: old age, survivors, and disability benefits; based on prior earnings and payroll contributions
Other retirement income	
Federal civil service pensions	
Railroad retirement income	For retired railroad workers
State government pensions	
Local government pensions	
Medicare	Federally administered subsidized health insurance; most hospital and medical costs for persons over 65 or disabled
Medicaid	State administered; federal grants made to states; health-care coverage to persons receiving federally supported public assistance; AFDC families automatically eligible
Work-related programs	
Workers' Compensation	State-administered compensation for injured workers, also for some work-related illnesses, notably black lung disease; composed of cash, medical, and rehabilitation benefits; total 1986 compensation = $17.8 billion
State unemployment compensation	State administered; eligibility based on past earnings and work experience; each state has broad discretion; funded by payroll tax
Other unemployment compensation	
Welfare and Income Support Programs	
AFDC	State administered with federal matching shares; on average, burden is 55 percent federal, 40 percent state, and 5 percent local

5. Community health centers, Department of Veteran Affairs health-care system, Indian Health Service, low-income housing, and social service block grants are excluded from this analysis.

Special Supplemental Feeding Program (WIC)	Food and food vouchers for low income, pregnant, and postpartum women and for children up to age 5
Food stamps	Federally funded; households receive monthly allowances of food stamps based on income and household size; other food programs include child and elderly nutrition (such as school lunch program) and distribution of surplus food
Supplemental Security Income	Federal program for poor people aged 65 and over, blind, or disabled; means tested
General Assistance	Means-tested state programs for the poor; concentrated in big cities; combination of cash, medical, and hospital benefits; large variance across states
Foster childcare payments	Federal program channeled through the states for all foster-care children meeting AFDC eligibility
Child support payments	
Other welfare	
Military-related programs	
Military retirement pensions	Paid to veterans or survivors with annual income below a certain level, and over 65 or disabled; total 1988 payments = $4.3 billion
Veterans' Compensation	Compensation for injury, disability, or death paid to veterans or survivors; received by one-thirteenth of veterans; total 1988 cost = $8.7 billion
GI Bill Benefits	Educational assistance for veterans; 1989 total = $511 million
Education	Federal, state, and local spending for education, including elementary, secondary, and postsecondary education

Appendix B
Expected Transfer Payments in 1986 (1986 $)

Table 1B.1 **Single Females**

	Age Cohort							
	15–25	25–35	35–45	45–55	55–65	65–75	75–85	85+
AFDC	174.8	447.41	413.54	189.35	16.81	1.02	2.39	0
Social Security	43.22	82.88	296.7	340.7	1,426.82	4,590.14	4,647.54	4,279.27
Railroad retirement	0	1.35	0	0	12.03	139.88	126.99	100.22
Supplemental Security	30.81	91.23	85.69	222.9	169.95	237.26	196.68	267.86
State unemployment compensation	14.72	70.69	143.07	58.82	59.44	0.23	0	0
Veterans' compensation	2.65	10.82	37.31	106.05	170.6	112.25	69.51	93.45
Workers' compensation	8.43	4.5	47.26	49.22	22.47	10.12	0	0
General assistance	13.6	32.75	71.8	45.81	27.02	3.71	0	0
Foster childcare	0	0	0.67	0	2.29	0	0	0
Other welfare	4.85	12.86	8.51	5.69	0	12.59	6.93	1.76
Food stamps	67.2	253.79	313.24	216.25	75.57	29.25	26.82	17.03
Child support payments	18.7	276.4	847.84	273.42	6.48	0	0	0
Federal civil service pensions	0	0	13.68	146.78	272.31	369.4	301.83	206.86
Medicare	7.06	25.11	49.44	148.98	272.33	1,637.97	2,456.49	2,851.89
Medicaid	213.13	472.53	611.37	327.33	211.91	294.64	700.66	1742
Military retirement	0	0	0	12.38	7.16	34.71	25.61	0
State government pensions	0	0	0	35.63	237.42	382.02	258.29	128.68
Local government pensions	0	0.28	0	1.49	53.68	98.06	305.2	34.24
GI Bill benefits	3.27	2.36	0	0	0	0	0	0
WIC	10.84	7.21	3.69	1.4	0	0	0	0
Other unemployment compensation	0	0.29	0.7	0	0	0	0	0

Table 1B.2 **Single Males**

	Age Cohort							
	15–25	25–35	35–45	45–55	55–65	65–75	75–85	85+
AFDC	1.1	6.97	29.46	22.58	4.96	0	0	0
Social Security	49.01	70	136.02	356.04	1,231.72	5,190.2	5,257.96	5,197.11
Railroad retirement	0	0	0	0	11.76	248.28	331.45	486.79
Supplemental security	20.54	48.51	88.21	108.73	163.07	213.76	125.03	87.13
State unemployment compensation	48.07	123.03	172.61	119.1	81.88	1.26	0	0
Veterans' compensation	1.06	10.31	78.7	215.5	397.64	558.09	101.62	11.45
Workers' compensation	10.28	59.94	98.71	105.4	34.65	0	0	0
General assistance	3.46	19.45	37.71	15.06	42.07	10.49	0	0
Foster childcare	0	0	0	4.13	0	0	0	0
Other welfare	0.54	0.42	0	0	0.58	0	0.62	0
Food stamps	2.83	12.14	42.52	31.63	23.8	26.64	21.45	9.1
Child support payments	0.75	4.83	34.07	0	0	0	0	0
Federal civil service pensions	0	4.79	0	0	170.6	877.48	594.2	958.04
Medicare	5.58	19.00	39.25	152.00	282.06	1,785.21	2,648.10	3,128.68
Medicaid	94.93	118.47	162.7	184.02	203.53	294.64	700.66	1742
Military retirement	1.53	0	9.69	414.94	466.37	647.95	84.4	0
State government pensions	0	0	0	24.19	84.59	273.61	396.55	179.22
Local government pensions	0	0	0	10.13	31.2	250.67	249.51	7.93
GI Bill Benefits	10.34	16.57	18.1	15.81	0	0	0	0
WIC	0	0	0	0	0	0	0	0
Other unemployment compensation	0	0	0	0	0	0	0	0

Table 1B.3 **Married Couples**

	Age Cohort							
	15–25	25–35	35–45	45–55	55–65	65–75	75–85	85+
AFDC	105.3	63.63	58.56	30.47	10.04	6.92	0	0
Social security	11.79	44.87	105.55	437.76	3,064.57	9,237.4	8,847.57	8,582.22
Railroad retirement	0	1.95	0	5.33	174.88	357.04	181.12	175.65
Supplemental security	0	10.73	26.61	21.4	61.6	75.45	129.86	689.04
State unemployment compensation	189.64	231.93	174.35	141.19	88.86	12.62	0	0
Veterans' compensation	27.39	45.09	59.1	89.84	326.53	190.87	78.7	149.54
Workers' compensation	76.84	107.88	36.7	87.59	114.17	15.3	0	0
General assistance	3.64	10.44	6.68	8.14	8.83	0	2.89	0
Foster childcare	3.37	10.54	5.23	7.29	3.65	0	0	0
Other welfare	0.47	0.63	10.73	1.82	0.44	3.17	14.29	0
Food stamps	86.28	74.82	53.52	42.37	20.49	12.08	17.93	19.77
Child support payments	23.97	88.41	87.22	12.27	2.19	0	0	0
Federal civil pensions service	0	0	17.31	98.52	801.23	979.51	938	1,067.23
Medicare	0.00	3.96	21.44	94.60	217.91	3,513.87	5,142.88	5,928.77
Medicaid	263.82	270.29	317.92	354.07	407.15	568.68	1,254.32	3,246.84
Military retirement	24.56	7.21	128.98	656.43	468.37	514.6	54.02	0
State government pensions	0	3.15	25.3	145.45	564.54	601.67	1,029.28	0
Local government pensions	0	0	8.75	52.47	201.12	264.57	323.59	0
GI Bill benefits	14.17	29.85	20.18	10.3	5.24	0	0	0
WIC	24.67	7.52	1.83	0.23	0.12	0	0	0
Other unemployment compensation	1.92	1.21	4.5	7.33	0.1	0	0	0

Appendix C
Total Transfer Payments (billion $)

	Age Cohort								
	Under 25	25–35	35–45	45–55	55–65	65–75	75–85	85+	Total
				Year 1990					
Social Security	1.47	1.94	3.64	6.60	33.82	90.44	50.60	14.90	203.41
Other retirement	0.00	0.13	0.81	3.86	17.65	21.77	12.88	2.24	59.34
Medicare	0.20	0.44	0.74	1.86	3.36	33.58	27.88	9.88	77.94
Medicaid	5.26	8.34	8.37	5.25	4.64	5.58	7.31	5.79	50.55
Income	5.67	13.05	13.19	4.89	2.40	2.38	1.65	0.95	44.19
Work-related	1.93	6.84	5.39	3.39	2.26	0.23	0.00	0.00	20.05
Military	0.45	1.43	3.73	9.93	9.18	7.32	0.99	0.26	33.29
Education	180.18	0.00	0.00	0.00	0.00	0.00	0.00	0.00	180.18
Total	195.16	32.18	35.88	35.78	73.31	161.32	101.32	34.02	668.95
				Year 2000					
Social Security	1.50	1.66	4.56	9.76	38.33	91.66	61.13	20.79	229.39
Other retirement	0.00	0.11	0.89	5.48	19.96	22.10	15.70	3.08	67.32
Medicare	0.20	0.38	0.94	2.86	3.84	34.06	33.76	13.82	89.86
Medicaid	5.31	7.03	10.09	7.70	5.27	5.65	8.81	8.08	57.95
Income	5.73	10.96	16.85	7.84	2.76	2.36	1.93	1.35	49.78
Work-related	1.91	5.79	6.60	5.00	2.57	0.24	0.00	0.00	22.10
Military	0.45	1.21	4.28	14.42	10.41	7.50	1.19	0.37	39.82
Education	189.29	0.00	0.00	0.00	0.00	0.00	0.00	0.00	189.29
Total	204.39	27.13	44.22	53.06	83.13	163.57	122.53	47.50	745.52
				Year 2020					
Social Security	1.49	1.79	3.86	9.79	63.80	153.42	74.05	29.56	337.75
Other retirement	0.00	0.12	0.77	5.29	32.32	37.23	19.18	4.43	99.33
Medicare	0.20	0.41	0.80	2.93	6.86	56.94	41.05	19.65	128.84
Medicaid	5.30	7.61	8.56	7.60	8.86	9.45	10.65	11.46	69.49
Income	5.70	11.93	14.00	7.73	5.10	3.98	2.26	1.92	52.61
Work-related	1.93	6.22	5.68	5.07	4.33	0.39	0.00	0.00	23.62
Military	0.45	1.29	3.71	14.63	18.27	13.01	1.42	0.52	53.32
Education	183.83	0.00	0.00	0.00	0.00	0.00	0.00	0.00	183.83
Total	198.90	29.37	37.37	53.05	139.54	274.42	148.60	67.54	948.79
				Year 2040					
Social Security	1.53	1.72	3.84	10.57	55.98	155.64	128.43	54.73	412.44
Other retirement	0.00	0.11	0.77	5.68	28.49	38.07	33.40	8.34	114.86
Medicare	0.20	0.40	0.80	3.18	5.93	57.67	70.93	36.40	175.50
Medicaid	5.43	7.31	8.50	8.19	7.76	9.56	18.44	21.15	86.34
Income	5.85	11.44	13.81	8.40	4.35	4.10	3.93	3.56	55.44
Work-related	1.98	5.99	5.69	5.47	3.80	0.39	0.00	0.00	23.32
Military	0.47	1.24	3.71	15.77	16.09	13.78	2.54	0.95	54.56
Education	183.93	0.00	0.00	0.00	0.00	0.00	0.00	0.00	183.93
Total	199.38	28.22	37.12	57.25	122.40	279.21	257.68	125.12	1,106.39
				Year 2060					
Social Security	1.51	1.70	3.95	10.20	56.15	169.95	118.30	66.59	428.34
Other retirement	0.00	0.11	0.78	5.50	28.56	41.64	30.90	10.27	117.76

	Age Cohort								
	Under 25	25–35	35–45	45–55	55–65	65–75	75–85	85+	Total
Medicare	0.20	0.39	0.82	3.06	5.94	62.97	65.48	44.22	183.07
Medicaid	5.38	7.18	8.73	7.91	7.79	10.44	16.97	25.71	90.10
Income	5.79	11.22	14.24	8.00	4.34	4.45	3.55	4.28	55.87
Work-related	1.96	5.91	5.84	5.29	3.82	0.42	0.00	0.00	23.24
Military	0.46	1.23	3.80	15.28	16.26	15.19	2.32	1.15	55.69
Education	183.93	0.00	0.00	0.00	0.00	0.00	0.00	0.00	183.93
Total	199.24	27.73	38.16	55.23	122.86	305.06	237.50	152.22	1,138.00
				Year 2080					
Social Security	1.50	1.70	3.92	10.06	57.71	166.77	122.34	78.96	442.97
Other retirement	0.00	0.11	0.78	5.42	29.33	40.87	32.04	12.28	120.83
Medicare	0.20	0.39	0.82	3.01	6.11	61.83	67.75	52.45	192.57
Medicaid	5.35	7.21	8.67	7.79	8.01	10.24	17.53	30.43	95.22
Income	5.75	11.26	14.13	7.83	4.46	4.29	3.63	5.08	56.44
Work-related	1.95	5.93	5.80	5.22	3.93	0.41	0.00	0.00	23.25
Military	0.46	1.23	3.78	15.10	16.76	14.92	2.40	1.35	56.00
Education	183.09	0.00	0.00	0.00	0.00	0.00	0.00	0.00	183.09
Total	198.30	27.85	37.89	54.42	126.32	299.34	245.70	180.55	1,170.37

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Comment Michael D. Hurd

It can be useful to think of total government spending as a weighted average of per capita spending with weights given by the population that draws on the programs. This is particularly true for a range of entitlement programs such as Social Security, because the rules roughly fix individual benefits and the sys-

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tem passively accepts total spending as determined by the number who qualify. This leads to a natural decomposition of change in spending into change per capita and change in population weights. Shoven, Topper, and Wise calculate part of this decomposition: the change in government spending on transfer programs that will result from changes in the age distribution of the population, holding constant per capita spending on each program.

The age distribution is expected to change rather dramatically, so we should expect rather large changes in government spending because of the importance of age-related programs. Indeed, Shoven, Topper, and Wise find that "the cost increase per adult is projected to be about 25%." Almost all of this is due to the increased costs of programs that benefit the elderly: about half comes from Social Security benefits and the rest from Medicare and Medicaid and from other federal government retirement programs (primarily civil service and military pensions). Shoven, Topper, and Wise conclude that "these projections have serious consequences. First, . . . there will be strong pressures to cut the benefits of these programs. . . . Second, new initiatives with budgetary costs will be crowded out by the growing expense of the existing programs."

I agree with their conclusion, but not because of their analysis. In fact, with a small modification, their analysis leads to optimistic conclusions. The modification is to allow income growth, which they exclude from their calculations. Suppose, for example, real GNP grows by 1 percent per year per capita. Then Social Security benefits as a percentage of GNP will fall from 5.0 percent in 1990 to 4.8 percent in 2020, so that the burden of transferring Social Security benefits through the tax system will decrease, not increase. Because the Medicare, Medicaid, and federal retirement programs increase at about the same rate as Social Security benefits, they will similarly decline as a percentage of GNP and, therefore, so will total government spending on these programs as a percentage of GNP.

Expert Panel Projections

The rest of my comments will be based on a report published by the 1991 Advisory Council on Social Security (1991). The council convened an expert panel to study the implications of the demographic change on income security and health-care expenditures. The panel produced a number of spending projections to 2020. I will take some examples from the panel's report and compare them with some results of Shoven, Topper, and Wise.

Table 1C.1 shows several categories of expenditures and transfers. The projection of Social Security benefits is based on a detailed projection model of the Office of the Actuary of the Social Security Administration. Health-care expenditures are the percentage of GNP spent on health care regardless of payment source. The projection is a modification of that of Shoven, Topper, and Wise: it reflects age-composition changes and per capita GNP growth. It is an aggregate of 18 kinds of health-care expenditures by age; an example is inpatient care in community hospitals, which varies by age. The projection of

Table 1C.1 Current and Projected Expenditures (% of GNP)

	1990	2020
Social Security retirement benefits	4.6	5.8
Health care	12.2	13.7[a]
Federal government purchases	7.7	6.2
State and local education	5.2	4.5
Total	29.7	30.2

Source: Advisory Council on Social Security (1991).

[a]Based only on changes in age composition and per capita GNP growth.

federal government purchases is based on expert judgement. The method of projecting educational expenses is similar to the method of Shoven, Topper, and Wise. Educational expenses fall because of the decline in the fraction of school-age population. The expert panel considered other uses of GNP, such as investment, but they are not sensitive to the age distribution, so I have not listed them.

The table shows a modest rise in the total. The conclusion is that at least until 2020 the change in age distribution is manageable. Between 2020 and 2030, the fraction of the population over age 65 increases further, but the same overall conclusion remains.

Table 1C.1 allows no change in per capita health-care expenditures except from income growth. However, over the past 20 years real per capita health-care expenditures have risen at an annual rate of 4.4 percent, which is much greater than the rate of GNP growth. A continuation of such rates of growth will have major impacts on Medicare and Medicaid and on the economic status of the elderly.

At the request of the expert panel, the Health Care Financing Administration (HCFA) constructed four scenarios for future health-care expenditures. The projections are based on forecasts of 18 kinds of health-care use. Expenditures on each kind can change because of demographic changes, changes in frequency of use, changes in intensity of use, and medical inflation in excess of general inflation.

Table 1C.2 gives an outline of the scenarios and the percentage of GNP spent on health care under each scenario. The expert panel focused on scenarios 2 and 3. Both show an increase in the percentage of GNP spent on health care that completely dominates any changes associated with demographic shifts (scenario 4). Both require a very large shift in the composition of total consumption from 12.2 percent of GNP in 1990 to 31.5 percent or 22.7 percent. Under scenario 2, all of the personal income growth between now and 2020 would be spent on health care, and under scenario 3, 69 percent of it would be.

It is hard to believe that health-care expenditures will grow from 12.2 percent of GNP to 22.7 percent or possibly even 31.5 percent; yet, it is difficult to

Table 1C.2 Four Scenarios of Health-Care Expenditures in 2020

	Scenario			
	1	2	3	4
Growth rates (%)	Same real growth per capita as last 10 years (4.7)	Modest reductions in growth rates; per capita growth same as last 20 years (4.4)	Moderate reductions in growth rates; per capita growth = 3.1	Demographic and GNP growth only
Expenditures (% of GNP)	36.0	31.5	22.7	13.7

Source: Advisory Council on Social Security (1991).

identify the mechanisms that will prevent such growth. One possibility is that a substantial fraction of the population will, because of costs, have limited access to the health-care system. In 1990, the elderly paid about 17 percent of their median income on medical expenses.[1] Under scenarios 2 and 3, this is expected to rise to 30 percent and 23 percent, respectively. Real per capita payments by private health-care insurers are projected to increase by factors of 3.2 and 2.3, which will threaten employment-based health-care coverage because of the expenses to employers.

The results of Shoven, Topper, and Wise, when normalized by GNP growth, show a fall in the tax burden; but according the HCFA projections, the per capita cost will substantially increase the tax burden. In 1990, the federal government's share of Medicare (HI and SMI) amounted to 4.4 percent of the taxable Social Security payroll. Under scenarios 2 and 3, this is expected to increase to 17.6 percent and 12.5 percent, respectively. Either of these is, of course, a very large increase in the tax burden.

Conclusion

The effects of population aging through 2020 seem manageable: the increase in transfers through the Social Security system are within historical variation; health-care costs associated with the demographic change do increase but not alarmingly; although not discussed here, the private pension system should be able to pay for the greater number of retirees. By far the most important problem is the escalation of health-care costs. This is associated with the demographic change because of an interaction effect: the elderly consume health-care services much more intensely than the nonelderly. The force driving the escalation, however, is not the age distribution of the population. The large projected increases in health-care costs come from inflation of medical

1. This figure includes payments for SMI premiums but not for any privately purchased health insurance.

costs in excess of general inflation, increased use per person, and increased intensity (higher cost per use). The expert panel concluded that immediate action is required to contain costs and that increasing costs will reduce the access of many to the health-care system.

Reference

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