

Health insurance coverage among disabled Medicare enrollees

by Jeffrey I. Rubin and Virginia Wilcox-Gök

In this article, we use the Survey of Income and Program Participation to identify patterns of non-Medicare insurance coverage among disabled Medicare enrollees. Compared with the aged, the disabled are less likely to have private insurance coverage and more likely to have Medicaid. Probit analysis of the determinants of

private insurance for disabled Medicare enrollees shows that income, education, marital status, sex, and having an employed family member are positively related to the likelihood of having private health insurance, whereas age and the probability of Medicaid enrollment are negatively related to this likelihood.

Introduction

Following a lengthy period of discussion and some efforts at reform, cost and access continue as the fundamental issues in the debate over the future of the American health care system (Brown, 1988; Evans, 1986). Assuring the availability and adequacy of health insurance coverage is a central element in proposals to provide access to all persons (Himmelstein and Woolhandler, 1989). At the same time, the design of health insurance policies affects the utilization and the cost of health care (Manning et al., 1987). Hence, the type and extent of health insurance coverage among such large and vulnerable populations as the aged and disabled are especially important concerns.

Both Medicare and Medicaid offer substantial protection against health care costs to the long-term disabled population. Medicare has imposed deductibles and coinsurance requirements on enrollees since its inception. Faced with the possibility of incurring out-of-pocket costs, many people covered by Medicare purchase private insurance to supplement Medicare benefits (Long, Settle, and Link, 1982; Cafferata, 1985). Some Medicare beneficiaries are eligible for additional private health insurance coverage through an employed family member. Certain low-income Medicare beneficiaries are able to qualify for Medicaid coverage. These public and private policies lower the cost of health care for Medicare enrollees and thus are likely to influence the demand for health care. Consequently, patterns of non-Medicare health insurance coverage can affect both access and cost for Medicare enrollees.

Legislative efforts to fill gaps in the protection offered by Medicare have generated substantial controversy. The repeal of the Medicare Catastrophic Coverage Act of 1988 is certain to generate new debate over possible reforms. Informed decisions as to how best to amend Medicare require a better understanding of how and why non-Medicare health insurance coverage varies among Medicare enrollees. There has been much research on the distribution, cost, and quality of the supplemental health insurance policies purchased by aged Medicare enrollees

(Garfinkel, Bonito, and McElroy, 1987; Rice and McCall, 1985). To date, there is very little research on the patterns of additional health insurance coverage among the long-term disabled who qualify for Medicare coverage.

The factors that explain variations in supplemental coverage may differ for the aged and disabled. Aged and disabled Medicare enrollees differ in numerous ways. Besides the obvious difference in age, the eligibility rules governing disability programs result in disabled Medicare enrollees having different health care needs than aged enrollees. The functional limitations of the disabled are apparent at the time they seek private insurance. The aged may not develop health problems until some time after their original decision to purchase insurance. These differences could affect the willingness of insurers to provide coverage. These distinctions suggest that a separate analysis of non-Medicare health insurance coverage among the disabled is required.

In this article, we extend previous work on the determinants of additional health insurance coverage among aged Medicare enrollees to disabled Medicare enrollees. Both our data source and methods differ from those used in previous work. For example, unlike in other studies, Medicaid coverage is treated as an endogenous variable in our analysis. We also control for the possibility that a disabled person may receive health insurance coverage via the employment of another family member.

In the following section, we review available program data and describe the disabled Medicare enrollee population and their utilization of health care. Where appropriate, we compare and contrast these findings with those for aged Medicare enrollees. Using data from the Survey of Income and Program Participation, we examine differences in insurance protection among the disabled. We next discuss the methods and results of an analysis of determinants of non-Medicare insurance coverage among disabled Medicare enrollees. The article concludes with comments on the policy implications of our findings.

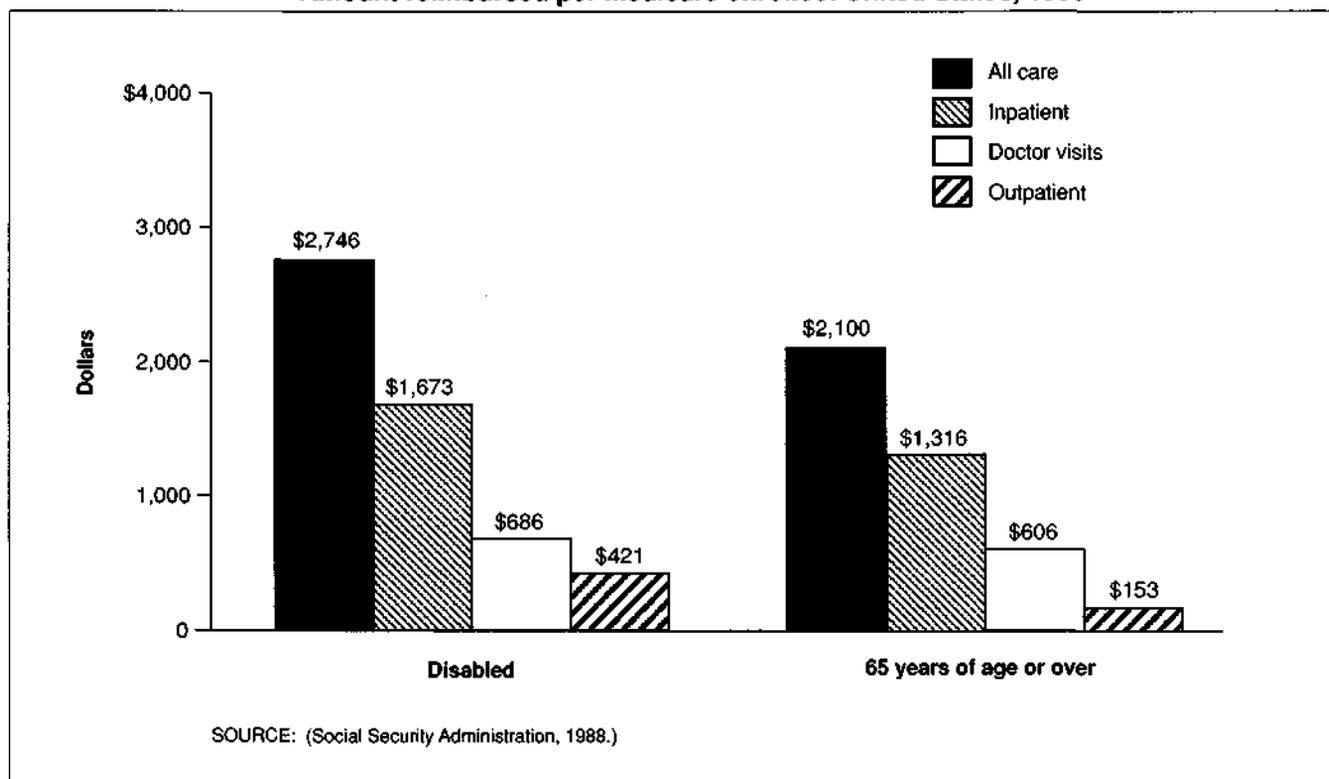
Disabled Medicare population

Most persons in the labor force are insured through the Social Security program against income losses associated with long-term disability. If covered individuals under 65 years of age suffer an impairment that results in their being unable to perform substantial gainful activity, they

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Figure 1
Amount reimbursed per Medicare enrollee: United States, 1986



may qualify for cash benefits under the Social Security Disability Insurance program (SSDI). After being entitled to SSDI payments for 2 years, an individual automatically qualifies for Medicare coverage under Part A. As is true for the aged, the disabled have the option of enrolling in Part B of Medicare. In 1980, a change in the law extended Medicare coverage for up to 3 years for disabled persons whose efforts to return to work result in the loss of SSDI benefits (Bye, Riley, and Lubitz, 1987). Similar provisions regarding Medicare apply to disabled persons covered under the Railroad Retirement Act.

In 1986, there were nearly 3 million disabled persons (including those with end stage renal disease) under 65 years of age enrolled in Medicare, or about 9.5 percent of all enrollees (Social Security Administration, 1988). The disabled accounted for 11.5 percent of reimbursements under the hospital insurance provisions (Part A) of Medicare and for 12.5 percent of total reimbursements for physician and other services in the supplemental medical insurance part of Medicare (Part B). Overall, 11.8 percent of the nearly \$69 billion in health care costs financed by Medicare in 1986 was for services provided to disabled enrollees.

As shown in Figure 1, the high health care costs for disabled enrollees are reflected in reimbursements per enrollee. In 1986, Medicare reimbursed providers a total of \$2,100 per aged enrollee and \$2,746 per disabled

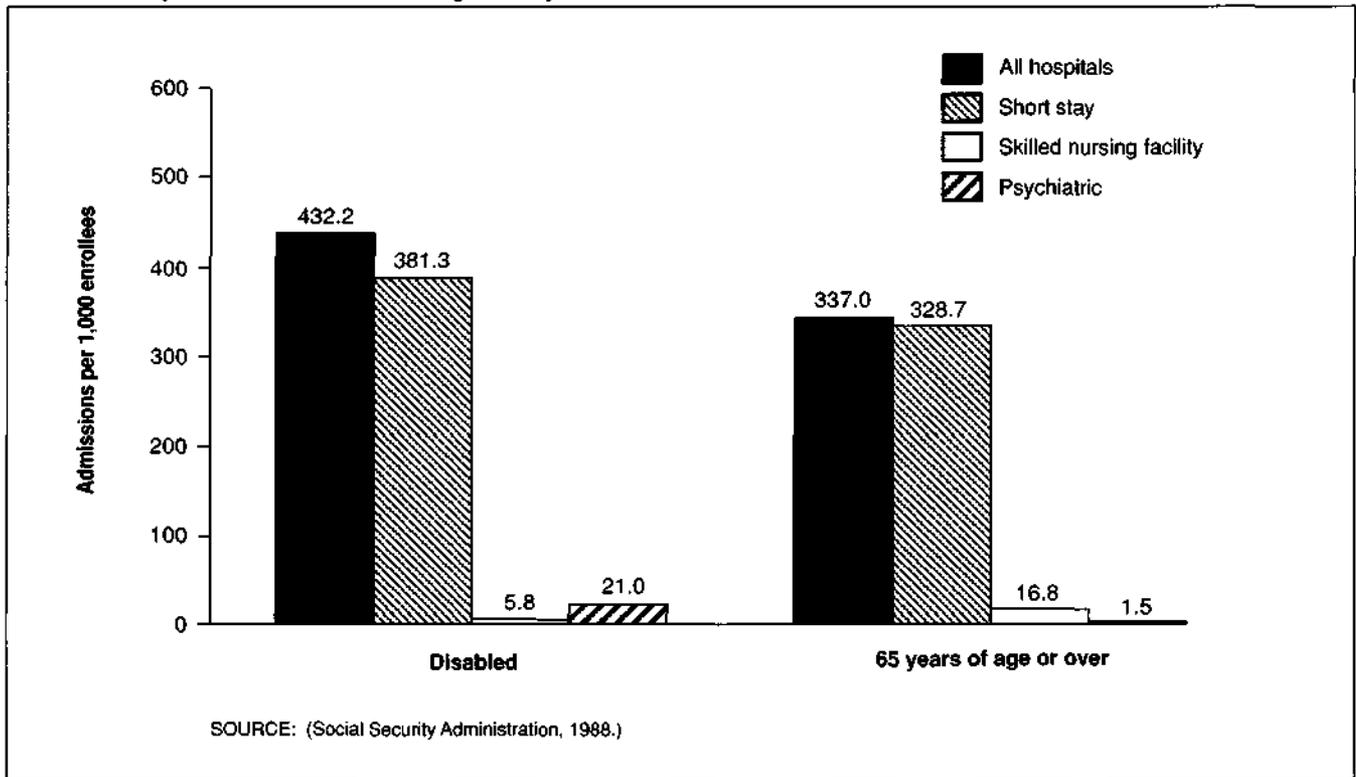
enrollee, a difference of over 30 percent.¹ The largest differences occurred in inpatient hospital care (\$1,673 per disabled enrollee and \$1,316 per aged enrollee) and in outpatient services (\$421 per disabled enrollee and \$153 per aged enrollee).

As these numbers suggest, the disabled are more likely than aged Medicare enrollees to have a hospital admission. Figure 2 shows admissions for disabled and aged Medicare enrollees. In 1986, there were 337.0 inpatient hospital admissions per 1,000 enrollees among those 65 years of age or over and 432.2 admissions per 1,000 disabled enrollees. One factor responsible for the higher rate of hospital admissions for the disabled is their substantially greater use of psychiatric facilities. In 1986, there were 1.5 psychiatric hospital admissions per 1,000 aged enrollees compared with 21.0 per 1,000 disabled enrollees. Although the disabled constituted 9.5 percent of all Medicare enrollees, they accounted for 60 percent of all admissions to psychiatric hospitals under the hospital insurance program. On the other hand, in

¹Published data on health care utilization and spending for disabled Medicare enrollees include persons with end stage renal disease. These persons have substantially higher costs than other Medicare enrollees under 65 years of age. One study, using Medicare files, indicated that in 1981 reimbursements per disabled enrollee (excluding persons with end stage renal disease) were 7.8 percent higher than reimbursements per aged enrollee (Lubitz and Pine, 1986). In our empirical work, we do not exclude persons with end stage renal disease. These persons comprise 1.3 percent of all disabled Medicare enrollees.

Figure 2

Hospital and skilled nursing facility admissions for Medicare enrollees: United States, 1986



1986, the disabled had a lower rate of admissions to skilled nursing facilities (5.8 per 1,000) than aged enrollees (16.8 per 1,000).

The disabled cluster in the older age groups. Almost 15 percent of disabled Medicare enrollees were under 35 years of age, 16.8 percent were 35-44 years of age, 20.7 percent were 45-54 years of age, and nearly 48 percent were 55-64 years of age (Social Security Administration, 1988). The large proportion of beneficiaries 55-64 years of age suggests that patterns of health insurance coverage established while receiving disability benefits are likely to affect variations in coverage among aged Medicare enrollees.

Other data on the characteristics of disabled Medicare enrollees are also available. A majority (63.6 percent) of disabled Medicare enrollees are males. This is in sharp contrast to the situation among aged beneficiaries. The longer life expectancy for females and the fact that eligibility for aged beneficiaries does not require recent labor force experience are the two major reasons that only 40.3 percent of aged beneficiaries are males. Slightly less than 80 percent of the disabled Medicare enrollees are white, whereas just over 88 percent of the aged are white. Of the disabled living in the United States, almost 38 percent live in the South, whereas 33.2 percent of aged beneficiaries live in this region (Social Security Administration, 1988).

Published program data are based on the combined experience of all disabled Medicare enrollees. In fact, there are several different groups of disabled persons who are able to qualify for SSDI benefits and eventually Medicare coverage. In a recent study, Lubitz and Pine

(1986) provide a complete description of the disability program, including the different eligibility categories. They note that in addition to disabled workers, who constitute 80 percent of the Medicare disabled population, there are two other groups that qualify for disability benefits. One group is adults disabled as children who are dependents of a recipient of either disability or retirement benefits or a survivor of a covered individual. Mentally retarded persons comprise over one-half of this group. The other group of eligible persons are disabled widows or widowers of someone who was covered by social security at the time of their death.

The groups differ substantially in their age and sex distribution. Because the minimum age for eligibility among widows and widowers is 50 years, it is not surprising that 60.7 percent of all these beneficiaries were 60-64 years of age. The comparable proportions of disabled workers and adults disabled in childhood were 34.2 and 4.6 percent, respectively. Nearly all persons eligible for disability benefits because of the death of a spouse were females. Among disabled workers, 67.2 percent were males; and among adults disabled in childhood, 55.0 were males (Lubitz and Pine, 1986).

Using data from the Continuous Medicare History Sample, Lubitz and Pine (1986) examined utilization among the Medicare disabled population in 1978. Among the principal findings was that Medicare reimbursements for adults disabled in childhood (\$345 per covered person) were substantially below the reimbursement per disabled worker (\$924) and per disabled widow or widower (\$1,051). The data suggest that the health care needs of disabled Medicare enrollees vary by age, sex,

and marital status. These differences in the potential need for and utilization of services could also be responsible for differences in non-Medicare health insurance coverage among disabled Medicare enrollees. At the same time, differences in non-Medicare health insurance coverage could influence utilization patterns.

Sampled disabled Medicare enrollees: Characteristics

Program data and analyses of Medicare files offer a clear picture of health care utilization by long-term disabled persons. But the determinants of utilization and any differences in non-Medicare health insurance coverage remain obscured. We expect that public and/or private health insurance coverage will help explain variations in health care use among the disabled. Thus, information on the determinants of non-Medicare insurance coverage is important in explaining differences in access.

To examine coverage patterns and estimate a model explaining variations in coverage, we use data from the 1984 Survey of Income and Program Participation (SIPP). The survey provides extensive data on individual characteristics, as well as information on private and public health insurance and health care use (U.S. Bureau of the Census, 1986). Unfortunately this survey, like most others, excludes the institutionalized population. Consequently, it will not yield a truly representative sample of all disabled Medicare enrollees. Nonetheless, given the large proportion of the eligible population which is comprised of noninstitutionalized disabled workers, SIPP does provide sufficient information to analyze the pattern and determinants of health insurance coverage among the majority of disabled persons covered by Medicare.

Using SIPP, we identified respondents under 65 years of age who indicated that they were disabled and covered by Medicare. We excluded respondents who reported Medicare coverage but did not claim to be disabled.² Also, because there were relatively few observations where respondents indicated that they were covered by Medicare, Medicaid, and private insurance, we cannot report reliable weighted population estimates for this group. (Persons with all three forms of coverage are included in the multivariate analysis reported later.) Therefore our focus in this section is on three groups of noninstitutionalized disabled Medicare enrollees: those who report only Medicare coverage; those who report only Medicare and Medicaid coverage; and those who report only Medicare and private insurance coverage. The total weighted sample from these three groups was 1,985,828.

A majority of disabled Medicare enrollees (62.3 percent) in our sample reported some coverage in addition to Medicare (Table 1). Some individuals purchase private coverage explicitly designed to

²There were 39 respondents (representing a weighted population of 167,963 individuals) under 65 years of age who reported Medicare coverage but did not indicate that they were disabled. SIPP only includes details describing health conditions for persons who reported that they were disabled. Hence, we are unable to determine what health problem(s) these enrollees might have. Alternatively, it is possible that these respondents incorrectly reported Medicare coverage.

supplement Medicare benefits. Others are eligible for coverage under a health insurance policy provided to a working family member. A portion of disabled workers may retain coverage under the terms of their employment contract. The precise nature of benefits under any of these types of policies is not available from SIPP.

Just over 41 percent of the sample had Medicare and private health insurance only. Ownership of private health insurance is likely to be positively related to income. Alternatively, if income is below a specified threshold, a disabled person could qualify for Medicaid. Some disabled persons may qualify for Medicaid soon after they become disabled and often before the 2-year waiting period for SSDI beneficiaries has elapsed. Medicaid coverage is also available to disabled recipients of Supplemental Security Income, including many who lack the work experience to qualify for SSDI. Disabled Medicaid recipients not receiving SSDI are not in our sample.

We found that 21.1 percent of disabled Medicare enrollees in our sample were eligible for Medicare and Medicaid only. The remaining 37.7 percent indicated that the only health insurance coverage they had was Medicare. Several explanations are possible for so many disabled persons lacking coverage beyond Medicare. Some people in this group may be willing to bear the risk of incurring out-of-pocket expenses not covered by Medicare. Having a disabling condition that leaves a person unable to work does not necessarily imply that the individual has substantial health care costs. Other disabled persons may have had income above the Medicaid threshold but too low to afford additional health insurance. Because of the disabling condition, some people may have had difficulty finding an insurer willing to provide supplemental health insurance coverage. Insurers, attempting to avoid the problem of adverse selection, may proceed cautiously in offering supplemental policies to persons with long-term impairments. Still others could possibly have coverage under a program not covered in the SIPP questionnaire or simply failed to report such coverage.

These findings provide further evidence of the important differences in health insurance coverage between the aged and disabled. Using a comparable sample of aged Medicare enrollees, we found that 73.1 percent had Medicare and private coverage, 6.7 percent had Medicare and Medicaid, and 20.2 percent had Medicare coverage alone. Thus, disabled Medicare enrollees are almost twice as likely as aged Medicare enrollees to have just Medicare coverage. The disabled were more than three times as likely as the aged to be eligible for Medicaid and were substantially less likely to have a private health insurance policy. The relative lack of added coverage among the disabled Medicare enrollees occurs even though they were much more likely than aged enrollees to report the presence of at least one functional limitation and poor health. The differences in health status are not surprising given the different eligibility criteria for aged and disabled Medicare enrollees.

Some interesting findings emerge when the demographic characteristics of disabled Medicare enrollees with different combinations of health insurance coverage are examined (Table 1). For example,

Table 1
Number and percent distribution of disabled Medicare enrollees 15-64 years of age, by health insurance coverage according to selected characteristics: United States, 1986

Category	Total population	Percent of total	Medicare only	Medicare and Medicaid	Medicare and private
Total population	1,985,828	—	749,114	419,584	817,130
			Percent distribution		
Total	—	100.00	37.72	21.13	41.15
Education					
0-7 years	485,115	100.00	46.19	30.36	23.45
8 years	256,577	100.00	39.95	26.04	34.00
9-11 years	388,699	100.00	37.00	21.18	41.82
12 years	577,909	100.00	31.67	17.90	50.43
13 years or more	277,528	100.00	34.49	7.09	58.43
Age					
15-29 years	98,144	100.00	36.63	52.08	11.29
30-39 years	186,282	100.00	43.92	34.01	22.07
40-49 years	250,277	100.00	41.38	20.24	38.38
50-59 years	794,050	100.00	35.67	22.97	41.36
60-64 years	675,074	100.00	37.22	10.97	51.81
Race					
White	1,592,691	100.00	37.32	17.04	45.63
Other	393,136	100.00	39.34	37.68	22.98
Sex					
Male	1,171,092	100.00	42.82	18.34	38.84
Female	814,736	100.00	30.40	25.14	44.46
Monthly household income					
\$1,000 or less	795,529	100.00	45.95	30.09	23.96
\$1,001-\$2,000	261,864	100.00	39.20	19.81	40.99
\$2,001 and more	522,221	100.00	23.30	9.16	67.54
Marital status					
Married	1,031,341	100.00	33.05	10.92	56.03
Widowed	246,614	100.00	34.18	27.58	38.24
Divorced	208,073	100.00	56.14	23.76	20.10
Separated	100,291	100.00	19.16	43.94	36.90
Never married	399,508	100.00	47.04	36.40	16.57
Self-reported health status					
Excellent or very good	124,468	100.00	25.67	37.64	36.69
Good	253,302	100.00	39.15	25.31	35.54
Fair	568,246	100.00	42.48	24.44	33.08
Poor	1,039,811	100.00	36.22	16.32	47.46
Number of functional limitations					
0	229,694	100.00	39.08	26.42	34.51
1	348,712	100.00	31.36	21.39	47.25
2	505,037	100.00	40.89	16.54	42.57
3 or more	902,385	100.00	38.06	22.25	39.69

NOTES: Population is persons 15-64 years of age who were covered by Medicare only, Medicare and Medicaid only, or Medicare and private insurance only at the date of interview. Medicare only—The person was covered only by Medicare at the date of interview. Medicare and Medicaid—The person was covered by Medicare and Medicaid at the date of interview but was not covered by private insurance. The person may also have been covered by other public programs. Medicare and private—The person was covered by Medicare and private insurance but not by Medicaid at the date of the interview. The person may also have been covered by other public programs.

SOURCE: U.S. Bureau of the Census: Data from the Survey of Income and Program Participation 1984, Wave 3.

58.4 percent of those with at least some college education had Medicare and private coverage, but only 23.5 percent of those with less than 8 years of schooling had similar coverage. Age also seems to be associated with differential coverage patterns. For example, among those 60-64 years of age, almost 52 percent had Medicare and private coverage. Of those 30-39 years of age, only 22.1 percent had similar coverage. Among those 15-29 years of age, however, 52.1 percent had Medicaid and Medicare only.

Income was another factor associated with higher rates of private coverage. About 68 percent of people in households with monthly incomes exceeding \$2,000 had Medicare and private coverage. Of people in households with incomes below \$1,000, only 24.0 percent had private coverage, whereas 46.0 percent had Medicare only and 30.1 percent had Medicare and Medicaid. Those with Medicare only had an average monthly household income of \$1,326, those with Medicare and Medicaid had

an average income of \$1,049, and those with Medicare and private coverage only had an average income of \$2,009.

Differences in coverage were also evident by race. Although 45.6 percent of white enrollees had Medicare and private coverage, only about 23.0 percent of the other enrollees had similar coverage. On the other hand, 37.7 percent of the other disabled Medicare enrollees had Medicaid, whereas only about 17.0 percent of those who were white reported Medicaid coverage.

Male and female disabled Medicare enrollees also differ in coverage patterns. About one-quarter of the females had both Medicare and Medicaid coverage, whereas just over 18 percent of males had such coverage. Females (44.5 percent) were also more likely than males (38.8 percent), however, to have private coverage in addition to Medicare. Along with differences in household income, differences in the proportion of males and females with working spouses are likely to be responsible for some of these variations in coverage.

The tabular data offer no clear picture of the relationship between patterns of insurance coverage and the self-reported health status of Medicare enrollees. Of those who report poor health, 47.5 percent had Medicare and private coverage, and 16.3 percent had Medicaid and Medicare. One might expect that poor health could lead to higher health care spending and thus increase the likelihood of qualifying for Medicaid. Thus, the relatively low proportion of disabled Medicare enrollees who report poor health and who have Medicaid coverage is somewhat surprising.

Overall, the results show that demographic and socioeconomic factors are related to variations in health insurance coverage among the long-term disabled. Although eligibility criteria in public programs explain some of the variability, other factors, including the current and anticipated need for health care, the ability to afford insurance, and family circumstances, may also be responsible for differences in coverage. To account for the separate effects of each of these factors simultaneously, we present and estimate a model of the determinants of health insurance coverage among disabled Medicare enrollees.

Methods

The relationship between the characteristics of disabled Medicare enrollees and the presence of private health insurance coverage is evaluated using multivariate probit analysis. Probit analysis, like logit analysis, relates a dichotomous outcome variable to several exogenous variables assumed to represent factors that influence the outcome. In the probit regression model, like the logit, it is assumed that there is an underlying response variable z , such that for each individual,

$$z = b'x + u, \quad (1)$$

in which x is a vector of variables representing factors that influence z , b' is the transpose of the vector of coefficients, and u is the error term. In practice, z is not observed. Rather, a dichotomous outcome is observed, such that for each individual,

$$d = 1 \text{ for } z > 0 \quad \text{and } d = 0 \text{ otherwise.} \quad (2)$$

In our analysis, z could be interpreted as a variable representing the desired dollar amount of health insurance coverage for an individual, and d is a dummy variable indicating whether an individual has private health insurance. Individuals for whom z is very low or zero will have no private health insurance ($d = 0$).

In probit analysis, the error terms of the individual observations are assumed to be independently and normally distributed with mean zero and constant variance. In logit analysis, the cumulative distribution of the error terms is assumed to be the logistic distribution. Because the cumulative normal and the logistic distributions are very close to each other, they typically yield very similar results. Maddala (1983) provides a further description of multivariate probit estimation.

Definitions of the variables used in the analysis are found in Table 2. As described earlier, the dependent variable is a dichotomous variable indicating whether an individual has private health insurance ($\text{PRIVATE} = 1$) in addition to Medicare coverage. Factors expected to be associated with the presence of private health insurance include family income and health status. Adjusted household income (INCOME) affects an individual's ability to afford private health insurance in addition to Medicare. An individual's current health status (POOR HEALTH) and the number of functional limitations (LIMIT) are indicators of future health care needs and are assumed to affect the likelihood of having private supplementary health insurance. Both of these health indicators are included because it is possible that they may have an impact on the individual's demand for private health insurance that is independent of his or her disability. Disabled persons may well rate themselves as having excellent general health despite the presence of the disabling condition. If the presence of serious health problems is used by insurers to deny coverage, these variables could be negatively related to the presence of private insurance.

The possibility of individuals being concurrently enrolled in multiple public health insurance programs makes this analysis complex. Eligibility for public insurance programs may depend on factors that might also influence the purchase of private insurance. In previous work on supplemental insurance among aged Medicare enrollees (Garfinkel, Bonito, and McLeroy, 1987), researchers controlled for Medicaid coverage by including a dummy variable among the explanatory variables of a regression. However, because Medicaid coverage is correlated with income, a measure of which was also included as an explanatory variable, this treatment is not ideal.

One means of eliminating this problem is to estimate the probability of having private health insurance for a population excluding individuals with any public health insurance coverage other than Medicare. Alternatively, individuals with other public health insurance coverage can be included if income and program participation variables are carefully specified. We estimate private health insurance regressions for two populations. The first population includes disabled Medicare enrollees 15-64 years of age who reported in SIPP that they had no other

Table 2
Definitions of variables

Variable	Definition
AGE	Years of age.
LIMIT	Number of functional limitations.
EDUCATION	Set of dummy variables indicating the number of years of education. Individuals in the
9-11 years	12 years category have received a high school diploma. The omitted category is "0 to 8 years".
12 years	
13 years or more	
FEMALE	Dummy variable = 1 if recipient is female.
INCOME	Monthly household income (weighted by size of household and averaged over 4 months).
MARITAL STATUS	Set of dummy variables indicating the recipient's marital status. "Married" includes
MARRIED	persons married with the spouse absent. The omitted category is "never married".
WIDOWED	
DIVORCED	
MCAIDHAT	Predicted probability of Medicaid coverage.
INTERACT	Interaction between the probability of not having Medicaid and income.
POOR HEALTH	Dummy variable = 1 if self-reported health status is poor.
PRIVATE INSURANCE	Dummy variable = 1 if the individual has private health insurance in addition to Medicare.
WHITE	Dummy variable = 1 if the recipient is white.
REGION	Set of dummy variables indicating region of the country. The omitted region is the Northeast—
1	Connecticut, Maine, Massachusetts, New Hampshire, New York, Rhode Island, and Vermont.
2	Mixed (for sampling reasons)—Idaho, Mississippi, New Mexico, South Dakota,
3	West Virginia, and Wyoming.
4	Western—Arizona, California, Colorado, Hawaii, Montana, Nevada, Oregon, Utah, and Washington.
5	Midwest—Illinois, Indiana, Iowa, Kansas, Michigan, Minnesota, Missouri, Nebraska,
URBAN	North Dakota, Ohio, Oklahoma, Texas, Utah, and Wisconsin.
WORKER	South—Alabama, Arkansas, Florida, Georgia, Kentucky, Louisiana, North Carolina, South Carolina,
MED NEEDED	Tennessee, and Virginia.
OWN HOUSE	Midatlantic—Delaware, District of Columbia, Maryland, New Jersey, and Pennsylvania.
	Dummy variable = 1 if the recipient lives in a metropolitan area.
	Dummy variable = 1 if family member is employed.
	Dummy variable = 1 if individual resides in State offering Medicaid coverage to the medically needy.
	Dummy variable = 1 if individual owns home.

SOURCE: U.S. Bureau of the Census: Data from the Survey of Income and Program Participation 1984, Wave 3.

publicly provided health insurance coverage. This population will be referred to as "Medicare One" (M1). Persons in this population may or may not have private health insurance. The second population includes Medicare enrollees who either have both Medicaid and Medicare coverage or who receive no public health coverage other than Medicare. This population will be referred to as "Medicare Two" (M2). Again, persons in this group may or may not have private health insurance. (Note that M1 is a subset of M2.)

Although our primary concern is understanding the factors determining the presence of private supplementary health insurance, it may be that Medicaid status is jointly determined with private health insurance coverage. To allow for this joint determination in our analysis of the M2 sample, enrollment in Medicaid is treated endogenously by including the predicted probability of being enrolled in Medicaid as an explanatory variable.³ Because the probability of enrolling in Medicaid is significantly related to income, including income as an explanatory variable in the private insurance regression will cause multicollinearity. However, for individuals not enrolled in Medicaid, income may be a significant factor

in the decision to purchase private supplementary health insurance. To allow an effect of income, we include an interaction term between income and a variable equal to one minus the probability of Medicaid enrollment ($INTERACT = (1 - MCAIDHAT) * INCOME$). This variable allows income to have an effect for individuals who have a low probability of Medicaid enrollment: The higher individuals' incomes are, the lower their probability is of enrolling in Medicaid (other factors held constant) and the more likely income is to play a role in the decision to have private supplementary health insurance. The lower individuals' incomes are, the higher their probability is of enrolling in Medicaid and having all costs met by the Medicaid program, and the less important income is likely to be in the decision to have private health insurance.

The set of independent variables also includes several other control variables. Because the disabled person with Medicare coverage may have private health insurance through an employed family member, a variable indicating whether any family member is employed (WORKER) is included. It is also possible that an individual may have private supplementary insurance through a prior employer. Wave 3 of SIPP does not contain information allowing us to ascertain whether this occurs. This may be a source of an omitted variable bias in our results, because other characteristics, such as income, may be correlated with the availability of private health insurance through a previous employer.

Other characteristics hypothesized to be associated with the presence of private health insurance include

³A table of the probit estimates used to predict the probability of enrolling in Medicaid is available from the authors. The dependent variable in the probit is a dummy variable equal to 1 if the individual is enrolled in Medicaid. The explanatory variables include AGE, AGE SQUARED, FEMALE, WHITE, EDUCATION (9-11, 12, 13 years or over), MARITAL STATUS (MARRIED, WIDOWED, DIVORCED), INCOME, OWN HOUSE, and MED NEEDED. Definitions, means, and standard deviations of these variables are given in Tables 2 and 3.

Table 3
Means and standard deviations
of regression variables

Variable	M1 population ¹		M2 population ¹	
	Mean	Standard deviation	Mean	Standard deviation
PRIVATE				
INSURANCE	0.52	0.50	0.44	0.50
POOR HEALTH	0.56	0.50	0.53	0.50
LIMIT	2.88	2.28	2.92	2.34
EDUCATION				
9-11 years	0.20	0.40	0.20	0.40
12 years	0.29	0.45	0.28	0.45
13 years or more	0.18	0.38	0.15	0.36
MARITAL STATUS				
MARRIED	0.62	0.49	0.55	0.50
WIDOWED	0.12	0.32	0.13	0.33
DIVORCED	0.09	0.29	0.10	0.30
WORKER	0.46	0.50	0.45	0.50
INCOME	\$1,405.53	978.60	\$1,288.13	933.57
MCAIDHAT	NA	NA	0.23	0.22
INTERACT	NA	NA	1,088.22	973.62
AGE	54.34	9.36	52.72	10.83
AGE SQUARED	3,040.98	906.33	2,896.91	1,006.61
FEMALE	0.40	0.49	0.44	0.50
WHITE	0.85	0.36	0.81	0.39
URBAN	0.63	0.48	0.65	0.48
REGION				
1	0.05	0.21	0.05	0.22
2	0.11	0.32	0.13	0.34
3	0.16	0.37	0.16	0.37
4	0.32	0.47	0.31	0.46
5	0.13	0.33	0.13	0.34
MED NEEDED	NA	NA	0.19	0.40
OWN HOUSE	NA	NA	0.72	0.45
Number of observations	325		420	

¹Individuals in the M1 population reported no public health coverage other than Medicare. Individuals in the M2 population reported either Medicare coverage or Medicare and Medicaid coverage. Individuals in either population may have private health insurance.

NOTE: See Table 2 for definitions of variables. NA is not applicable.

SOURCE: U.S. Bureau of the Census: Data from the Survey of Income and Program Participation 1984, Wave 3.

MARITAL STATUS (MARRIED, WIDOWED, DIVORCED), EDUCATION (9-11 years, 12 years, 13 years or over), AGE, RACE (WHITE) and SEX (FEMALE). Also included are control variables indicating whether the enrollee lives in a metropolitan area (URBAN) and the region of the country (REGION1 through REGION5) where the enrollee resides. These variables are included to control for possible regional and urban-rural differentials in the expected cost of medical care and the supply of private health insurance.⁴ Table 3 contains the means and standard deviations of all variables used in the analysis.

Regression results

Results of the probit regressions for the M1 and M2 populations are presented in Table 4. The *F*-statistics

⁴A series of dummy variables indicating the number of physicians and hospital beds by area was alternatively considered to proxy the supply of medical care. This specification did not improve the results of the probit regressions.

indicate that both regressions are highly significant: These specifications are acceptable with at least 99 percent confidence.

As indicated in the table, several of the probit coefficient estimates are statistically significant. However, probit coefficients do not have a direct intuitive interpretation. To make the discussion more useful, we will refer not to the coefficients but to incremental probabilities obtained from the coefficients. An incremental probability is the change in the probability of a favorable outcome because of a unit increase in the relevant exogenous variable (assuming all other factors are unchanged). The value of an incremental probability depends on the values of the independent variables in the analysis. For the values at which we have calculated the incremental probabilities, they can be interpreted as the effects on the probability of having private insurance of a change of one unit in a particular variable for an "average" individual: This individual is assumed to be a married white man with a high school diploma, reporting poor health, having no employed family member, living in an urban setting in the South, and having average values for age, income, probability of Medicaid enrollment, and number of functional limitations. For an individual whose characteristics differ from these, the change in the probability of private insurance coverage because of a one-unit increase in an independent variable will differ from what is reported.

More technically, the incremental probability of a variable is the partial derivative with respect to that variable of the probability of the outcome equaling 1. The incremental probabilities discussed are obtained by multiplying each probit regression coefficient by the value of the probability density function of the associated variable at the mean for the continuous variables used (LIMIT, INCOME, MCAIDHAT, INTERACT, AGE, AGE SQUARED) and at either zero or 1 for the dichotomous variables (POOR HEALTH = 1, 12 YEARS OF EDUCATION = 1, MARRIED = 1, WHITE = 1, URBAN = 1, REGION 4 = 1), and all other dichotomous variables are assumed to be zero. Not only are incremental probabilities more easily understood than untranslated probit regression coefficients but probit, logit, and linear probability models all yield the same incremental probabilities (by appropriate calculation). Maddala (1983) provides further details.

The probability of the individual described above having private health insurance is 0.51 for the M1 population and 0.39 for the M2 population.⁵ For both populations, the probability of having private health insurance in addition to Medicare is positively related to years of education (although the coefficient for 9-11 years of schooling is not statistically significant for the M1 population). Compared with individuals with fewer than 9 years of education, attainment of a high school diploma increases the probability of having private insurance by 0.19 for the M1 population and by 0.16 for the M2 population. College attendance increases the probability

⁵The average predicted probability of having private health insurance is 0.51 for individuals in the M1 population and 0.43 for individuals in the M2 population. Because 52 percent of the M1 population and 41 percent of the M2 population have private health insurance, the models predict well the observed outcomes.

Table 4

Probit regression estimates of presence of private health insurance for disabled Medicare enrollees

Variable	M1 population ¹		M2 population ¹	
	Regression coefficient	Asymptotic standard error	Regression coefficient	Asymptotic standard error
POOR HEALTH LIMIT	0.22 -0.01	0.19 0.04	0.27 -0.02	0.17 0.03
EDUCATION				
9-11 years	0.35	0.24	0.43	0.22
12 years	0.49	0.21	0.43	0.19
13 years or more	0.87	0.28	0.50	0.28
MARITAL STATUS				
MARRIED	0.70	0.26	0.36	0.25
WIDOWED	0.62	0.33	0.25	0.29
DIVORCED	-0.13	0.35	-0.27	0.32
WORKER	0.57	0.20	0.42	0.17
INCOME	0.43	0.09		
MCAIDHAT			-1.84	0.86
INTERACT			0.29	0.11
AGE	0.04	0.09	-0.13	0.06
AGE SQUARED	0.0001	0.001	0.001	0.0006
FEMALE	0.59	0.18	0.50	0.16
WHITE	0.35	0.23	0.18	0.22
URBAN				
REGION				
1	-0.08	0.20	-0.06	0.18
2	-0.17	0.41	-0.31	0.37
3	-0.29	0.30	-0.27	0.26
4	-0.29	0.28	-0.11	0.25
5	-0.04	0.24	-0.16	0.22
Intercept	4.18	2.19	1.72	1.63
Number of observations		325		420
Regression degrees of freedom		21		22
F-statistic		14.48		18.09

¹Individuals in the M1 population reported no public health coverage other than Medicare. Individuals in the M2 population reported either Medicare coverage or Medicare and Medicaid coverage. Individuals in either population may have private health insurance.

²Significant with a 95-percent confidence interval.

³Significant with a 90-percent confidence interval.

NOTE: See Table 2 for definitions of variables.

SOURCE: U.S. Bureau of the Census: Data from the Survey of Income and Program Participation 1984, Wave 3.

of having private insurance by 0.35 for the M1 population and by 0.19 for the M2 population.

Being married (rather than never married) increases the probability of having private insurance in the M1 population by 0.28. For the M1 population, being widowed also increases the probability of having private health insurance by 0.25 when compared with those who were never married, but being divorced is not related to the presence of private insurance for either population. Marital status is not significantly related to the probability of having private supplementary health insurance for the M2 population.

In both populations, the employment of a family member increases the probability that the disabled person has private insurance coverage. For our hypothetical person, the presence of an employed family member increases the probability of having private health insurance coverage by 0.23 in the M1 population and by 0.16 in the M2 population.

In the M1 population, higher household income increases the probability of a disabled enrollee having private coverage. The first regression indicates that every increase of \$1,000 in monthly household income increases the probability of private insurance by 0.17.

Enrollment in Medicaid reduces the likelihood of having a private health insurance supplement to

Medicare. An increase of 10 percent in the probability of enrolling in Medicaid is associated with a decrease of 7.1 percent in the probability of having a private insurance supplement. The impact of income is more difficult to assess in the M2 population, because it is premultiplied by the probability of not being enrolled in a Medicaid program. As income increases, other factors held constant, the probability of not being on Medicaid also increases. However, the significant positive coefficient of INTERACT, after controlling for the probability of Medicaid enrollment, suggests that income is positively associated with the probability of having private supplemental health insurance.⁶

Age is negatively associated with the presence of private health insurance for the M2 population. The probability of having private coverage drops 0.05 per year of age. The coefficient of age squared is significant and positively related to the dependent variable. Thus, as age increases, the probability of having private health insurance decreases at a decreasing rate. If we assume a linear relationship between age, age squared, and the probability of private health insurance,

$$\text{Prob(PRIV)} = \text{IP}_{\text{age}} * \text{AGE} + \text{IP}_{\text{agesq}} * \text{AGE SQUARED}, \quad (3)$$

⁶Using 1 minus the actual value of the Medicaid dummy rather than 1 minus predicted Medicaid status has little effect on the results.

and that other factors are constant, the net effect of age on the probability of private health insurance is negative until 50 years of age and positive after 50 years of age.⁷

For both groups, women are more likely than men to have private health insurance, and white enrollees are more likely to have private health insurance than the other enrollees. Being female increases the probability of having private health insurance by 0.24 for the M1 population and by 0.19 for the M2 population.

Discussion

Garfinkel, Bonito, and McLeroy (1987) studied the socioeconomic factors associated with supplementary health insurance for Medicare enrollees 65 years of age or over. Despite differences between aged and disabled Medicare enrollees, and differences in data sources, variables, and estimation techniques, many of the results are quite similar: Married, better educated, and higher income white enrollees are more likely to have private health insurance in addition to Medicare coverage than other enrollees. Medicaid enrollment and increasing age (up to 50 years of age) are associated with a lower probability of having private coverage. Garfinkel, Bonito, and McLeroy (1987) found that the number of chronic conditions positively affected the likelihood of private health insurance coverage, whereas perceived health status and functional limitations were unrelated to private coverage. We find that the number of functional limitations and poor health status are statistically unrelated to the probability of having private health insurance for disabled Medicare enrollees under 64 years of age.

In addition to these variables, we find that the income level of non-Medicaid recipients is positively associated with the probability of having private insurance. Further, the employment of a family member increases the probability that a disabled Medicare enrollee has private health insurance coverage.

Even after controlling for the employment status of other family members, we find that women are more likely to have private coverage in addition to Medicare coverage. In other research, we found that female disabled Medicare enrollees are more likely to visit a physician and to have greater numbers of doctor visits and hospital days. Also, Lubitz and Pine (1986) report that, in 1978, Medicare reimbursements per disabled female enrollee were 17.4 percent higher than per disabled male enrollee. Bye, Riley, and Lubitz (1987) also report that, during an 8-year period, Medicare reimbursement was substantially higher for disabled women than for disabled men. Because Medicare coverage for both men and women is equivalent, the higher use by women suggests a greater demand for medical care. Thus, women may be more likely to have private health insurance because they anticipate higher costs of medical care.

The extent of non-Medicare coverage affects access through its impact on the price of medical care. By

offering protection against the cost of medical care not covered by Medicare, additional private and public insurance policies lower one of the key barriers to seeking medical treatment. We find that disabled Medicare enrollees are less likely to have private health insurance coverage and more likely to have Medicaid than aged Medicare enrollees.

Another important implication of the scope of non-Medicare coverage is its impact on Medicare costs. For example, rules governing which policy is applicable when duplicate coverage exists can be used to shift costs from Medicare to non-Medicare policies. This may be especially important if the disabled are covered by employment-related health insurance policies and not just specific policies designed to supplement Medicare's coverage.

Further, having less non-Medicare coverage may make the disabled less likely, all else equal, to enter the health care system. The economic barriers created by deductibles and coinsurance in Medicare could keep some people from seeking health care services. In the short-term, these disabled enrollees would receive fewer health care services. In the long-term, the effects on Medicare costs are ambiguous because of the possible health implications of delaying care.

Because the lack of non-Medicare insurance coverage is expected to discourage disabled persons from seeking health care, a change in Medicare that would treat these persons differently from aged enrollees may be worthy of consideration. It may also be possible to make broad changes in Medicare that, though applying equally to the aged and disabled, result, in practice, in greater gains for the disabled. For example, eliminating the deductible for hospital care would be of more benefit to the disabled than the aged, because the disabled have a higher rate of hospital admissions. The current pattern of utilization, in which the disabled have less private insurance than the aged, also suggests that eliminating hospital deductibles would have a greater relative effect on out-of-pocket expenses for hospital care among the disabled than among the aged. Furthermore, the consequences of changes in Medicare would be unevenly distributed across disabled Medicare enrollees.

A less extensive reform might limit the application of the Medicare hospital deductible to the first hospital admission in a given period. Such a change was part of the recently repealed Medicare Catastrophic Coverage Act of 1988. In other research, we found that the disabled are more likely than the aged to have multiple hospital stays. Thus, the disabled would, on average, have gained more from this change than the aged. More generally, to the extent that any Medicare reform causes benefits found in typical private supplements to Medicare to be incorporated into Medicare, the disabled will be at an advantage relative to the aged. (Of course, those with private insurance will indirectly benefit from added Medicare benefits by paying lower premiums for private supplementary health insurance.)

In addition, our results indicate that, within the disabled population, those who have less education, less income (among non-Medicaid recipients), who are not white, are male, and are unmarried are less likely to have a private health insurance policy. Disabled Medicare enrollees with these characteristics are more likely to

⁷Age 50 is the AGE at which $\text{Prob}(\text{PRIV}) = -0.05 \cdot \text{AGE} + 0.0005 \cdot \text{AGE SQUARED}$ is minimized. The incremental probabilities of AGE and AGE SQUARED are -0.05 and 0.0005, respectively.

benefit from revisions in Medicare. The uneven distribution of the gains within and across Medicare groups suggests that health planners must address not only the issue of the distribution of costs of expanded coverage, but also the distribution of benefits.

Identifying differences in health insurance coverage and explaining why such differences exist is the first step in an evaluation of health insurance coverage among the long-term disabled. Along with the distributional and equity effects, the impact of non-Medicare coverage on utilization, cost, and health status must also be investigated.

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