The effects of health insurance on consumer spending

In the late 1960's and early 1970's, much of the burden of funding health care shifted to business and government; households, which in large measure have avoided increasing health care expenditures, may contribute more in the future, affecting nonhealth expenditures

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Health care expenditures in the United States are consuming an ever increasing portion of gross domestic product (GDP). In 1993, the Nation's health care costs amounted to $884.2 billion, up 7.8 percent from 1992, accounting for 13.9 percent of the GDP.[1] This compares with 5.9 percent in 1965,[2] the year in which the Federal Government initiated two major health care programs—medicare and medicaid.[3]

As reliance on the health care system and the cost of health care have risen, responsibility for funding health care has shifted. In 1965, 50 percent of health services and supplies were paid for by household out-of-pocket spending.[4] By 1993, the amount dropped to 18 percent.[5]

In the late 1960's and early 1970's, much of the direct cost of funding health care shifted to business and government. The private business share of health services and supplies grew from 16 percent in 1965 to 28 percent in 1981 and has since remained fairly constant.[6] But the Federal Government's share of health care expenditures continued to grow, increasing on average 12.2 percent a year over the 1989–93 period. In 1993, the Federal Government's share for health care amounted to 31.7 percent of the Nation's health care bill.[7] Rising costs for health care, increased use, changing demographics, and the perennial initiative for fiscal austerity in the Federal Government are continually sparking debate over funding health care. Households, which have avoided much of the direct costs of increasing health care expenditures, are likely to contribute more to fund health care in the future. Such a prospect makes it important to examine household expenditure patterns to establish a reference point for assessing how a transfer of health care costs to consumers may affect families.

This article uses Consumer Expenditure Survey data to analyze expenditures for health care and other items in the consumer budget for four distinct groups: the fully insured, the partially insured, medicaid recipients, and the uninsured.

The demographic characteristics of consumer units are described and compared for each group.[8] Expenditure shares for each group are derived and analyzed. Regression results also are described. Income elasticities are derived from these results and examined. The data show clear differences in consumer spending patterns among groups, depending on insurance coverage; the differences are not limited to health care expenditures alone.

Past trends

Increases in health care expenditures can be sorted by price increases, population increases that lead to greater use of health care, and intensity of use (changes in use or in the type of services and supplies). In the 1960's, the Consumer Price Index (CPI-U) for medical care averaged 2.3

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percentage points more per year than the overall Consumer Price Index.[9] The 1989–94 annual average change of the medical care index (7.3 percent) was 3.4 percent higher than the CPI (3.9 percent).

In the 1960–91 period, health care expenditure increases that can be attributed to rising prices averaged 57 percent. Population growth accounted for 10 percent of increased spending on health care, while intensity of use was responsible for the remaining 33 percent.[10]

Federal government-sponsored insurance programs that cover primarily the needs of the elderly (medicare) and the poor (medicaid), made up 70 percent of all public funding for health care in 1993.[11] Although the rate of growth of public expenditures on medicaid has fallen in the past 3 years, the growth rate remains relatively high: it has increased 16 percent per year, on average, between 1991 and 1993.[12]

In 1993, Federal, State, and local governments spent $117.9 billion on the medicaid program.[13] Consumer Expenditure Survey data show that the families that participate in the medicaid program represent about 9 percent of U.S. households. Federal spending for medicare in 1993 totaled $154.2 billion.[14] Medicare outlays per enrollee increased more rapidly than private insurance in 1992 and 1993, reversing a pattern that held for nearly a decade.[15]

As the baby-boom generation approaches retirement age, the current system of transfers of health care funds to those on medicare may need to be restructured.[16] In a study on health care spending, Ralph Bradley found that if changes are not made in the current health care system, unanticipated transfers of wealth from the younger generation to the elderly could accelerate at the start of the 21st century.[17]

As noted above, private business stabilized its share of national health care expenditures in the 1980's. This was accomplished by shifting some of the costs of employees' health insurance premiums to workers. According to Katharine R. Levit, Mark S. Freeland, and Daniel R. Waldo, the cost of health care paid by employers has increased steadily since the mid–1960's. As a result, businesses have experimented with alternative methods of cost containment, while still providing health insurance as a benefit. They state that deductible expenses for employees have increased: In 1980, 8 percent of full-time workers in medium and large firms who participated in employer-sponsored health insurance plans had a deductible greater than $100.[18] By 1993, 54 percent of such workers had deductibles greater than $100, while 25 percent had deductibles of $250 or more.[19] According to the BLS Employee Benefits Survey, from 1980 to 1993 the proportion of full-time employees in medium and large private establishments whose health insurance premiums were completely paid for by their employer declined by 47 percent for those with self-coverage policies and by 56 percent for those with family coverage policies.[20]

As some premium costs were shifted from employer to employee, more benefits and broader coverage were offered by encouraging participation in health maintenance organization-type plans.[21] Health insurance companies responded to rising medical care prices by increasing consumers' out-of-pocket expenditures for health care. However, a shift toward health maintenance plans to contain the cost of copayments and deductibles may have offset some of these increases.

Consumer expenditures for health insurance premiums have increased, probably in part by shifting premium costs from employer to employee. The Consumer Expenditure Survey shows that the percentage of families that reported health insurance expenditures rose steadily, from 55 percent in 1988 to 61 percent in 1993. The survey also shows that insurance premiums increased from 39 percent of the average family's spending on health care in 1988 to 45 percent in 1993. The data indicate that, in nominal dollars, average spending on health insurance premiums rose 69 percent in this 5-year period.

Eva Jacobs and Stephanie Shipp show that as a share of current consumption, (total expenditures minus gifts outside the family, cash contributions, and personal insurance and pensions), out-of-pocket health care expenditures peaked at 6.7 percent in 1960–61, declined to 5.4 percent in 1972–73, and rose to 5.7 percent in 1988–89.[22] Some of the decline is undoubtedly due to medicare and medicaid. In 1993, the share of current consumption allocated to health care rose to 6.9 percent.[23]

Several recent studies have used Consumer Expenditure Survey data to analyze various aspects of health care. Richard D. Miller and Elizabeth M. Reise examined the probability of purchasing health insurance for various types of consumers;[24] Rose M. Rubin and Kenneth Koelln tested for evidence of moral hazard, which is the increased demand for health care as a result of having health insurance, and adverse selection, which is the increased likelihood that a less healthy person will purchase insurance than will someone in good health.[25]

Edith Rasell, Jared Bernstein, and Kainan Tang combined Consumer Expenditure Survey data with National Medical Expenditure Survey data to investigate the distribution of health care spending among families by income level.[26] They found that when consumer tax obligations are

included in an analysis of out-of-pocket spending on health care, the health care system becomes considerably regressive.

Although these articles have considered different issues related to health care, none has examined the relationship between out-of-pocket health care expenditures and other spending patterns. This article examines Consumer Expenditure Survey data to measure how changes in out-of-pocket health care expenditures affect budgets of families that have different levels of health insurance.

About the data

The data presented in this article are from the interview component of the Consumer Expenditure Survey for all families interviewed between January 1993 and December 1993.[27] The interview component collects data quarterly from about 5,000 consumer units on a rotating panel basis. Families selected to participate in the survey may do so for up to five consecutive quarters. Data collected in the first interview are not included in the survey, but are used as a reference to compare responses in the subsequent interview.

Each quarter, 20 percent of the sample is rotated out of the survey and a new 20 percent is sampled. Data collected in each quarter are considered independent so that the estimates are not contingent on the responses of families participating in the survey for all five quarters.

The survey is designed to collect data about expenses for relatively large purchases and expenses that occur on a regular basis. The total sample size for the study is 20,877 interviews, which, when weighted to reflect the population, represent about 100 million families.[28] In addition to collecting data on expenditures, the Consumer Expenditure Survey gathers information on demographic characteristics, including each respondent's age, education, ethnicity, and occupation,[29] and each family's income, composition, and region of residence.

Definitions of insurance status. Information about health insurance is obtained by asking families to list the number of health insurance policies held by the family and the number of family members each policy covers. Additional data, such as the type of policy, whether the policy is part of a group plan, and who pays the premium—employer, family, employer and family, union, or person outside of the family—also are collected.

Families are placed in one of four health insurance status groups:

Fully insured—includes families in which the sum of the members covered by each insurance policy is equal to, or greater than, the number of family members. (Medicare is counted as an insurance policy.)[30]

Partially insured—includes families in which the number of members covered by health insurance policies is less than the total number of family members. (Medicare is counted as an insurance policy.)

Medicaid recipients—includes families in which at least one member is receiving medicaid, regardless of what other policies they may have. Although some family members may not be covered by medicaid, the entire family is placed in the medicaid group.

Uninsured—includes families who reported that they did not have a policy, or that they had a policy that covered only someone outside the consumer unit (such as a child at school), or that they had a policy with limited coverage.[31]

These definitions of health insurance status groups are consistent with those derived by Miller and subsequently used by both him and Reise in their studies of health insurance coverage.[32]

The findings

Table 1 shows data on selected characteristics of families by health insurance status for all families sampled. The data used in this article are weighted to represent the U.S. population. Characteristics refer either to the family as a whole (for example, annual income before taxes,[33] composition of consumer unit, and region), or to the reference person (for example, his or her age, ethnicity, and occupation).[34]

The fully insured. About two-thirds of all families have full insurance coverage. This group has, on average, the oldest reference person, the fewest family members under the age of 18,[35] and the smallest family size. Fully insured families are predominantly in the upper two income quintiles.[36] The fully insured group also includes fewer blacks and Hispanics, and more college graduates, than the other groups. Typically, families with full health insurance coverage are married couples whose reference person is employed in a professional, managerial, or supervisory position. This group also has relatively fewer unemployed reference persons, more retirees, and more residents living in the Northeast than does the general population.

The partially insured. Families with partial coverage make up about one-tenth of all families. On average, this group has the largest family size, the most earners per family, and, like the fully insured group, relatively more families in the higher income quintiles. Families with

Table 1. **Selected characteristics of families by insurance status, 1993 Consumer Expenditure Survey**

Item	All consumer units	Insurance status			
		Fully covered	Partially covered	Medicaid	Not covered
Sample size	20,877	13,394	2,399	1,793	3,291
Number of consumer units (in thousands)	99,782	63,280	11,260	9,057	16,184
Age of reference person	47.8	51.4	45.0	45.0	37.0
Annual income before taxes[1]	$29,872	$33,603	$34,770	$13,041	$21,294
Average number per consumer units					
Persons	2.5	2.2	3.5	3.2	2.5
Earners	1.3	1.3	2.0	.8	1.4
Children under 18 years	.7	.5	1.0	1.4	.8
Persons over 64 years	.3	.4	.2	.3	0
Percent distribution					
Age of reference person					
Under 25	8	4	7	14	19
25-34	20	18	20	25	28
35-64	50	49	62	42	51
65-74	12	16	8	10	1
75 and above	10	14	4	9	1
Income distribution by quintile[1]					
1st quintile	20	14	10	55	31
2nd quintile	20	18	16	26	25
3rd quintile	20	21	23	11	20
4th quintile	20	23	27	5	13
5th quintile	20	24	23	3	11
Ethnicity of reference person					
Black	10	7	12	26	13
Hispanic origin	7	4	10	17	13
White and other	83	90	78	57	74
Education of reference person					
Less than high school diploma	22	18	22	50	24
High school graduate or some college	54	54	60	46	58
College graduate	23	28	18	4	18
Composition of consumer unit					
Husband/Wife only	21	28	10	6	10
Husband/Wife with children	27	26	36	18	28
Single parent	7	4	7	26	9
Single person	29	33	0	20	37
Other	16	8	47	30	16
Region of residence					
Northeast	20	22	17	21	15
Midwest	25	26	25	23	23
South	34	32	36	35	39
West	21	19	22	21	23
Occupation of reference person					
Wage and salary earner	64	63	77	37	76
Professional, managerial, supervisor	23	27	25	4	18
Technical, sales, clerical	15	15	19	8	15
Service	7	5	8	8	15
Blue collar and other	19	16	25	17	28
Self employed	7	7	6	3	8
Retired	18	24	10	14	3
Out of labor force (includes unemployed)	11	5	7	47	13

Note: Data may not add to 100 percent due to rounding.

[1] Data are for complete income reporters only (see text footnote 36).

partial insurance coverage are primarily in the 35-to-64-year-old age group and are more likely than other families to have a high school diploma or some college education. They are predominantly married couples with children or "other families."[37] Half of the group works for a wage or salary, in a professional, managerial, or supervisory position or in a blue-collar occupation.

Medicaid recipients. The medicaid group includes about 9 percent of families. On average, medicaid families have fewer earners and more

children per family than families in the other groups. As expected, families in the medicaid group are in the lowest income quintile, and about half of these families have a reference person who has not graduated from high school. About half also are unemployed or out of the labor force for reasons other than retirement. The percentage of blacks and Hispanics in this group is substantially higher than in the population as a whole. Also, a greater proportion of single-parent families participate in the medicaid program than do married couples.

The uninsured. The uninsured group represents about 16 percent of all consumer units. On average, families in this group are the youngest, representing substantially more persons under the age of 25 than the population as a whole. This group has the highest proportion of single persons and blue-collar workers. Members of this group also are more likely to be in the lower two income quintiles and to live in the South.

In measuring outlays for goods and services, dollar comparisons between groups become less meaningful for a given analysis if the groups being compared have different income or different total expenditure levels. For example, the fully and partially insured groups have the highest levels of total expenditures, on average, and they therefore spend more on nearly all items than do the medicaid or uninsured families. (See table 2.) Therefore, this analysis considers two types of shares: total expenditure shares and health care shares.

Expenditure shares. Expenditure shares are the ratio of mean expenditures for a specific category to the mean expenditure for a more general category. For example, the total expenditure share for food at home is calculated by dividing average food at home by average total expenditures. The health care share for insurance is calculated by dividing average health insurance expendi-

Table 2. **Average annual expenditures and t-statistics, by insurance status, 1993 Consumer Expenditure Survey data**

Type of expenditures	All consumer units	Insurance status				t-statistics for group mean differences					
		Fully covered (A)	Partially covered (B)	Medicaid (C)	Not covered (D)	(A) – (B)	(A) – (C)	(A) – (D)	(B) – (C)	(B) – (D)	(C) – (D)
Total expenditures	$27,768	$30,372	$31,008	$14,976	$22,492	–0.91	**26.83	**9.29	**21.61	**8.78	**–8.46
Food at home	3,216	3,192	3,908	3,080	2,904	**–8.89	1.08	**3.30	**6.76	**9.29	1.37
Housing (minus other lodging)	8,508	9,120	9,276	5,532	7,264	–.64	**16.28	**7.32	**12.98	**6.40	**–5.89
Apparel and services	1,288	1,396	1,460	728	1,048	–.83	**12.15	**6.94	**8.74	**5.09	**–5.26
Transportation (minus trips)	5,076	5,480	6,220	2,456	4,160	*–2.32	**15.45	**4.53	**10.93	**5.07	–1.35
Health care	1,652	2,064	1,628	544	664	**4.89	**22.59	**17.86	**12.43	**10.05	–1.56
Health insurance	796	1,044	700	280	168	**9.67	**26.06	**28.42	**11.08	**13.61	**3.35
Medical services	576	676	668	152	360	0.10	**12.40	**6.11	**8.82	**4.69	**–4.66
Prescription drugs and medical supplies	280	344	260	112	132	**4.46	**11.82	**12.47	**6.30	**6.00	–.95
Personal care	252	284	280	140	176	.65	**14.65	**10.39	**10.09	**7.16	**–2.97
Tobacco and alcohol	512	496	624	412	552	**–4.65	**3.60	*–2.05	**6.41	*2.02	**–4.24
Recreation and related	3,380	3,908	3,308	1,104	2,624	**4.32	**26.51	**8.84	**17.24	**4.22	**–11.31
Food away from home	1,168	1,320	1,212	364	984	*2.15	**25.98	**6.65	**17.06	**3.76	**–12.50
Other lodging	360	452	332	48	208	*2.43	**15.81	**6.48	**6.42	*2.35	**–5.42
Transportation for trips	260	328	184	60	176	**5.84	**13.88	**5.52	**5.38	.36	**–4.32
Entertainment	1,424	1,616	1,428	580	1,144	*2.57	**18.42	**6.08	**12.63	**3.34	**–7.70
Reading material	164	196	152	52	116	**4.71	**21.71	**10.66	**11.01	**3.64	**–9.15
Other exependitures	3,888	4,432	4,304	984	3,100	.73	**25.39	**6.51	**22.55	**5.68	**–11.44
Education	404	404	432	80	572	–.45	**9.19	–1.90	**6.26	–1.41	**–5.83
Miscellaneous	396	460	384	144	300	1.83	**8.52	**4.40	**5.83	*2.10	**–4.17
Cash contributions	236	296	200	60	132	**2.81	**8.65	**6.38	**4.19	*2.19	**–2.71
Personal insurance and pensions	2,852	3,272	3,288	700	2,100	–.11	**22.78	**6.93	**23.65	**7.11	**–9.52

* Difference is significant at a 95-percent confidence level.
** Difference is significant at a 99-percent confidence level.
NOTE: Components may not add to totals due to rounding.

Table 3. **Average annual expenditures, budget shares, and t–statistics by insurance status groups, 1993 Consumer Expenditure Survey data**

Type of expenditures	All consumer units	Insurance status				t-statistics for group mean differences[1]					
		Fully covered (A)	Partially covered (B)	Medicaid (C)	Not covered (D)	(A) – (B)	(A) – (C)	(A) – (D)	(B) – (C)	(B) – (D)	(C) – (D)
Total expenditures	$27,769	$30,372	$31,008	$14,976	$22,492	–.91	**26.83	**9.30	**21.61	**8.78	**–8.46
Expenditure shares (percent):											
Food at home	11.6	10.5	12.6	20.6	12.9	**–5.92	**–12.39	**–4.31	**–9.31	–.51	**7.97
Housing (minus other lodging)	30.6	30.0	29.9	36.9	32.3	.12	**–5.13	–1.71	**–4.78	–1.64	**2.60
Apparel and services	4.6	4.6	4.7	4.9	4.7	–.42	–.74	–.27	–.36	.12	.46
Transportation (minus trips)	18.3	18.0	20.1	16.4	18.5	*–2.21	1.50	–.38	**2.73	1.10	–1.35
Health care	5.9	6.8	5.3	3.6	2.9	**5.13	**8.90	**11.70	**4.07	**6.15	1.63
Health insurance	2.9	3.4	2.3	1.9	.8	**9.28	**9.01	**20.30	*2.04	**9.87	**5.79
Medical services	2.1	2.2	2.2	1.0	1.6	.32	**6.06	**2.94	**4.60	*2.23	*–2.49
Prescription drugs and medical supplies	1.0	1.1	.8	.8	.6	**4.60	**3.27	**7.55	.68	**2.97	1.25
Personal care	.9	.9	.9	.9	.8	1.02	.28	*2.95	–.33	1.80	1.68
Tobacco and alcohol	1.8	1.6	2.0	2.8	2.5	**–3.91	**–6.95	**–5.73	**–4.10	**–2.66	1.46
Recreation and related	12.2	12.9	10.7	7.4	11.7	**4.67	**10.31	1.79	**5.62	–1.39	**–5.67
Food away from home	4.2	4.4	3.9	2.4	4.4	*2.42	**9.45	–.07	**6.30	–1.64	**–6.57
Other lodging	1.3	1.5	1.1	.3	.9	**2.60	**12.05	**3.66	**4.97	.73	**–4.32
Transportation for trips	.9	1.1	.6	.4	.8	**5.98	**6.79	*2.52	1.91	–1.44	**–2.79
Entertainment	5.1	5.3	4.6	3.9	5.1	**2.85	**4.94	.68	*2.33	–1.24	**–2.97
Reading material	.6	.6	.5	.4	.5	**4.78	**8.27	**3.59	**3.43	–.72	**–3.93
Other expenditures	14.0	14.6	13.9	6.6	13.8	1.24	**13.02	.92	**11.01	.11	**–7.67
Education	1.5	1.3	1.4	.5	2.5	–.32	**5.27	**–3.16	**4.19	**–2.82	**–5.22
Miscellaneous	1.4	1.5	1.2	1.0	1.3	*2.03	**2.77	1.20	1.37	–.57	–1.72
Cash contributions	.8	1.0	.7	.4	.6	**2.96	**3.98	**3.89	1.55	.58	–1.14
Personal insurance and pensions	10.3	10.8	10.6	4.7	9.3	.37	**12.59	*2.03	**11.85	1.76	**6.35

[1] For total expenditures, t–statistics measure difference of actual dollar values; for expenditure shares, t–statistics measure share differences for individual expenditure categories.

* Difference is significant at a 95-percent level of confidence

** Difference is significant at a 99-percent level of confidence.

Note: Subcomponents may not add to totals due to rounding.

tures by average total health care expenditures. Expenditure levels are annualized by multiplying quarterly averages by 4. Expenditure shares for the different expenditure categories are delineated by the four insurance groups.

A statistical test also is applied to assess whether the shares and total expenditure levels for the four insurance groups are significantly different from each other. (See the appendix for a discussion of the test.)

One way to examine the data is to search for relationships described by Prussian economist Ernst Engel. In 1857, Engel proposed that as income increases, the share of income spent on basic necessities such as food decreases.[38] The principle still holds when shares of total expenditures, rather than income, are examined. In this article, total expenditures are used as a proxy for income because expenditures depend not only on current income, but also on past and expected future income, according to Milton Friedman's "permanent income hypothesis."[39] Because all families report total expenditures, but not all report income, we do not need to restrict the sample to complete income reporters only.

In 1993, total expenditures of the partially and the fully insured groups were about $8,000 higher than those of the uninsured group, and about $16,000 higher than those in the medicaid group. (See table 3.) Among the four groups, the fully insured allocate the smallest expenditure share (about one-tenth) to food at home while medicaid families allocate twice that share (about one-fifth of total expenditures). This example of the

relationship Engel identified holds for a number of expenditure categories when a comparison is made between the higher and lower income groups. Housing, which accounts for nearly one-third of total expenditures for the fully insured, is that group's largest expenditure share, followed by transportation, other expenditures, recreational goods, and apparel and services.

The partially insured group allocates its budget in a similar fashion to the fully insured. But food at home and transportation shares for the partially insured are slightly larger. This probably occurs because families that are partially insured have, on average, more family members and income earners than do families that are fully insured. Also, expenditures in all subcategories of the recreation category (which account for about one-tenth of total expenditures) are slightly lower than for the fully insured.

An analysis of the medicaid group's expenditure shares bears out Engel's relationship for several categories. This group devotes larger shares to housing (37 percent) and food at home[40] (21 percent) than does any other group. Its share for food at home is about twice that of fully insured families. Expenditure shares for recreation and for all other commodities are substantially lower for medicaid recipients.

The expenditure shares of the uninsured group have a pattern similar to those shares for families that are fully or partially insured. The expenditure share for housing is somewhat larger for the uninsured than for the fully and partially insured, but is smaller than for the medicaid group. The uninsured group allocates larger shares for tobacco and alcohol, food away from home, entertainment, and education than most or all of the other groups. This may reflect the greater proportion of single and younger persons in the uninsured group.

The expenditure shares for two items, apparel and services and personal care, are virtually the same for all groups. This indicates that spending changes across groups for these items are about proportionate to changes in total expenditures.

Health care spending. Health care expenditures are composed of out-of-pocket costs for health insurance, medical services, and prescription drugs (including medical supplies). Out-of-pocket costs include all consumer payments for these goods and services, minus reimbursements received from health insurance companies or other third-party payers, in the 3 months before the Consumer Expenditure Survey interview.

Reimbursements for health care expenses are recorded as negative expenditures in the Consumer Expenditure Survey. Because reimbursements may not be received in the same quarter as the "up front" expenditure for health care, some families in each quarter are shown as having negative health care expenditures. However, in other cases, families are shown to have large health care expenditures, because a portion will be reimbursed in the future. We assume that, on average, the reimbursements received by some families in the current period will offset "up-front" expenditures that will be recouped by other families in a later period.

Fully insured families allocate the largest share of total expenditures to health care (7 percent). The health care expenditure share for the partially insured is lower than that for the fully insured group, primarily because a smaller share of total expenditures is allocated to health insurance. Government subsidies help limit health care to a relatively small portion of the medicaid group's budget (4 percent), and the uninsured group allocates the smallest share for health care (3 percent). The typically younger members of the uninsured group may, on average, be in better health than members of other groups. Also, because they are younger, members of this group may be less risk averse and may hold entry-level jobs that limit access to employer-sponsored health insurance.

Health care expenditures of all four groups may be examined more closely by looking at the component shares in the health care category. For example, fully insured families spend about half of their health care dollars for insurance premium payments. (See table 4.) The relatively large number of older families in this group suggests that they value health insurance as a hedge against their increasing use of medical services and that because of their higher incomes, health insurance is more affordable.

For the fully insured, expenditures for medical services (33 percent of health care expenditures) and prescription drugs (17 percent) probably consist of insurance deductibles, copayments, and costs for goods and services not covered or for goods and services beyond maximum insurance coverage limits. Families with partial coverage devote about the same portion of their total health care expenditures to prescription drugs (16 percent) as do the fully insured, a smaller portion to insurance payments, and a larger portion to medical services (41 percent). Whether by choice or by need, partially insured families apparently are substituting spending on medical services for health insurance expenditures, which is represented in the composition of their health care component shares.

Similar to fully insured families, members of the medicaid group allocate about half of their health care budget to health insurance. Although this is a large share, it amounts to only about

Table 4. **Average annual health care spending and component shares by insurance status, 1993 Consumer Expenditure Survey data**

Type of expenditures	Insurance status				t-statistics for group mean differences[1]					
	Fully covered (A)	Partially covered (B)	Medicaid (C)	Not covered (D)	(A) – (B)	(A) – (C)	(A) – (D)	(B) – (C)	(B) – (D)	(C) – (D)
Health care expenditures	$2,064	$1,628	$544	$664	**4.89	**22.59	**17.86	**12.43	**10.05	–1.56
Health care expenditures as a percent of total expenditures	6.8	5.3	3.6	2.9	**5.13	**8.90	**11.70	**4.07	**6.15	1.63
Component shares of health care spending, (in percent) for:	100.0	100.0	100.0	100.0	...	...	...	...	...	...
Health insurance premiums	50.6	43.0	51.5	25.4	**3.14	–0.21	**6.81	–1.80	**4.33	**4.75
Medical services	32.7	41.1	27.8	54.6	**–3.17	1.22	**–4.50	**2.98	**–2.58	**4.43
Prescription drugs and medical supplies	16.7	15.9	20.7	20.0	0.67	–1.33	–1.33	–1.54	–1.56	0.17

[1] For total expenditures, t-statistics measure difference of actual dollar value; for expenditure shares, t-statistics measure share differences for individual expenditure category

* Difference is significant at a 95–percent level of confidence.

** Difference is significant at a 99–percent level of confidence.

NOTE: Components may not add to totals due to rounding.

$70 per quarter, compared with about $260 per quarter for fully insured families. Also, the health insurance expenditures of the medicaid group are primarily for policies with limited coverage or for policies of non-medicaid recipients who, because at least one person in the family is enrolled in medicaid, are included in the medicaid group.[41]

Compared with all other groups, medicaid recipients allocate a smaller portion of their health care expenditures to medical services and a larger portion to prescription drugs. As expected, the largest share (more than one-half) of health care expenditures for the uninsured is devoted to medical services. When groups are ordered by their share spent on medical services, the uninsured group is followed by the partially insured, the fully insured, and then medicaid recipients. At the other extreme, health insurance expenditures account for only about one-quarter of health care expenditures for uninsured families, the smallest share for any group.[42] This share on average accounts for about $168 of total expenditures, the smallest amount allocated by any group. This result also is expected, because health insurance expenditures for the uninsured are for policies with limited coverage or for policies purchased for persons who are not in the consumer unit.

When comparing components of health care expenditures across groups, shares for prescription drugs are distributed the most evenly across the four groups (between 16 percent and 21 percent). The ranges are wider across groups for shares for health insurance (26 percent to 52 percent) and medical services (28 percent to 55 percent).

Regression analysis

Although shares analysis provides some insight into spending patterns, it is, by itself, not conclusive. As discussed, it tries to control for income, but not for other characteristics. For example, partially insured families spend a larger share of their income on food at home compared with fully insured families, even though they have slightly more (though not statistically significantly more) income. (See table 3.) This apparent violation of Engel's proposition may be due to the larger average family size of those with partial insurance.

Regression techniques allow comparisons of expenditures across insurance groups given that all other characteristics are held constant. In this way differences observed in expenditure patterns are more likely related to health insurance status than to differences in average income, family size, or other characteristics. Furthermore, as described later, these differences show the potential change in expenditure patterns if health care costs are increasingly borne by the consumer.

This section uses regression analysis to compare relationships of several expenditure categories to demographic characteristics for each health insurance coverage group.

Regression techniques. Regressions using weighted least squares are run to estimate relationships of major expenditure categories, for example, food at home and housing minus other lodging, to family characteristics, such as age, family size, and permanent income. The weighted

least squares method is used to correct for heteroskedasticity—the condition in which the variance of the error from the regression is not constant across all observations.

The method used here is identical to ordinary least squares, except that the equation is weighted by a variable equal to the population weight divided by total expenditures squared. The numerator of this weighting variable weights the regression to reflect the population. The denominator corrects for heteroskedasticity. Similar methods appear in the literature.[43]

Sample size. For most of the regressions the sample includes the same 20,877 families that are analyzed earlier. However, 439 families are missing from the housing regression because the variable for rooms occasionally has missing values; the regression cannot be run with these families included. But because they comprise only 2 percent of the sample, omitting these families from one regression is not worrisome.

Dependent variables. Each regression requires a different dependent variable. In this case, the dependent variables are food at home, housing (minus other lodging), apparel and services, transportation (minus trips), and recreation and related expenditures. Two major expenditure categories—other expenditures and health care expenditures—are not considered. Other expenditures are omitted because their subcomponents are too varied to yield meaningful results across insurance groups.

Health care expenditures are omitted because of the difficulty in adequately modeling health care expenditures using Consumer Expenditure Survey data. For example, the data do not describe what the deductible for each policy is, nor is there a variable that describes whether the family has reached or exceeded deductible spending. As has already been discussed, it cannot even be discerned whether a reimbursement for an expenditure is expected—only that a reimbursement has been received. Therefore, modeling health care expenditures is not attempted in this study.

Model specification. Each model is specified as follows:

$$Y = a_i + a_pD_p + a_mD_m + a_uD_u + b_iX_i + b_{ip}D_pX_i + b_{im}D_mX_i + b_{iu}D_uX_i + e$$

where

- Y is the expenditure to be predicted;
- a_j is a parameter estimate for insurance group j (fully insured, partially insured, medicaid, uninsured);
- D_j is a dummy variable describing insurance group $_j$, for example, D_p is 1 if partially insured, zero otherwise;
- b_{ij} is a vector of parameter estimates;
- X_i is a vector of demographic characteristics.

In other words, each regression is run with an intercept for which the coefficient (a_i) is interpreted as the coefficient for the fully insured, in addition to three dummy variables (D_p, D_m, and D_u) describing insurance status. That is, the first dummy variable included is coded one if the family is partially insured, and zero otherwise; the second is coded one if the family receives medicaid, and zero otherwise; the third is coded one if the family is uninsured, and zero otherwise. The coefficients a_p, a_m, and a_u for these dummy variables are interpreted as the difference in intercept between the fully insured group and the other groups.

For example, the intercept for food at home has a value of –218.87. The dummy variable for the medicaid group is 179.43. Therefore, the intercept for the fully insured is interpreted to be –218.87, while the medicaid are interpreted to have an intercept of –39.944, or –218.87 plus 179.43. The fact that the coefficient for the medicaid variable is statistically significant indicates that the difference between intercepts for fully insured and medicaid families is statistically significant.

Income and expenditures. Including an income variable is important for two reasons. First, levels of detailed expenditures in general are expected to increase as incomes increase. Second, if health care costs are shifted onto the consumer in the future, as is possible, then each dollar of total expenditures that the consumer spends on health care diminishes the amount of total expenditures available to spend on other items, if all else is equal. Including an income variable allows the researcher to estimate the portion of each additional dollar of income that the consumer will allocate to a selected expenditure, and the percent change in each expenditure given a 1-percent change in income, that is, income elasticity.

It is important to note that a dollar-for-dollar shift of health care costs onto the consumer does not necessarily imply that consumers will automatically increase their health care expenditures by the same level. For example, a family may have a policy with a $200 deductible for doctors visits, which it reaches or exceeds every year. If the deductible is raised to $300, the family may still choose to pay only $200 in out-of-pocket expenditures by not visiting the doctor for minor ailments.

Nevertheless, if for any reason the family now uses more than $200 in services, its members have less money to allocate to food, housing, and

other expenditures. Because changes in health care costs are expected to affect total expenditures for families with different levels of insurance in different ways, it is important to analyze the relationship of expenditures to income by insurance group.[44]

For the reasons described earlier, total expenditures are used in the regressions as a proxy for permanent income.[45] However, because of reimbursements, the observed value of total expenditures is lower than it would otherwise be. To control for the potential bias in the income parameter estimate that this may cause, a dummy variable, coded one if a reimbursement occurs and zero otherwise, also is included in each model. This variable also is used to form an interaction term with the dummy variable describing insurance group status, and with total expenditures. In this way, any difference in the parameter estimate caused by the negative expenditure (for example, health care related reimbursement) can be controlled.

However, as has been noted, the survey does not ask whether a current expenditure for health care is expected to be reimbursed. Therefore, a downward bias may appear in the total expenditures parameter estimate from those who pay a large amount now and get reimbursed later. Because families reporting reimbursements are such a small portion of the sample—less than 2 percent—it can be assumed that the "prepayers" also are a small portion of the population, and the resulting bias will be minimal.

Other continuous independent variables. Other continuous independent variables are common to all models. For example, age of the reference person is included in each stage. Rather than include family size directly, number of adults is included separately from number of persons younger than 18 because adults may have different propensities to consume than children, and the addition of one adult to the family may have a different effect on certain expenditures than the addition of one child. (For example, adding another child may lead to a larger increase in apparel expenditures than adding an adult, because children outgrow clothing quickly.)

Because some expenditures may not be increasing at a linear rate with age, age squared also is included. In addition, other family characteristics are included. Squared terms for numbers of adults and persons younger than 18 also are added because, once again, the relationship between these factors and health care expenditures may not be linear.

Dummy variables. In addition to the dummy variables describing each family's insurance group, other variables are included that describe characteristics. These are all coded one if the condition is true, and zero otherwise. Each of these "characteristic" dummy variables also is interacted with the "insurance group" dummy variables. In this way, differences may be compared within each insurance group but across characteristics, as may differences across insurance groups but within characteristics. For example, dummy variables are included describing the family's region of residence (Northeast, Midwest, and West).

The coefficient for the Northeast variable is positive and statistically significant for the fully insured in the housing equation; this indicates that fully insured families in the Northeast are predicted to spend more for housing than fully insured families in the "omitted" group (the South in this case), even when all other factors (income, house size, etc.) are held constant. So within the fully insured group, differences are seen across region of residence.

The parameter estimates for Northeast for all other insurance groups are negative and statistically significant (except for the partially insured, where the parameter estimate is negative but not significant). These parameter estimates are all smaller in magnitude (ranging from 32.79 to 126.31 in absolute value) than the parameter estimate for the fully insured (161.35). This implies that, although Northeastern families who are not fully insured pay less on average than fully insured Northeastern families, all Northeastern families are predicted to spend more than all Southern families, regardless of insurance coverage. So the expenditure differs across insurance groups within the Northeast region, even though Northeasterners in general spend more than their Southern counterparts.

Additionally, dummy variables control for family type (single person, husband and wife with children, single parents, and other families). The omitted group is families consisting of a husband and wife only. A dummy variable is not included for singles who are partially insured, because this condition is impossible given the definition of the insurance groups. If the single person does not have a policy or has only a limited coverage policy, then he is uninsured. If he has at least one regular policy, then he is fully insured, unless he is on medicaid.

Other variables describe degree of urbanization (zero if urban, one if rural). Differences in prices by region or degree of urbanization may affect expenditures. Similarly, variables describing the reference person's occupational category (including self-employed or not working for various reasons) are included, as Robert Cage finds that expenditures for several categories differ by

occupation, even when other characteristics are held constant.[46] Where a specific occupation is described (technical, sales, and clerical; service; and blue-collar and other) the family's reference person is working for a wage or salary, rather than being self-employed. The omitted category consists of managers, professionals, and supervisors who work for wage or salary.

Other variables controlling for education of the reference person and the ethnic origin of the reference person are included to account for differences in tastes and preferences that might be associated with these variables. The education variables are included for families whose reference person did not graduate high school or graduated college. The omitted group consists of families whose reference person is a high school graduate, including those who have some college experience. The omitted group for ethnic origin are families whose reference person is neither black nor Hispanic.

Model-specific variables. For some regression equations it is necessary to add certain variables. For example, transportation expenditures are obviously related to number of vehicles owned, but it is not clear that apparel expenditures would be so strongly related to number of vehicles owned. Therefore, variables describing number of automobiles and other vehicles owned are included in the transportation regression. Similarly, the housing regression contains several variables not included elsewhere. These include continuous variables describing number of rooms, including bedrooms, in the house, and the number of bathrooms and half baths. Several dummy variables also are included. The first two describe housing tenure (homeowners with no mortgage and renters; the omitted group is homeowners who still pay for a mortgage). Other dummy variables describe whether or not the dwelling is public housing, and whether or not the family receives other government assistance to pay the cost of housing. Finally, the housing tenure variables are used to construct interaction terms with total expenditures, age of the reference person, and age squared. Paulin finds that the relationship of housing expenditures to permanent income and the age variables differs significantly across tenure.[47]

Regression results

Background. Table 5 shows results of each regression, including the parameter estimates for each of the independent variables by insurance group, as well as t-statistics for each parameter estimate. For the fully insured group, t-statistics measure whether the parameter estimate differs from zero in a statistically significant way. For the other groups, the t-statistic measures whether the difference between the group under study and the fully insured group is statistically significant. For example, the permanent income (total expenditure) parameter estimate for food at home for the fully insured is 0.061, with a t-statistic of 42.07. This means that one can say with a great deal of statistical confidence that the parameter estimate is significantly different from zero.

The parameter estimate for the partially insured group is 0.013, with a t-statistic of 3.33. This means that at the 99-percent confidence level, the hypothesis can be rejected that the parameter estimates for the fully insured and partially insured are the same. As demonstrated earlier, adding these two parameter estimates yields the estimated relationship between food at home expenditures and a $1-increase in total expenditures for the partially insured; that is, a $1-increase in total expenditures is associated with an increase of 7 cents in the predicted value for quarterly food at home expenditures for the partially insured. If the parameter estimate were associated with a small t-statistic (i.e., less than 1.96), this would indicate that although partially insured families may appear to show a greater increase in food at home expenditures (7 cents) given a $1-increase in food at home expenditures than the fully insured (6 cents) when all else is equal, one could not say with any degree of statistical confidence that there was a difference in the relationship between food at home expenditures and total expenditures for the partially and fully insured groups.[48]

Maxima and minima. In some regressions variables (age, number of adults, and number of persons younger than 18) have statistically significant parameter estimates associated with their squared terms. For example, in the food at home regression age of the reference person and age squared have parameter estimates significant at the 99-percent confidence level for the fully insured group. Because the squared term is statistically significant, one can see whether the predicted expenditure for each category is increasing or decreasing, and at what age the predicted expenditure reaches a maximum or minimum. (If the squared term is negative, the predicted expenditure reaches a maximum. If it is positive, the predicted expenditure reaches a minimum.)[49]

Food at home. Each insurance group has a positive, statistically significant coefficient for permanent income in the food at home regression. This means that given an extra dollar, all families are predicted to increase their food at home

(Text continues on page 49.)

Table 5. **Parameter estimates and t-statistics for regressions on selected consumer expenditures, 1993 Consumer Expenditure Survey**

Independent variables	Insurance status				t-statistics			
	Fully covered (A)	Partially covered (B)	Medicaid (C)	Not covered (D)	(A)	(A) – (B)	(A) – (C)	(A) – (D)
	Food-at-home expenditures regression							
Intercept	**–218.866	79.816	***179.426	20.000	–4.86	0.83	2.32	0.34
Total expenditures	**.061	****.013	****.062	****.023	42.0	3.33	13.54	7.86
Reimbursement for health care expenditures	31.341	33.737	119.693	120.892	1.17	.59	1.14	1.67
Reimbursement x total expenditures	–.009	–.013	–.035	–.041	–1.38	–.88	–.86	–1.91
Family characteristics:								
Age of reference person	**11.109	–2.115	****–8.689	****–3.795	17.09	–.81	–5.95	–2.62
Age of reference person square	**–.087	.000	****.068	***.039	–13.94	.00	5.06	2.28
Number of adults	**142.052	–26.750	–82.411	–2.163	4.54	–.49	–1.82	–.06
Number of adults square	.262	–3.316	–5.215	–12.084	.05	–.35	–.67	–1.67
Persons under 18 years old	**137.579	****–72.795	****–72.960	****–73.488	7.44	–2.91	3.26	–3.02
Persons under 18 years old square	*–10.132	10.847	****13.200	****14.687	–2.37	1.81	2.69	2.68
Single person	**–56.151	—	29.253	4.342	–3.01	—	.93	.16
Husband/wife with children	–35.389	49.460	39.147	60.229	–1.67	1.42	1.15	1.83
Single parent	–13.423	***88.420	***73.756	60.331	–.61	1.97	2.07	1.87
Other type of consumer unit composition	**–90.492	10.978	****80.459	***59.860	–6.87	.41	3.22	2.52
(Husband/wife only)	—	—	—	—	—	—	—	—
Region:								
Northeast	*12.125	****97.940	22.729	****66.294	1.97	3.91	1.85	5.97
Midwest	**–38.624	****64.818	****43.867	****29.386	–6.20	3.43	4.55	4.63
West	**29.386	9.409	14.402	9.215	3.76	.39	.97	.70
(south)	—	–	—	—	—	–	—	—
Rural residence	11.980	–32.748	–15.392	–16.342	1.81	–1.66	–1.11	–1.39
(Urban residence)	—	—	—	—	—	—	—	—
Education:								
Non-high school graduate	–1.713	****74.395	15.470	7.149	–.33	3.80	1.50	.84
College graduate	14.438	–26.059	9.538	–8.046	1.68	–.93	.40	–.54
(High school graduate/some college)	—	—	—	—	—	—	—	—
Ethnicity:								
Black	11.370	***–53.391	24.066	–.679	1.40	–2.48	1.94	–.06
Hispanic	26.245	****82.874	***44.319	28.261	1.89	.27	2.25	1.53
(Nonblack and non–Hispanic)	—	—	—	—	—	—	—	—
Occupation:								
Technician and sales	–6.368	1.817	62.291	12.387	–.65	.06	1.72	.89
Service	3.138	18.776	56.644	****50.820	.27	.54	1.58	3.34
Blue collar and other	**32.727	19.405	–7.997	***36.131	3.13	.66	–.24	2.50
Self employed	–10.132	–8.007	12.358	27.811	–.71	–.19	.27	1.21
Retired	**36.454	–13.247	19.236	25.859	3.45	–.36	.56	.97
Out of labor force (includes unemployed)	**61.331	–1.431	25.647	25.514	6.08	–.04	.80	1.75
(Managers, professionals, supervisors)	—	—	—	—	—	—	—	—
	Housing expenditures regression							
Intercept	**1,345.806	****–1,108.595	****–1,182.629	–518.800	7.07	–3.00	–3.84	–1.27
Total expenditures	**.285	–.007	.002	****.030	70.59	–.69	.11	3.17
Reimbursement for health care expenditures	**157.289	****720.699	–81.377	***–286.138	3.36	6.77	–.44	–2.22
Reimbursement x total expenditures	–.011	****–0.125	–.080	–.007	–.94	–4.59	–1.11	–.18
Family characteristics:								
Age of reference person	**–21.548	12.101	***25.961	–9.267	–4.21	.88	2.55	–.54
Age of reference person square	**.171	–.090	***–.218	.205	3.51	–.64	–2.28	1.07
Number of adults	**–425.254	****488.461	****374.628	****455.985	–3.81	3.57	2.95	3.32
Number of adults square	*46.828	***–58.719	***–45.404	***–51.381	2.37	–2.45	–2.01	–2.12
Persons under 18 years old	26.679	–22.152	***–80.420	–8.727	.82	–.50	–2.04	–.20
Persons under 18 years old square	–4.753	5.518	10.853	3.074	–.63	.52	1.26	.32
Number of rooms in dwelling	**18.286	–.139	–9.975	****–17.345	5.92	–.02	–1.48	–3.04
Number of bathrooms and half bathrooms	**36.742	42.595	20.602	***–36.221	4.24	1.86	.93	–2.13
Single person household	**–186.386	—	****195.030	****221.413	–3.30	—	2.67	2.95

See footnotes at end of table.

Table 5. **Continued—Parameter estimates and t-statistics for regressions on selected consumer expenditures, 1993 Consumer Expenditure Survey**

Independent variables	Insurance status				t-statistics			
	Fully covered (A)	Partially covered (B)	Medicaid (C)	Not covered (D)	(A)	(A) – (B)	(A) – (C)	(A) – (D)
	Housing expenditures regression							
Husband/wife with children	−15.669	−54.759	113.615	6.353	−.42	−.89	1.90	.11
Single parent	−97.203	***197.985	***192.364	****225.240	−1.66	2.17	2.50	2.84
Other type of consumer unit composition	*47.626	−5.304	15.208	−7.685	2.04	−.11	.34	−.18
(Husband/wife only)	—	—	—	—	—	—	—	—
Consumer unit owns home, no mortgage	**−708.726	491.950	***752.252	−475.922	−4.60	1.25	2.25	−.11
Owns home, no mortgage x total expenditures	**−.049	****−.045	.004	−.029	−8.92	−2.95	.19	−1.18
Owns home, no mortgage x age	**17.560	−11.472	***−31.026	27.226	2.99	−.72	−2.51	1.49
Owns home, no mortgage x age square	*−.130	.073	***.267	−.369	−2.44	.47	2.40	−1.86
Consumer unit rents home	**−1003.450	558.516	***521.928	−349.298	−7.38	1.56	1.99	−.93
Consumer unit rents home x total expenditures	**.035	****−.045	****.107	−.019	5.91	−2.90	5.82	−1.59
Consumer unit rents home x age	**28.193	−7.394	***−24.482	26.965	5.08	−.48	−2.31	1.53
Consumer unit rents home x age square	**−.195	.026	.192	***−0.406	−3.73	.16	1.91	−2.08
(Consumer unit owns home with mortgage)	—	—	—	—	—	—	—	—
Public housing	**−187.904	86.771	4.842	****−181.226	−6.38	.98	.13	−3.75
(Nonpublic housing)	—	—	—	—	—	—	—	—
Other government assistance for housing	**−186.261	171.899	59.526	***−102.103	−6.18	1.37	1.67	−2.35
(No government assistance for housing)	—	—	—	—	—	—	—	—
Region:								
Northeast	**161.346	−32.792	****−96.109	****−126.313	12.98	−.74	−4.20	−4.98
Midwest	**65.408	−43.606	****−66.551	−37.447	5.68	−1.30	−3.05	−1.80
West	**63.997	****110.896	−6.773	−8.434	4.48	2.59	−.25	−.35
(South)	—	—	—	—	—	—	—	—
Rural residence	**−89.624	***−73.168	***49.823	.071	−7.42	−2.07	2.03	.00
(Urban residence)	—	—	—	—	—	—	—	—
Education:								
Non-high school graduate	*−24.668	−32.741	28.033	5.789	−2.30	−.93	1.46	.30
College graduate	25.019	***115.766	−36.762	****−89.008	1.63	2.34	−.86	−3.16
(High school graduate/some college)	—	—	—	—	—	—	—	—
Ethnicity:								
Black	12.886	45.025	6.801	31.735	.87	1.17	.31	1.32
Hispanic	13.458	−28.856	29.964	28.578	.55	−.55	.86	.85
(Nonblack/non–Hispanic)	—	—	—	—	—	—	—	—
Occupation:								
Technician and sales	**59.171	−64.767	−54.258	5.603	2.93	−1.19	−.84	.16
Service	39.840	32.738	−12.299	38.065	1.60	.53	−.19	1.01
Blue collar and other	**−54.819	.776	16.325	32.193	−2.75	.02	.27	.93
Self employed	40.045	***169.003	27.518	24.231	1.45	2.21	.35	.51
Retired	**62.268	77.517	−6.217	66.187	3.03	1.16	−.10	1.23
Out of labor force (includes unemployed)	**103.140	−53.523	4.914	45.983	4.69	−.89	.08	1.28
(Managers, professional, supervisors)	—	—	—	—	—	—	—	—
	Apparel and services expenditures regression							
Intercept	**86.487	−88.264	−69.949	−57.240	3.14	−1.50	−1.48	−1.59
Total expenditures	**.049	****.007	***.007	.001	54.78	3.11	2.38	.75
Reimbursement for health care expenditures	**58.586	***77.777	−58.170	−34.176	3.59	2.24	−.91	−.77
Reimbursement x total expenditures	.001	−.006	.003	−.004	.14	−.62	.11	−.30
Family characteristics:								
Age of reference person	**−3.458	2.527	1.007	****−3.668	−8.69	1.60	1.13	−4.14
Age of reference person square	**.023	−.023	−.006	****.040	6.12	−1.43	−.73	3.81
Number of adults	−.711	−22.560	6.736	****76.128	−.04	−.68	.24	3.22
Number of adults square	.473	.893	−2.849	****−14.856	.14	.15	−.60	−3.35
Persons under 18 years old	7.067	−9.999	19.047	−8.287	.62	−.65	1.39	−.56
Persons under 18 years old square	.045	3.928	−3.718	2.689	.02	1.07	−1.24	.80
Single person household	15.830	—	5.507	***34.527	1.38	—	.29	2.04
Husband/wife with children	2.951	32.675	1.498	29.141	.23	1.53	.07	1.45
Single parent	25.196	13.158	−3.272	***48.797	1.86	.48	−.15	2.47
Other type of consumer unit composition	11.544	18.608	−14.686	1.773	1.43	1.14	−.96	.12
(Husband/wife only)	—	—	—	—	—	—	—	—
Region:								
Northeast	1.053	7.726	14.576	1.399	.28	.50	1.94	.21

See footnotes at end of table.

Table 5. **Continued—Parameter estimates and t-statistics for regressions on selected consumer expenditures, 1993 Consumer Expenditure Survey**

Independent variables	Insurance status				t-statistics			
	Fully covered (A)	Partially covered (B)	Medicaid (C)	Not covered (D)	(A)	(A) – (B)	(A) – (C)	(A) – (D)
	Apparel and service expenditures regression							
Midwest	5.722	–1.306	3.840	****–25.122	1.50	–.11	.52	–4.33
West	2.365	***–32.024	0.015	–8.512	.50	–.21	.00	–1.05
South	—	—	—	—	—	—	—	—
Rural residence	–3.228	4.392	–3.692	–13.764	–.80	.36	–.45	–1.92
(Urban residence)								
Education:								
Non-high school graduate	4.453	8.043	–0.769	–9.180	1.40	.67	–.12	–1.76
College graduate	*12.238	–4.162	–8.837	–6.336	2.33	–.24	–.60	–.69
(High school graduate/some college)	—	—	—	—	—	—	—	—
Ethnicity:								
Black	**16.897	–10.157	–1.215	****48.626	3.42	–.77	–.16	6.83
Hispanic	–2.980	***39.276	23.089	21.954	–.35	2.16	1.91	1.94
(Nonblack/non–Hispanic)	—	—	—	—	—	—	—	—
Occupation:								
Technician and sales	–.641	2.397	29.105	15.311	–.11	.13	1.31	1.79
Service	*–18.304	10.871	1.545	****44.604	–2.51	.51	.07	4.79
Blue collar and other	**–37.200	9.971	31.977	****37.216	–5.82	.56	1.55	4.22
Self employed	**–25.935	–15.178	–37.252	***30.770	–2.96	–.58	–1.35	2.20
Retired	**–28.218	30.882	18.040	***37.571	–4.37	1.38	.86	2.31
Out of labor force (includes unemployed)	**–46.187	36.006	25.377	****51.959	–7.48	1.79	1.29	5.81
(Managers, professionals, supervisors)	—	—	—	—	—	—	—	—
	Transportation expenditures regressions							
Intercept	*182.118	–308.055	–115.513	–37.696	2.36	–1.86	–.88	–.37
Total expenditures	**.185	****.043	***–.019	****–.017	72.74	6.32	–2.35	–3.28
Reimbursement for health care expenditures	**138.082	****593.502	–316.154	49.929	3.02	6.11	–1.76	1.76
Reimbursement x total expenditures	**–.036	****–.099	****.185	0.007	–3.11	–3.78	2.63	2.63
Family characteristics:								
Age of reference person	**–13.517	3.308	****11.038	3.352	–12.03	.74	4.40	1.35
Age of reference person square	**.097	.003	****–.087	.002	9.01	.06	–3.75	.08
Number of adults	**–198.538	99.351	***154.080	***168.005	–3.71	1.07	1.98	2.53
Number of adults square	**46.029	***–33.505	****–41.482	****–43.895	4.69	–2.05	–.31	–3.53
Persons under 18 years old	**–150.394	***81.073	****117.348	***105.777	–4.75	1.89	.30	2.54
Persons under 18 years old square	**21.025	–16.975	****–22.204	***–19.596	2.87	–1.66	–.26	–2.09
Number of automobiles	**90.339	–23.683	****41.395	–9.377	13.89	–1.39	.29	–.83
Number of other vehicles owned	**60.537	–19.562	27.948	–10.307	10.86	–1.38	.16	–.98
Single person household	44.664	—	–54.084	–32.389	1.40	—	–.10	–.68
Husband/wife with children	42.583	–70.213	–99.320	–27.335	1.18	–1.17	–.17	–.49
Single parent	58.452	–82.826	–108.614	–75.287	1.54	–1.08	–.17	–1.36
Other type of consumer unit composition	–1.513	–27.991	–27.293	5.529	–.07	–.61	–.64	.14
(Husband/wife only)	—	—	—	—	—	—	—	—
Region:								
Northeast	–14.815	–57.414	–14.896	–26.524	–1.39	–1.33	–.70	–1.39
Midwest	–11.712	–1.051	–2.149	–5.659	–1.10	–.03	–.10	–.35
West	–24.695	****–130.976	–25.470	***–53.230	–1.84	–3.13	–1.00	–2.34
(South)	—	—	—	—	—	—	—	—
Rural residence	**55.539	****112.105	***–50.516	1.868	4.84	3.26	–2.16	.09
(Urban residence)	—	—	—	—	—	—	—	—
Education:								
Non-high school graduate	**29.017	–16.923	****–46.918	–19.852	3.22	–.50	–2.64	–1.35
College graduate	**–110.350	42.505	***91.451	42.247	–7.51	.89	2.23	1.64
(High school graduate/some college)	—	—	—	—	—	—	—	—
Ethnicity:								
Black	**42.575	–20.185	–22.470	–24.672	3.04	–.54	–1.05	–1.24
Hispanic	*53.182	8.157	–59.752	–52.356	2.23	.16	–1.76	–1.65
(Nonblack/non–Hispanic)	—	—	—	—	—	—	—	—
Occupation:								
Technician and sales	**68.124	57.739	***–151.871	****–89.193	4.05	11.1	–2.44	–3.74
Service	**66.438	33.837	***–130.782	****–103.866	3.25	.57	–2.14	–3.98

See footnotes at end of table.

expenditures, but that fully insured families would increase the expenditures the least (6 cents), followed by the partially insured (7 cents), the uninsured (8 cents) and medicaid families (12 cents). The income elasticities implied by these figures are discussed later.

When all else is held constant, the fully, partially, and uninsured generally experience increases in food at home expenditures as they get older, at least to a point. For fully insured and medicaid families, predicted expenditures for food at home peak around age 64. For uninsured

Table 5. **Continued—Parameter estimates and t-statistics for regressions on selected consumer expenditures, 1993 Consumer Expenditure Survey**

Independent variables	Insurance status				t-statistics			
	Fully covered (A)	Partially covered (B)	Medicaid (C)	Not covered (D)	(A)	(A) – (B)	(A) – (C)	(A) – (D)
	Transportation expenditures regression							
Blue collar and other	**76.395	65.341	***–121.678	****–109.410	4.27	1.30	–2.11	–4.40
Self employed	33.491	–48.406	–58.123	–52.521	1.37	–.66	–.74	–1.34
Retired	**108.017	3.742	****–167.258	****–167.883	5.98	.06	–2.86	–3.68
Out of labor force (includes unemployed)	**85.713	71.251	–152.716	****–137.406	4.97	1.26	–2.76	–5.48
(Managers, professionals, supervisors)	—	—	—	—	—	—	—	—
	Recreation and related expenditures							
Intercept	**180.090	–45.746	***–185.174	54.969	3.42	–.41	–2.05	.80
Total expenditures	**.145	****–.022	****–.056	–.003	85.41	–4.95	–10.37	–.10
Reimbursement for health care expenditures	**150.544	****342.544	***–298.844	–33.386	4.83	5.16	–2.44	–.40
Reimbursement x total expenditures	–0.008	****–.056	.079	.019	–1.01	–3.16	1.65	.77
Family characteristics:								
Age of reference person	**–6.875	****6.775	2.298	***–3.668	–9.05	2.23	1.35	–2.17
Age of reference person square	**.040	–.035	.001	****.051	5.43	–1.13	.07	2.58
Number of adults	–50.566	–47.098	48.297	–.316	–1.38	–.74	.91	–.01
Number of adults square	2.524	5.293	–4.887	1.343	.38	.47	–.54	.16
Persons under 18 years old	**–62.027	***58.391	****68.781	40.969	–2.87	2.00	2.63	1.44
Persons under 18 years old square	9.488	–12.841	***–12.259	–10.203	1.90	–1.84	–2.14	–1.59
Single person household	27.755	—	33.040	–3.507	1.27	—	.90	–.11
Husband/wife with children	*–55.673	59.561	55.327	–4.758	–2.25	1.46	1.39	–.12
Single parent	–47.380	9.289	65.050	–9.693	–1.83	.18	1.56	–.26
Other type of consumer unit composition	22.289	12.490	13.906	–39.484	1.45	.40	.48	–1.42
(Husband/wife only)	—	—	—	—	—	—	—	—
Region:								
Northeast	**–25.797	–21.929	***32.053	24.093	–3.58	–.75	2.23	1.86
Midwest	*18.306	–19.714	–3.791	***24.546	2.51	–.89	–.27	2.22
West	*19.369	26.155	–1.295	–14.299	2.12	.92	–.07	–.92
(South)	—	—	—	—	—	—	—	—
Rural residence	1.872	–16.826	3.965	–9.502	.24	–.73	.25	–.69
(Urban residence)	—	—	—	—	—	—	—	—
Education:								
Non-high school graduate	**–18.655	–4.610	2.337	****26.543	–3.08	–.20	.19	2.67
College graduate	**43.862	–11.383	17.172	–22.389	4.37	–.35	.61	–1.28
(High school graduate/some college)	—	—	—	—	—	—	—	—
Ethnicity:								
Black	**–42.156	–23.783	22.844	5.308	–4.44	–.94	1.58	.39
Hispanic	*–35.839	***–68.680	–1.561	–14.836	–2.21	–1.97	–.07	–.69
(Nonblack and non–Hispanic)	—	—	—	—	—	—	—	—
Occupation:								
Technician and sales	–.462	***–71.860	62.633	–9.433	–.04	–2.02	1.48	–.58
Service	–13.067	–68.293	***84.864	–23.853	–.94	–1.69	2.03	–1.34
Blue collar and other	–22.870	–64.387	72.014	–1.754	–1.87	–1.88	1.83	–.10
Self employed	13.024	***–114.364	36.290	–4.090	.80	–2.27	.69	–.15
Retired	**42.164	–77.504	–2.065	***–74.596	3.42	–1.81	–.05	–2.40
Out of labor force (includes unemployed)	–6.516	****–110.177	46.547	–11.873	–.55	–2.86	1.24	–.70
(Managers, professionals, supervisors)	—	—	—	—	—	—	—	—

NOTE: Classifications in parentheses indicate omitted categories.
* — Significantly different from zero at the 95-percent level.
** — Significantly different from zero at the 99-percent level.
*** — Significantly different from the fully insured group coefficient at the 95-percent level.
**** — Significantly different from the fully insured group coefficient at the 99-percent level.
— Not applicable

families, the predicted peak is even later—around age 76. But for the partially insured, the predicted peak is at a younger age—about 52 years.

Similarly, the addition of adults (those persons at least 18 years old) to the family is associated with an increase in expenditures. For the fully and partially insured families, expenditures are predicted to increase over the range of normal family sizes, while for medicaid and uninsured families, expenditures are predicted to peak only at very large family sizes. Number of children also is positively correlated with food at home expenditures for all insurance groups.

Housing (minus other lodging). The relationship between housing expenditures and permanent income differs little across insurance groups, at least for homeowners with mortgages. All families are predicted to spend about 28 cents of every additional dollar on housing, except for uninsured families. These families are predicted to spend 3 cents more (or 31 cents) out of every additional dollar on housing.

When the mortgage is paid off, housing expenditures as a share of an additional dollar decline. For the fully insured, the decrease is nearly 5 cents. For the partially insured the decrease is nearly double—9 cents, while uninsured families appear to spend about 2 cents less of each additional dollar, though the parameter estimate for the interaction between owning without a mortgage and total expenditures is not statistically significant for the uninsured.

Renters exhibit very different patterns by insurance group. Fully insured renters are predicted to spend about 32 cents of every additional dollar on housing. Partially insured renters are more similar to homeowners, with a predicted expenditure of 27 cents per dollar. Renting families covered by medicaid spend the largest portion of an additional dollar on housing—42 cents. Statistically, uninsured renters are not significantly different from fully insured renters.

Apparel and services. The increase in expenditures on apparel and services, given an additional dollar of permanent income, is similar regardless of insurance status. All groups are predicted to spend between 5 cents and 6 cents of each additional dollar for apparel and services.

Transportation (minus trips). Transportation is strongly related to income, regardless of insurance group. Partially insured families are predicted to spend the largest share of an additional dollar—nearly 23 cents—on transportation, followed by the fully insured (18 cents), the uninsured and medicaid families (17 cents each). Spending on transportation is predicted to decrease as the reference person grows older for all groups. Ownership of each additional automobile is predicted to add about $90 to quarterly transportation expenditures for all except medicaid families, who are predicted to spend about $132 more per automobile per quarter. Each additional vehicle, other than a car, is expected to add about $61 to quarterly expenditures, regardless of insurance group.

Recreation and related expenditures. Recreation and related expenditures consume about one-seventh of every additional dollar (14.5 cents) for the fully insured, and the uninsured are not statistically significantly different. Partially insured families are predicted to dedicate a slightly smaller fraction (12 cents) of their additional dollars to recreation and related expenditures, with medicaid families spending the least (9 cents) of every additional dollar on these items.

Only the fully and uninsured have parameter estimates that are statistically significant for both age and age squared. For the fully insured, recreation and related expenditures decrease throughout their lifetimes. For the uninsured they are predicted to decrease until age 58. While none of the parameter estimates for number of adults (or adults squared) is statistically significant, the estimates indicate that expenditures probably decrease with number of adults. Most of the parameter estimates for persons younger than 18 (and their squared terms) are statistically significant, at least at the 90-percent confidence level (that is, the t-statistic is greater than 1.64). These parameter estimates indicate that recreation and related expenditures decrease with number of children. Regardless of insurance status, larger families incur larger expenditures for food, housing, and other items. It may be that given all else is held constant (including income), recreation is one area in which families economize as they grow larger.

Income elasticities

The information just provided describes the relationship of several expenditure categories to different demographic characteristics for each insurance coverage group. One consistently significant variable is permanent income. Although the regression results show how expenditures are predicted to change given an increase of one dollar in permanent income, how are expenditures predicted to change given an increase of 1 percent in permanent income? To answer this question, income elasticities are estimated using regression and other results.

An elasticity can be described as the percent change in one factor given a 1-percent increase

Table 6. **Income elasticities for selected expenditure categories, Consumer Expenditure Survey data, 1993**

Type of expenditure	Insurance status			
	Fully covered	Partially covered	Medicaid	Not covered
Food at home	0.58	0.59	0.60	0.65
Housing (less other lodging)	.95	.93	.78	.98
Apparel and services	1.07	1.19	1.14	1.06
Transportation (less trips)	1.03	1.13	1.01	.91
Recreation and related expenditures	1.12	1.15	1.20	1.21
Using the expenditure means for all consumer units				
Food at home	** .52	****.63	****1.04	****.71
Housing (less other lodging)	**.93	.91	.94	****1.03
Apparel and services	**1.07	****1.22	***1.22	1.09
Transportation (less trips)	**1.01	****1.25	***.91	****.92
Recreation and related expenditures	**1.19	****1.01	****.73	1.17

** Significantly different from zero at the 99-percent level.
*** Significantly different from the fully insured group coefficient at the 95-percent level.
**** Significantly different from the fully insured group coefficient at the 99-percent level.

in another factor. For example, table 6 shows the income elasticity of food at home for the fully insured is 0.58. This means that given a 1-percent increase in income, the average fully insured family is predicted to increase its expenditures on food at home by 0.58 percent. If the income elasticity of a good or service is less than one, it is called "inelastic." (An elasticity of zero implies perfect inelasticity; an increase in income yields no change in expenditures.) If it is exactly one, it is called "unitary elastic." If it is greater than one, it is called "elastic." Expenditures with an income elasticity that is positive but less than one are often called "necessities," while those with elasticities greater than one are often called "luxuries."

The calculation of elasticities is straightforward. In general, the formula for an elasticity (often written as

$$\eta_{Y,I} = \frac{\partial / y}{\partial I} \cdot \frac{I}{Y}$$

where

Y is an expenditure (such as food at home)
I is permanent income, at least in the present case.

The term $\partial Y/\partial I$ is simply the parameter estimate associated with the expenditure of interest.[50] The terms I and Y represent the average income and expenditure values for the group being analyzed. Note that I/Y is the inverse of Y/I, or the share of total expenditures devoted to good Y. Therefore, the inverse of the share shown in table 3 can be used for I/Y.

Elasticities are shown for average families in each insurance group. (See table 6.) That is, values are computed using the income parameter estimate for the fully insured multiplied by the inverse of the expenditure share for the fully insured. (For food at home, the income elasticity is calculated to be 0.061 multiplied by 1/0.105, or about 0.58).

Table 6 also shows what the elasticity is predicted to be if income and expenditures are held constant across groups. That is, the parameter estimates for income are allowed to vary across groups, but the inverse share is calculated from the "all consumer units" column in table 3. (For food at home the inverse share is 1/0.116 regardless of insurance coverage.) Because the elasticities in the latter part of table 6 are standardized for income and expenditures, it is possible to test differences across insurance groups for statistical significance. If the parameter estimate for the fully insured group is statistically significant, this means that the elasticity is significantly different from zero. If the parameter estimate for the non-fully insured group is statistically significant, this means that the elasticity for the non-fully insured group is statistically significantly different from the elasticity for the insured group.

Income elasticities do not vary greatly across groups for most items. (See the first part of table 6.) If a good is inelastic for one insurance group, it is inelastic for all groups, and what is elastic for one is elastic for all, except for transportation. For the uninsured, transportation is inelastic. For other groups, transportation is elastic.

Also, housing is notably more inelastic for medicaid recipients than the other groups, which have nearly identical elasticities. This difference is fairly easy to explain. Because the average medicaid recipient has less income than the average member of any other group, it is not surprising that housing is more a "necessity" for this group than the others.

At any rate, the order of elasticities is similar for each group, regardless of insurance status. That is, the three least elastic goods are food at home, housing, and transportation while the most elastic goods are apparel and recreation and related expenditures. The general interpretation of the results in the first part of table 6 is that given a certain income, most families, regardless of insurance group, will "settle" at the point where the average family in one insurance group is about as "sensitive" to a 1-percent increase in income as the average family in any other group for any particular expenditure item.

More intriguing are the results shown in the latter part of table 6. Each family is treated as if it had the same level of expenditures and permanent income as the average member of the population. Therefore, any differences in elasticity must be due to differences in the marginal propensity to consume, that is, the amount of each additional dollar the recipient would spend for each item. Therefore, differences in table 6 more likely reflect differences in tastes or other less quantifiable factors that differ by insurance group.

When all families are given average income and expenditures, some of the results are noteworthy. For example, for medicaid families, food at home has an income elasticity exceeding one, but for recreation and related goods the income elasticity is less than one. This may be because medicaid families have low incomes, and are used to "doing without," even to the point of cutting back as much as possible on the most basic necessities, such as food. Given extra income, therefore, they are more likely to purchase more (or better quality) food than to spend more for recreation.

Also of interest is that the income elasticities of housing and apparel do not change much by insurance group even when everyone is given the same income and expenditure level, although the elasticity for housing for medicaid families moves more in line with the other groups.

Conclusions

Many recent developments related to health care have made it a subject of much discussion. Prices have risen substantially in recent years, and the share of current consumption devoted to health care is high by historical standards. Rising prices have caused changes in the availability of insurance, as employers have cut costs by reducing their contributions to health insurance or offering programs with higher deductibles. As evidence of rising prices and reduced employer contributions, employee out-of-pocket expenditures for health care have risen and expenditures for health insurance premiums have increased.

The analysis in this article indicates that consumer spending patterns clearly differ with the health insurance status of families and that the spending patterns are not limited to differences in health care expenditures.

The analysis also suggests that changes in the portion of health care costs that consumers pay out-of-pocket will be tied to changes in other expenditures. Future research may continue to examine the relationship between health care and other expenditures if warranted by changes in health care costs. □

Footnotes

[1] *HHS News*, U.S. Department of Health and Human Services, November 1994, p. 1.

[2] *Health, United States, 1992*, National Center for Health Statistics, MD, Hyattsville, Public Health Service, 1993, p. 161.

[3] Medicare is a nationwide health insurance program providing health insurance protection to persons at least 65 years old, persons who are entitled to Social Security disability payments for at least 2 years, and all persons with end-stage renal disease, regardless of income. Medicare consists of two parts: hospital insurance (Part A), and supplementary medical insurance (Part B). However, the Consumer Expenditure Survey makes no distinction between parts A and B policies.

Medicaid is operated and administered at the State level, but includes Federal financial participation. Within federally mandated guidelines, States decide eligibility, the amount, duration, and scope of services covered, and other related issues. Medicaid provides coverage for certain low-income persons, and categorically covers participants in the Aid to Families with Dependent Children program and in the Supplemental Security Income program. In most States it also covers certain other persons considered medically needy.

[4] *Health, United States*, p. 170. These data are compiled by the Health Care Financing Administration and do not include consumer expenditures for health insurance premiums in the calculation of out-of-pocket health care expenditures. The current study, which uses Consumer Expenditure Survey data, includes health insurance expenditures in out-of-pocket health care spending. The other components of out-of-pocket health care expenditures are medical care services, prescription drugs, nonprescription drugs, and medical supplies.

[5] *HHS News*. These data do not include health insurance premium payments in the calculation of out-of-pocket health expenditures.

[6] Cathy A. Cowan and Patricia A. McDonnell, "Business, Households, and Governments: Health Spending 1991." *Health Care Financing Review*, Spring 1993, p. 229.

[7] *HHS News*, Table 1.

[8] A consumer unit consists of a single person living alone or sharing a household with others, but who is financially independent; members of a household related by blood, marriage, adoption, or some other legal arrangement; or two or more persons living together who share responsibility for at least two of three major expenses—for example, food and housing. For convenience, this article uses the terms *family* and *families* interchangeably with the term *consumer unit(s)*.

[9] "Early Retiree Health: Health Security Act Would Shift Billions in Costs to Federal Government," U.S. General Accounting Office, July 1994, p. 15.

[10] *Health, United States*, p. 163

[11] *HHS News*, p. 2.

[12] *Ibid.*, p. 3. The precise rates of change are: 24.5 percent in 1991, 15.0 percent in 1992, and 9.2 percent in 1993.

[13] *Ibid.*, p. 3.

[14] *Ibid.*, p. 3

[15] *Ibid.*, p. 2.

[16] Projections show that in 2025, 18.7 percent of the U.S. population will be over age 65, compared with 12.6 percent in 1991. *Statistical Abstract of the United States*, 1993, U.S. Bureau of the Census, 1993, pp. 21, 24.

[17] Ralph Bradley, "Growth of U.S. Health Care Spending," *Contemporary Economic Policy*, October 1994, pp. 45–56.

[18] Katharine R. Levit, Mark S. Freeland, and Daniel R. Waldo, "National Health Care Spending Trends: 1988," *Health Affairs*, Summer 1990, pp. 171–84.

[19] *Employee Benefits in Medium and Large Establishments*, 1993, Bulletin 2456 (Bureau of Labor Statistics, November 1994).

[20] Unpublished data from BLS, Division of Occupational Pay and Employee Benefits Levels, "Percent of full-time employees participating in employer-provided benefits plans, 1979–93."

[21] Cowan and McDonnell, "Business, Households, and Governments: Health Spending 1991," *Health Care Financing Review*, pp. 231–32.

[22] Eva Jacobs and Stephanie Shipp, "A History of the U.S. Consumer Expenditure Survey: 1935–36 to 1988–89." *Journal of Economic and Social Measurement*, June, 1993, pp. 59–96.

[23] The share of total expenditures allocated to health care rose from 5.0 percent in 1988 to 5.8 percent in 1993. These Consumer Expenditure Survey data include the cost of health insurance premiums in the tabulation of out-of-pocket health care expenditures.

[24] See Richard D. Miller, "Another Look at the Medically Uninsured Using the 1987 Consumer Expenditure Survey." Working Paper 206 (Bureau of Labor Statistics, October 1990); Elizabeth M. Reise, "A Look at Private Health Insurance Coverage of Families with Children under 18 Using Data from the Consumer Expenditure Interview Survey for 1989–91." Presented at the winter meetings of the American Statistical Association, Ft. Lauderdale, FL, January 1993.

[25] Rose M. Rubin and Kenneth Koelln, "Determinants of Household Out-of-Pocket Health Expenditures," *Social Sciences Quarterly*, December 1993, pp. 721–35.

[26] Edith Rasell, Jared Bernstein, and Kainan Tang, "The Impact of Health Care Financing on Family Budgets." *Challenge*, November-December 1993, pp. 12–20.

[27] For more information about the Consumer Expenditure Survey, see *Consumer Expenditure Survey, 1990–91*, Bulletin 2425 (Bureau of Labor Statistics, September 1993).

[28] Because of the rotating sample, each observation does not represent a unique family. The number of unique families can be estimated by dividing the number of observations by 4. This estimate will undercount unique families, though, because not all families who are interviewed in the first quarter of 1993 remain in the sample through the fourth quarter.

[29] Data on occupation are collected for all respondents at least 14 years of age. Such data include employment status even if the respondent is not working (for example, unemployed, retired, taking care of family members, and so forth).

[30] In a few cases the family reported a policy, but had an invalid response for the number of members covered (such as a refusal to answer or "don't know"). In these cases, the policy was assumed to cover one member.

[31] Examples of policies with limited coverage include those that provide only dental coverage or policies that only cover children injured in school-related athletic activities.

[32] See Miller, "Another Look at the Medically Uninsured," and Reise, "A Look at Private Health Insurance."

[33] Data in the tables are only for complete income reporters. Complete income reporters are defined as consumer units that provide values for at least one of the major sources of their income, such as wages and salaries, self-employment income, or Social Security income. However, even complete income reporters do not necessarily provide a full accounting of all income from all sources. As a result, the Division of Consumer Expenditure Surveys plans to impute values for families with missing income. For a description of ongoing work and related research in this area, see Geoffrey D. Paulin and David L. Ferraro, "Imputing income in the Consumer Expenditure Survey," *Monthly Labor Review*, December 1994, pp. 23–31.

[34] The reference person is the first person mentioned when the respondent is asked to "Start with the name of the person or one of the persons who owns or rents this home." The relationship of other consumer unit members is determined with respect to this person.

[35] In the Consumer Expenditure Survey, the term "child" or "children" refers to the offspring (by birth or adoption) of a parent. Therefore, a family in which a grandparent is caring for a grandchild would be listed as having no children, but as having one person under 18. Furthermore, if a student is living with parents while attending college, that student is considered a child even if the student is older than 18. In this article, the terms "child" are "children" refer to persons younger than 18, whether or not the parent is part of the consumer unit.

[36] Complete reporters of income are ranked in ascending order of income and divided into five equal groups. Each of these groups is called a quintile. Families in the lowest quintile have the least income on average. Families in the highest quintile have the highest income, on average.

[37] "Other families" include unmarried couples, married couples living with relatives, and all others who as a group fit the definition of a consumer unit.

[38] Graham Bannock, Ron Baxter, and R. Rees, *A Dictionary of Economics* (Middlesex, England, Harmondsworth, Penguin Books Ltd., 1972), p. 140.

[39] Milton Friedman, *A Theory of the Consumption Function* (Princeton, NJ, Princeton University Press for National Bureau of Economic Research, 1957), p 221. Recent studies using total expenditures as a proxy for permanent income include Julie Nelson, "Individual Consumption Within the Household: A Study of Expenditure on Clothing," *Journal of Consumer Affairs*, Summer 1989, pp. 21–43; E. Raphael Branch, "Short Run Income Elasticity of Demand for Residential Electricity Using Consumer Expenditure

Survey Data," *The Energy Journal*, 1993, pp. 111–21; and Geoffrey D. Paulin, "A Comparison of Consumer Expenditures by Housing Tenure," *Journal of Consumer Affairs*, Summer 1995. A version, which includes an analysis of condominium owners, is available from the Bureau of Labor Statistics, Division of Consumer Expenditure Surveys (Working Paper 249, December 1993).

[40] The value of food stamps is included in both the income and the expenditure tabulations in the Consumer Expenditure Survey.

[41] Seventy-six percent of medicaid families do not report expenditures for health insurance. Families who report their primary policy as Blue Cross/Blue Shield (7 percent), other commercial insurance (9 percent), or health maintenance organization policies (3 percent) account for fewer than one-fifth of these families. The remainder report primary policies for medicare supplements (2 percent) or limited coverage policies (4 percent). Few families report dental-only primary policies. A primary policy is defined here as the first policy described by the respondent in the interview. The numbers described do not add to 100 percent due to rounding.

[42] Like the medicaid families, most uninsured families (77 percent) do not report health insurance expenditures. Families who report a primary policy for Blue Cross/Blue Shield (5 percent), other commercial insurance (8 percent), or health maintenance organization policies (5 percent) also account for fewer than one-fifth of these families. The remainder report primary policies for limited coverage (4 percent) and dental coverage only (1 percent). No uninsured families who were sampled reported medicare supplements. A primary policy is defined here as the first policy described by the respondent in the interview. As described in the text, primary polices for the uninsured are reported to cover zero members of the consumer unit; they presumably cover children at school, dependents living with another legal guardian (such as children living with the respondent's former spouse), or other similar persons.

[43] Barbara A. Sawtelle, "Income Elasticities of Household Expenditures: a US Cross-Section Perspective." *Applied Economics*, May 1993, pp. 635–644. Although Sawtelle does not weight the regressions by the population, she divides each variable by income before taxes before calculating her regressions. In other words, instead of running the regression for $Y = a + bX$, she runs the regression $Y/X = a/X + b$.

The method used in this article is the same as used by Geoffrey D. Paulin, "A Comparison of Consumer Expenditures by Housing Tenure," *Journal of Consumer Affairs*, Summer 1995. In it, regressions are run using a weight statement in the computer program. Therefore, the regression run minimizes $\sum wi\ (Yi - Y^*)^2$ where wi is the weight for each observation (that is, population weight divided by total expenditures squared), Yi is the observed value of the dependent variable for each observation, and Y^* is the predicted value for each observation. Both versions result in the same values for the parameter estimates and their associated standard errors, but the version here yields results that are easier to interpret, in general. In the method Sawtelle uses, the intercept of the equation actually is interpreted as the parameter estimate for variable X would usually be interpreted, and the parameter estimate for $1/X$ is interpreted as the intercept is usually interpreted. In the method used here, the intercept is interpreted as the intercept, and all other parameter estimates are interpreted in the conventional manner.

[44] Another important measure would be the cross-expenditure elasticity of substitution of health care and other detailed expenditures (that is, if health care expenditures rise by 1 percent, by what percent do expenditures for food, housing, and other items change?). However, it is not immediately clear how such an analysis would be conducted using Consumer Expenditure Survey data, because no information on deductibles and other information is collected in the survey. Deductibles result in kinks in the budget constraint that cannot be controlled for in the regressions. Therefore, calculating cross-elasticity of substitution is not attempted in this article.

[45] Although it is possible that simultaneous equations bias exists when the detailed expenditure is a large share of total expenditures, Peter Kennedy provides a list of reasons why the problem may not be serious when ordinary least square is used. See *A Guide to Econometrics*, Third Edition, Cambridge, MA, the MIT Press, 1992, pp. 157–58.

[46] Robert Cage, "Spending differences across occupational fields," *Monthly Labor Review*, December 1989, pp. 33–43.

[47] Paulin, "A Comparison of Consumer Expenditures by Housing Tenure."

[48] A t-statistic of at least 1.96 in absolute value is statistically significant at the 95 percent-confidence level. A t-statistic of at least 2.58 in absolute value is statistically significant at the 99 percent-confidence level.

[49] The initial equation is specified as:

$$Y = \alpha + \beta_1^2, A + \beta_2 A^2 + \beta_3 Xi + e$$

where Y is a selected expenditure (such as food at home); is the intercept; and β_1 and β_2 are the parameter estimates for age and age squared, respectively; β_3Xi represents all other variables multiplied by their parameter estimates; e is the error term for the regression. According to the rules of calculus, the maximum or minimum is found at the point at which the value of the first derivative of the equation is equal to zero:

$$\frac{\partial Y}{\partial A} = \beta_1 + 2\beta_2 A = 0$$

or

$$A^* = -\beta_1 / 2\beta_2$$

where A* is the age at which the predicted expenditure peaks, if it has reached a maximum. According to the second order condition, if the second derivative is negative, a maximum has been reached. If the second derivative is positive, a minimum has been reached. Therefore, whether predicted expenditures reach a maximum or minimum depends on the sign of β_2, as illustrated in the following equation:

$$\partial^2 Y / \partial A^2 = 2\beta_2$$

If β_2 is not statistically significant, there is no evidence to support the hypothesis that predicted expenditures have a nonlinear relationship with age. Therefore, expenditures are predicted to increase or decrease linearly with age, depending on the sign (and statistical significance) of β_1.

[50] Robert Pindyck and Rubinfeld, Daniel L. *Econometric Models and Economic Forecasts, Second Edition*, New York (McGraw-Hill, 1981), p. 91.

Appendix: Statistical test for expenditure shares

In a comparison of means of two samples, a *t*-test is frequently used to see whether observed differences are statistically significant. For large samples the formula for the standard *t*-test is:

$$(1) \qquad t = (M_1 - M_2)/SE_p$$

where

M_1 is the mean of the first sample
M_2 is the mean of the second sample
SE_p is the pooled standard error of the samples.

The pooled standard error is calculated by squaring the standard errors of the first and second samples, adding the squares together, and taking the square root of the summed squares. If the value for *t* is greater than 1.96, the difference is statistically significant at the 95-percent confidence level. If it is greater than 2.58, the difference is statistically significant at the 99-percent confidence level.

However, the above equation is not appropriate for testing differences in shares because, as defined in the text, *t*-statistics are calculated by dividing an average by an average. For example, if the average family in group 1 spends $2,000 on food at home and $20,000 on total expenditures, the share (S_{f1}) is 0.10. If the average family in group 2 spends $1,200 on food at home and $10,000 on total expenditures, the share (S_{f2}) is 0.12. Is the difference between these shares statistically significant? Standard errors are associated with the mean expenditure for food at home and the mean expenditure for total expenditures. These standard errors most likely differ for groups 1 and 2. This must be taken into account before a *t*-test can be computed.

A formula is available to compare shares. It uses the relative standard error (RSE) of the mean for each element of the share (food at home and total expenditures). The RSE is defined as the standard error of the expenditure divided by the mean expenditure ($SE_{f1}/M_{f1} = RSE_{f1}$, where f1 indicates expenditures for food at home for group 1). To calculate the pooled standard error for use in the shares test, the following formula is used:

To calculate the pooled standard error for use in the shares test, the following formula is used:

$$(2) \quad (SE_{pf})^2 = S_{f1}^2[RSE_{f1}^2 + RSE_{t1}^2 - 2S_{f1}RSE_{f1}^2] + S_{f2}^2[RSE_{f2}^2 + RSE_{t2}^2 - 2S_{f2}RSE_{f22}]$$

where subscript 1 indicates group 1, subscript 2 indicates group 2, and subscript f indicates food at home. To test whether the difference in shares that groups 1 and 2 allocate for food at home is statistically significant, the following formula is used:

$$(3) \qquad t_f = (S_{f1} - S_{f2})/SE_{pf}$$