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PRIVATE HEALTH INSURANCE AND THE UTILIZATION OF MEDICAL CARE BY THE ELDERLY

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Private Health Insurance and the Utilization of Medical Care by the Elderly

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Abstract

In this study, we report that unobserved common factors are powerful explanation of the decision to have private health insurance and the use of medical care by elderly Medicare recipients. This indicates that unobserved factors leading some individuals to have private health insurance coverage to fill in the gaps in Medicare also cause these individuals to seek more medical care than other Medicare enrollees. Simultaneity is also significant between the decisions to have private health insurance in addition to Medicare coverage and to visit a doctor, but not between the decisions to have private health insurance and the number of doctor visits nor the use of hospital care.

Other results indicate that health status and functional limitations are significant determinants of whether an individual has private health insurance and the decision to seek medical care and subsequent decisions concerning the levels of utilization. Other characteristics (age, sex, race, education, marital status, and region) are significant in the decision to have private health insurance, but less important in the utilization of medical care. Unlike prior studies in which health insurance coverage is not jointly estimated with use of medical care, we find that education and income have only an effect on use of medical care.

Table A.1
Coefficients from Probits of Medicaid Enrollment

AGE	.01*	.005
FEMALE	.20*	.07
WHITE	- .61*	.07
Education:		
HIGH SCHOOL	- .51*	.08
COLLEGE	- .08	.11
MARRIED	- .36*	.07
INCOME	- .39*	.03
OWN HOUSE+	- .45*	.06
MED NEEDY STATE+	.12**	.07
INTERCEPT	- .88*	.35

# observations	5697
-2(log L)	2562.00
model df	10

* Significant with a 95 % confidence interval.
**Significant with a 90% confidence interval.
+ OWN HOUSE (mean = .77, SD= .42) is a dummy variable with a value of one if the enrollee owns his or her residence. MED NEEDY STATE (mean = .16, SD= .37) is a dummy variable with a value of one if the enrollee lives in a state in which Medicaid is offered to the medically needy. The other variables are defined in Table 1 of the paper.

Table 5
Coefficient Estimates of Medical Care Utilization

	I DOCTOR VISITS (Y/N)	II LOG OF DOC VISITS	III HOSPITAL STAY(Y/N)
POOR HEALTH	.40*	.43*	.41*
	(.08)	(.04)	(.06)
LIMITATIONS	.10*	.09*	.09*
	(.01)	(.01)	(.01)
AGE	.006	.01*	- .002
	(.004)	(.003)	(.004)
FEMALE	.20*	01	- .15*
	(.05)	(.04)	(.05)
WHITE	.21**	.06	.15
	(.11)	(.07)	(.09)
MARRIED	.10*	.03	.03
	(.05)	(.04)	(.05)
HIGH SCHOOL	.04	.01	.02
	(.05)	(.04)-	(.06)
COLLEGE	.03	.02	- .02
	(.06)	(.05)	(.06)
INCOME INTERACT	.02	.005	- .03
	(.02)	(.01)	(.02)
MCAIDHAT	.53	.36	- .18
	(.60)	(.29)	(.36)
METRO	.11*	.07**	- .07
	(.05)	(.04)	(.04)
DOCS	.02	.08*	
	(.05)	(.04)	
BEDS			01
			(.03)
PRIVATEHAT	91**		
	(.49)		
INTERCEPT	.57	1.90*	.77*
	(.45)	(.25)	(.33)
Rho	.13*	.05*	.10*
	(.03)	(.02)	(.03)
observations	5697	4658	4658
-2(log L)	.10825.3*	16763.1	9390.0*
Model df	31	29	29

+ Asymptotic standard errors in parentheses.
*Significant with a 95 % confidence interval.
**Significant with a 90% confidence interval.

I. Introduction

The Medicare program provides health insurance coverage to over 30 million people (more than 10 percent of the total United States population). Over 75 percent of beneficiaries has private health insurance coverage in addition to Medicare coverage. The repeal of the Medicare Catastrophic Coverage Act, the reform of regulation of the market for health insurance coverage specifically designed to supplement Medicare (Medigap), and the availability of retiree health benefits from some employers indicate that private health insurance coverage will continue to provide the elderly with significant protection from medical care costs. To assess the impact of the Medigap reforms, efforts to control retiree health care costs, or other changes on the insurance decisions and health care utilization of Medicare enrollees, a better understanding of both the decision to purchase private health insurance and the decision to use medical care is needed.

The decisions to purchase private insurance to make an initial visit to a physician, and to use further treatment are intertwined. While Medicare provides substantial coverage to enrollees, deductibles and copayments require recipients to bear part of the cost of medical care. Private health insurance coverage that provides either partial or complete financial protection against out-of-pocket payments could be an important determinant of the use of medical care. Further, an anticipated need for medical care could be a determinant of the decision to have private health insurance in addition to Medicare coverage.

A number of studies have examined the factors that determine the purchase of private health insurance by Medicare enrollees [Long et al. (1982), Cafferata (1985), Rice and McCall (1985), Garfinkel et al. (1987), Taylor et al. (1988)]. Other studies of medical care utilization indicate that health insurance coverage and other economic variables play a significant role in the decision to seek medical care [Link et al. (1980), Coffey (1983), Manning et al. (1987), Christensen et al. (1987), McCall et al. (1991)].

None of the these fully explores the potential linkages between private health insurance and the use of medical care.[1] Two recent studies do link the demand for health insurance with the use of medical care. Cartwright et al. (1992) examined private health insurance, insurance premia, and medical expenditures of the elderly, but rejected simultaneity between health insurance coverage and medical expenditures. They used a simple recursive model in which insurance is assumed to affect the level of expenditures on medical care, but medical expenditures do not affect the level of insurance coverage. Cameron et al. (1988) treated health insurance endogenously in their study of the effects of public health insurance programs in Australia on the utilization of medical care. However, in their model the initial decision to seek medical care was

[1]Random assignment of supplemental coverage to Medicare enrollees would allow the determinants of medical care use among the elderly to be estimated without bias. Although the Health Insurance Experiment, the one major experiment using such random assignment, did focus on the impact of differential health insurance coverage on the level of health care services utilization (Manning et al. (1987), it did not include individuals over 65 years of age.

not distinguished from overall use.

In this paper, using data from the Survey of Income and Program Participation, we examine the purchase of private health insurance and the use of medical care by elderly Medicare enrollees. We model the use of medical care as a sequential process in which the individual first makes the decision to seek medical care and subsequently decides on the quantity of care consumed. At each step in this process, by estimating on models with both simultaneity and a joint error structure between private insurance and use of medical care, the decision to use medical care is linked with the purchase of private health insurance. We find simultaneity only between private health insurance and the probability of a visit to a doctor, but find the joint error structure to be appropriate for all of the measures of utilization. Finally, having determined the appropriate estimating models, we report coefficient estimates of factors that influence the purchase of private health insurance and the use of medical care.

II. Data and Model

To examine health insurance coverage and utilization among elderly Medicare enrollees we use 5697 observations of individuals age 65 or older from wave 3, 1984, of the Survey of Income and Program (SIPP). The survey provides extensive data on individual characteristics, as well as information on private and public health insurance and health care use during the year preceding the survey. This survey provides extensive data on individual characteristics, as well as information on private and public health insurance and health care use during the year preceding the survey. This survey, like most others, excludes the institutionalized population. Thus it will not yield a truly representative sample of all elderly Medicare enrollees. Nonetheless, given the large proportion of the eligible population comprising noninstitutionalized individuals, SIPP does provide sufficient information to analyze the determinants of health insurance coverage among the majority of elderly Medicare recipients.

First we consider the purchase of private health insurance. The dependent variable is a dichotomous variable indicating whether an individual has private health insurance coverage. The variables representing the chronic inability to perform certain tasks (LIMITATIONS) and health status (POOR HEALTH) capture the effects of an individual's specific health status on the demand for private health insurance. Definitions of all variables are given in Table 1 and means and standard deviations are shown in Table 2.

In addition to those who may or may not have private health coverage, the study sample also includes Medicare enrollees who have Medicaid coverage. Because Medicaid enrollment may depend upon the level of medical care expenditures and private heath insurance coverage, we treat Medicaid enrollment endogenously throughout this analysis: The probability of being enrolled in Medicaid is estimated in a preliminary probit and used as an independent variable in the insurance

and utilization regressions.[2]

Household income indicates the household's ability to purchase private health insurance. Because the probability of enrolling in Medicaid is significantly related to income, including income as an explanatory variable will cause multicollinearity. However, for individuals not enrolled in Medicaid, income may be a significant factor in the decision to purchase private 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 an individual's income, the lower is his or her probability of enrolling in Medicaid (other factors held constant), and the more likely will affect the decision to purchase private health insurance.

The set of independent variables also includes several other control variables. Because an elderly person with Medicare coverage may have private health insurance through an employer, a variable indicating whether he or she is employed (WORK) is included. It is also possible that a retired person May have private 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.[3] Note that WORK can be expected to influence the decision to have private health insurance, but is not expected to independently influence the decision to use medical care.[4]

Other characteristics hypothesized to be associated with the presence of private health insurance include marital status (MARRIED), education (HIGH SCHOOL, COLLEGE), AGE, race (WHITE) and sex (FEMALE). Also included are control variables indicating the region of the country (MIDWEST, NORTHEAST, SOUTH) in which the enrollee resides. These variables are included to control for possible regional differentials in the supply of private health insurance. Because simultaneity is allowed between private insurance coverage and use of medical care in the

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[2]Table A.1 reports the probit coefficient estimates used to calculate the probability of enrolling in Medicaid. In previous work on private insurance among elderly Medicare enrollees [Garfinkel et al., (1987)], researchers controlled for Medicaid coverage by including a dummy variable among the explanatory variables of a regression. However, if Medicaid coverage is a choice for some Medicare enrollees, and therefore endogenous, this treatment is not satisfactory. If more detailed information about insurance choices were available, a nested multinomial estimation model could be used to represent the elderly individual's health insurance choice.

[3]Retiree health benefits are generally more like regular health insurance than Medicare supplements. The law now requires that non-Medicare health insurance be the primary payer with Medicare as secondary payer. The net result is largely the same: Having private health insurance coverage lowers the cost of care. Moreover, the magnitude of retiree coverage, at the moment, is rather limited. Only about 2 million of the approximately 22 million Medicare enrollees with private health insurance have their coverage through company sponsored health plans.

[4]Because individuals who work may have a higher value of time used in obtaining medical care, we experimented with including WORK in the utilization equations. It was not statistically significant.

estimation of the model, any differentials in regional supply must be due to cost differentials unrelated to differences in anticipated utilization. The inclusion of the regional variables and WORK in the private insurance equation ensures the identification of the utilization equations described below.

The dichotomous decision to have private health insurance is represented by

$$(1) \quad PRIVATE = X'a_1 + Y'b_1 + c_1 UTILHAT + u_1$$

X' is a vector containing the variables POOR HEALTH, LIMITATIONS, AGE, FEMALE, WHITE, HIGH SCHOOL, COLLEGE, MARRIED, INCOME INTERACT and MCAIDHAT. Y' is a vector of predetermined variables including WORK, MIDWEST, NORTHEAST, and SOUTH. UTILHAT represents the predicted value of medical care utilization. This variable will be the predicted value of either DOCTOR VISIT (Y/N), LOG OF DOC VISITS, or HOSPITAL STAY (Y/N), depending upon which of the utilization equations is estimated in tandem with the PRIVATE equation.

We model utilization as a sequential process: (1)Individuals enter the health care system by seeking the care of a physician. We use probit analysis to determine the factors influential in in whether an individual had a least one visit to a physician in the 12 months prior to the survey (DOCTOR VISIT (Y/N)). (2) Subsequent use of medical care is measured by the number of visits made to a physician (LOG OF DOC VISITS) and whether an individual had at least one stay in a hospital (HOSPITAL STAY (Y/N)) in the 12 months prior to the survey. Because the model describes individuals as entering the medical system sequentially, we run the probits of DOCTOR VISIT (Y/N) on the full sample and the regressions of LOG OF DOC VISITS and HOSPITAL STAY (Y/N) on the subsample of individuals who have at least one doctor visit.[5]

The factors assumed to influence the use of medical care include health status, income, and health insurance coverage. Poor health reported by the survey respondent (POOR HEALTH) and the number of functional limitations (LIMITATIONS) may be indicators of future health care needs and are assumed to affect the likelihood of using medical care. Both of these health indicators are included because it is possible that they may have independent impacts on the individual's demand for medical care.

Typically, private health insurance for Medicare enrollees, by offering coverage of deductibles and coinsurance, lowers the cost of a physician visit or hospital stay.[6] Thus, the type of health

[5]The choice of models for the utilization regressions is discussed in both Maddala (1985) and Duan et al. (1983). A further measure of utilization, the log of hospital days, was also examined, but all of the estimating models tested performed equally poorly in explaining this aspect of utilization. The only powerful explanators of the number of hospital days were POOR HEALTH and LIMITATIONS.

[6]Medicare hospital coverage requires a deductible but no coinsurance associated with length of stay (except for very long stays). Hence, for the patient the money price of a marginal hospital day is zero.

insurance coverage, either Medicare only or Medicare plus private heath insurance (PRIVATE), reflects the cost of care to the individual. Similarly, Medicaid coverage is expected to lower the cost of medical care. Because Medicaid enrollment may depend upon the level of medical care expenditures, the probability of being enrolled in Medicaid (MCAIDHAT) is used as an independent variable in the utilization on regressions.

To allow an effect of income on the decision to seek medical care, we include INCOME INTERACT as an independent variable. This allows income to have an effect for individuals who have a low probability of Medicaid enrollment: The higher an individual's income, the lower is his or her probability of enrolling in Medicaid (other factors held constant), and the more likely income will affected the decision to seek medical care. The lower an individuals income, the higher is his or her probability of enrolling in Medicaid. Because Medicaid offers coverage against some costs not paid by Medicare, income is likely to be less important in the decision to use medical care for individuals enrolled in Medicaid.

Finally, variables indicating whether the individual lives in an urban area (METRO) and the number of doctors (DOCS) or the number of hospital beds (BEDS) per 1000 residents of a state are proxies for the supply of medical care. These three variables may represent the availability of medical services to an individual and therefore may influence her or his use of medical care. However, none of the three is expected to influence the demand or supply for private insurance other than through the expected use of medical care. Because we allow for simultaneity between utilization and insurance coverage, the latter is taken into account in the estimation. The inclusion of the regional variables and the DOCS or BEDS variable in the utilization equations ensures the identification of the private insurance equation described above.

The utilization of medical care is represented by the following equations:

(2) DOCTOR VISIT (Y/N) = $X'a_2 + Z'b_2 + C_2\,\text{PRIVATE} + u_2$

(3) LOG OF DOC VISITS = $X'a_3 + Z'b_3 + C_3\,\text{PRIVATE} + u_3$

(4) HOSPITAL STAY (Y/N) = $X'a_4 + Z'b_4 + C'_4\,\text{PRIVATE} + u_4$

The vector X' is defined above. For equations (2) and (3), the vector Z' contains the variables METRO and DOCS. For equation (4), Z' contains METRO and BEDS. As discussed below, PRIVATE is dropped or predicted in some of the specifications.

The observed pattern of insurance and medical care use reflects both the patient's demand and providers' supply of insurance and Medical care .[7] Consequently, the insurance and utilization regressions estimate reduced form equations that include both supply and demand factors.

[7]Insurers may attempt to restrict coverage for individuals with high anticipated use. Others may receive coverage but with restrictions on pre-existing conditions.

III. Estimation

The nature of the relationship between the use of medical care and the presence of private health insurance is not known a priori. We therefore consider models with simultaneity, with jointly distributed errors (caused by unobserved factors common to both equations), and with both simultaneity and jointly distributed errors.

Independent Equations Model. As a basis against which to compare more sophisticated models, we begin by estimating an Independent Equations Model (IE). In this two-equation model, the presence of private health and the use of medical care are assumed to be unrelated. By testing the IE model against models with simultaneity and/or jointly distributed errors, we can ascertain which model is appropriate. If the hypotheses of simultaneity and joint errorsare rejected, the appropriate estimating model is recursive. In a recursive model, the presence of private health insurance is assumed to affect the individual's decision to seek an initial visit with a doctor and to have further treatment. The need for medical care, however, is not anticipated. Consequently, in this model the decision to have private health insurance is not related to medical care use. Hence, it is not to estimate the insurance and utilization equations jointly. Cartwright et al. (1992) reports results from a recursive model of private health insurance and medical care expenditures of elderly Medicare recipients.

Simultaneous Equations Model. If individuals anticipate a need for medical care and the decision to purchase health insurance is affected by this anticipated need for medical care, then private health insurance coverage is determined simultaneously with the demand for medical care. Although individuals cannot perfectly predict their future demands for medical care, they are likely to have information about their health that leads them to expect greater demand. Thus, not only are the probabilities and levels of utilization dependent upon an individual's health insurance coverage, but the level of coverage may be dependent upon (anticipated) utilization.

To properly estimate the factors affecting the utilization of medical care in the presence of simultaneity a two-stage simultaneous equations (SE) model is estimated. In the first stage, a probit regression is used to generate a predicted value for the private insurance dummy variable (PRIVATEHAT). This predicted value is used as an instrument variable in the second stage estimation of medical care use. Our use of an instrument for the choice of health insurance coverage is similar to the approach used by Cameron et al. (1988) in a study of the demand for health insurance and health care in Australia. In the Australian data, four types of health insurance coverage were possible. The authors divided the sample into two subsamples, in each of which individuals were faced with a dichotomous choice of health insurance coverages.

A health insurance instrument was then generated using a discrete choice model. Because the sample for this paper is limited to Medicare enrollees with or without private insurance, there is no need to create subsamples.

The second stage estimation of medical care utilization consists of a regression for each of

the three utilization measures: A probit analysis is performed for whether the individual had at least one visit to a physician (PHYSICIAN VISIT (Y/N)). A conditional regression is performed for the log of the number of doctor visits (LOG OF DOC VISITS). A conditional probit is performed for the probability of having at least one hospital stay (HOSPITAL STAY (Y/N)).[8]
The two-stage procedure for estimating the coefficients of factors influencing the decision to have private health insurance is similar. Utilization is predicted in a first stage probit or regression (depending upon the measure of utilization) and the predicted value is used as an instrument in the second stage probit of PRIVATE.

Joint Errors Model. The unimportant assumption in the SE model is that individuals anticipate a need for medical care that affects their decision to purchase private health insurance. It is possible that the relationship between the purchase of health insurance and the use of medical care has an entirely different nature. The two variables may be correlated because individuals have unobserved characteristics that cause some individuals to demand more health insurance coverage than that provided by Medicare and also to use more medical care than other individuals. These individuals do not have private health insurance because they anticipate greater use of medical care. Rather, they have underlying values that cause them to demand more of both insurance and medical care.

In this situation, the effects of the unobserved characteristics contributing to the presence of private health insurance and to the use of medical care are common to the error terms of the insurance and utilization equations. Our second estimation approach is to estimate a joint errors (JE) model to capture the cross-equation common in the error terms. Specifically, we assume that the errors have a bivariate d normal distribution. Bivariate probit regressions are used to estimate the coefficients of the joint decision to have private health insurance (PRIVATE) and to visit a doctor (DOCTOR VISIT (Y/N)) and the joint decision to have private health insurance and to go to a hospital (HOSPITAL STAY (Y/N)). Similarly, the error terms of the probit of the decision to have private insurance (PRIVATE) and the decision to make multiple visits to a doctor (LOG OF DOC VISITS) are assumed to have a bivariate normal distribution.

Simultaneous and Joint Errors Model. Finally, since simultaneity and joint errors are not mutually exclusive, we estimate a third version of our model of insurance and medical care utilization assuming the presence of both. This model is S&JE.

IV. Results

We begin by judging the overall performance of the models. Likelihood ratio tests were used to compare models. Chi-squared values from likelihood ratio tests are reported in Table 3 for tests between the IE and SE models, the IE and JE models, the IE and S&JE models, the SE and S&JE,

[8]The choice of regression models for the utilization regressions is discussed in both Maddala (1985) and Duan et al. (1983).

and the JE and S&JE models.

The only models that are not nested are the SE and JE models. To compare these models, we use the Schwarz criterion. To use the Schwarz criterion the maximum log likelihoods for alternative models are adjusted by subtracting one-half the number of parameters in the model multiplied by the logarithm of the sample size from the maximum of the log likelihood function . The adjusted maximum log likelihoods of the alternative models are then compared.[9] The preferred model has the largest numerical value under this criterion. The number reported in Table 3 (in brackets) is twice the difference between the JE model value and the SE model value. Thus a positive value indicates that the JE model is preferred because it has a greater maximum log likelihood than the SE model.

Although all of the models are significant for each of the dependent variables, the results of Table 3 indicate that unobserved individual characteristics are important determinants of both the presence of private health insurance (in addition to Medicare coverage) and the use of medical care. Comparison of the JE and SE models using the Schwarz criterion indicates that the JE model performs better than the SE model for all measures of utilization. Further comparison between the JE and S&JE models indicates that for DOCTOR VISIT (Y/N) the S&JE model performs significantly better than the JE model. Therefore, in Tables 4 and 5, we report S&JE coefficient estimates for the bivariate probit of PRIVATE and DOCTOR VISIT (Y/N)). For LOG OF DOC VISITS and HOSPITAL STAY (Y/N), the S&JE model does not perform significantly better than the JE model. The coefficient estimates in Tables 4 and 5 for these utilization measures are drawn from the JE model.

Table 4 presents probit coefficient estimates for whether an individual has private health insurance (PRIVATE) in addition to Medicare coverage and Table 5 presents coefficient estimates for the utilization regressions. The roman numerals I through III at the top of the columns indicate the jointly estimated regressions. For example, the coefficients from column I of Table 4 were estimated jointly with the coefficients for DOCTOR VISITS (Y/N) reported in column I of Table 5. Although the coefficients in Table 4 are not the derivatives of the probability of PRIVATE equaling one, the signs of the coefficients are consistent with changes in the probability of PRIVATE equaling one.

The first two independent variables of Tables 4 and 5 are indicators of health status: POOR HEALTH and LIMITATIONS. POOR HEALTH is negatively and significantly related to the probability of having private health insurance in two of the three probits. The number of chronic limiting conditions are negatively and significantly associated with the presence of private health insurance in all of the probits reported in Table 4. The negative association between health status and the presence of private insurance may be due to the inability of individuals with poor health or chronic limitations to obtain private health insurance. Although Cartwright et al. (1992)

[9]Both likelihood ratio tests and the Schwarz criterion are described in Judge et al. (1985). The Schwarz Criterion differs from the Akaike criterion in that the dimension of the model is multiplied by one-half of ln(sample size).

found a negative relationship between poor health and the probability of having private insurance, other studies of elderly Medicare enrollees report a positive and significant effect of chronic conditions on the likelihood of having private insurance.[10]

As expected, poor health and functional limitations are positively and significantly related to all three measures of utilization of medical care by elderly enrollees.

Among personal characteristics, race, education, sex, and age are systematically related to the presence of private health insurance. Being white increases the probability of having private health insurance in each of the regressions. Compared with individuals who have not completed high school, high school graduates are more likely to have private health insurance in addition to Medicare. College graduates are also found to be more likely to have private health insurance in two of the three probits. The insignificant coefficient estimate is also positive in sign.

In two of the probits, women are more likely to have private health insurance than men. Increasing age reduces the probability of having private health insurance, but is not significant in the probit estimated with the probability of a hospital stay. Marital status is marginally significant and positively related to the presence of private health insurance in two sets of estimates.

In comparison, personal characteristics are only weakly related to utilization of medical care. Being white significantly reduces the probability of seeing a doctor. Education is not significantly related to any of the utilization measures. Being a woman increases the probability of seeing a doctor, but reduces the probability of having a hospital stay. Age has a small negative relationship with the number of doctor visits over the last 12 months.[11]

Higher household income, represented by the interaction term (INCOME INTERACT), is positively and significantly associated with the probability of private health insurance in all of the probits. A higher probability of Medicaid coverage (MCAIDHAT) has a large negative association with the probability of private health insurance in all of the specifications. Neither income nor the probability of Medicaid enrollment is significantly related to utilization of medical care.

The employment of the Medicare enrollee (WORK) is unrelated to the probability of having private health insurance.[12] Because employment may allow a Medicare enrollee to have private health insurance through an employer, we expected WORK to have a positive sign. Cartwright et al. (1992) found a positive relationship between employment and private health insurance among the

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[10]See, for example Garfinkel, Bonito and McLeroy (1987).

[11]The square of AGE was added to the explanatory variables, but was not significant.

[12]The correlation between WORK and INCOME INTERACT is low (.16). Another variable indicating whether anyone in the family is employed is not used because it is more highly correlated with INCOME INTERACT (.27).

elderly.

In comparison to the reference group of states, living in the MIDWEST, NORTHEAST, or SOUTH is positively and significantly related to the probability of having private health insurance. Living in an urban area (METRO) has a positive and significant effect on the probability of a doctor visit and the number of doctor visits but is unrelated to the probability of a hospital stay. The number of doctors practicing in a state per thousand residents (DOCS) is positively related to the number of doctor visits, but the number of hospital beds per thousand residents (BEDS) is not significantly related to the probability of a hospital stay.

The only case in which simultaneity is not rejected is the joint estimation of PRIVATE and DOCTOR VISIT (Y/N): In the probit of private insurance, the predicted value of utilization (DOCVISITHAT) has a large and positive effect on the probability of having private health insurance, implying that individuals who have a high probability of visiting a doctor are more likely to have private health insurance. The predicted value of whether an individual has private health insurance (PRIVATEHAT) in the probit of DOCTOR VISIT (Y/N) also has a large positive coefficient, indicating that individuals with a high probability of having private
health insurance are more likely to make at least one visit to a doctor.

The correlations between the residuals of the PRIVATE and utilization regressions are reported at the bottom of Table 5. Each of the correlations is statistically significant. The residual of the PRIVATE probit is positively correlated with that of the probit of the probability of visiting a doctor. Similarly, the residual from the PRIVATE probit is positively correlated with that of the probit of the probability of staying in a hospital. However, the residuals of PRIVATE and LOG OF DOC VISITS are negatively correlated. Thus, if the common unobserved variable in the two error terms were to change, the probability of having private health insurance, the probability of visiting a doctor, and the probability of having a hospital stay would all move in the same direction, while the number of visits to a doctor would move in the opposite direction.

V. Discussion

The potential estimation bias introduced by ignoring a relationship between the decision to use medical care and the decision to have private insurance is acknowledged in the literature.[13] However, this relationship is often assumed to be simultaneity rather than a common unobserved factor influencing both decisions. In this study, we report that unobserved common factors are powerful explanators of the decision to have private health insurance and the use of medical care by elderly Medicare recipients. This indicates that the factors that lead some individuals to have private health insurance coverage to fill in the gaps in Medicare also cause these individuals to seek more medical care than other Medicare enrollees.

Identifying the common unobserved influencing the decision to have private insurance and the

[13]See, for example, Congressional Budget Office (1991), page 6.

decision to use medical services is not possible with the data used for this study. However, sociological studies suggest that illness experience and attitudes regarding help-seeking are important determinants of help-seeking behavior.[14] It may be that similar factors influence individuals' attitudes toward health insurance coverage. This is an important question deserving of further research with data reporting individuals' attitudes toward health care and health insurance.

Simultaneity is also significant between the decisions to have private health insurance in addition to Medicare coverage and to visit a doctor, but not between the decisions to have private health insurance and the number of doctor visits nor the use of hospital care. This is not surprising. The decision to visit a doctor is easily predicted by individuals deciding to purchase private health insurance, while the number of doctor visits and the need for a hospital stay, because they depend or. the occurrence and severity of illness, are less reliably predicted.

Further results from this study that health status and functional limitations are significant determinants of whether an individual has private health insurance and the decision to seek medical care and subsequent decisions concerning the levels of utilization. Other characteristics (age, sex, race, education, marital status, and religion) are significant in the decision to have private health insurance, but less important in the utilization of medical care. An interesting result is that education and income influence the decision to have private health insurance, but do not have a direct effect on the use of medical care. Thus, unlike prior studies in which health insurance coverage is not jointly estimated with use of medical care, we find that education and income have only an indirect effect on use of medical care.

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Table 1

Definitions of Variables

Dependent Variable:	Definition:
MEDICAID	Dummy variable = 1 if the individual is enrolled in Medicaid.
PRIVATE	Dummy variable = 1 if the individual has private health insurance in addition to Medicare.
DOCTOR VISIT (Y/N)	Dummy variable = 1 if the individual has at least one visit with a doctor over a 12 month period.
LOG OF DOC VISITS	Log of doctor visits over a 12 month period.
HOSPITAL STAY (Y/N)	Dummy variable = 1 if the individual has at least one hospital stay over a 12 month period.
Independent Variable:	**Definition:**
AGE	Years of age.
BEDS	Hospital beds per 1000 population in the state.
DOCS	Doctors per 1000 population in the state.
DOCVISITHAT	Predicted value of DOCTOR VISIT (Y/N).
Education:	Set of dummy variables indicating the level of schooling HIGH SCHOOL attainment. Individuals in the HIGH SCHOOL category have COLLEGE received a high school diploma only. The omitted category contains individuals who have not completed high school.

FEMALE	Dummy variable = 1 if individual is female.
INCOME	Monthly household income (in thousands) weighted by size of household and averaged over four months.
INCOME INTERACT	Interaction variable = (1-MCAIDHAT)*INCOME.
LIMITATIONS	Number of functional limitations.

Table 2

Means and Standard Deviations of Regression Variables

Dependent Variables:	N	Mean	SD
MEDICAID	5697	.08	.27
PRIVATE	5697	.73	.44
DOCTOR VISIT (Y/N)	5697	.82	.39
LOG OF DOC VISITS	4658	1.42	.96
HOSPITAL STAY (Y/N)	4658	.25	.41
Independent Variables:			
AGE	5697	73.35	6.10
BEDS	5697	5.58	.83
Education:			
HIGH SCHOOL	5697	.45	.50
COLLEGE	5697	.19	.39
DOCS	5697	2.00	.48
DOCVISITHAT	5697	.82	.07
FEMALE	5697	.60	.49
INCOME	5697	1.55	1.28
INCOME INTERACT	5697	1.48	1.31
LIMITATIONS	5697	1.65	2.30
MARRIED	5697	.54	.50
MCAIDHAT	5697	.08	.10
METRO	5697	.67	.47
POOR HEALTH	5697	.18	.39
PRIVATEHAT	5697	.73	.18
Region:			
MIDWEST	5697	.23	.42
NORTHEAST	5697	.24	.43
SOUTH	5697	.26	.44
WHITE	5697	.90	.29
WORK	5697	.09	.29

MARRIED	Dummy variable = 1 if the individual is currently married. Includes persons married with the spouse absent.
MCAIDHAT	Probability of MEDICAID enrollment.
METRO	Dummy variable = 1 if the individual lives in an metropolitan area.
POOR HEALTH	Dummy variable = 1 if self-reported health status is poor.
PRIVATEHAT	Predicted value of PRIVATE.
Region: MIDWEST	Dummy variables = 1 if the individual's residence is in: Illinois, Indiana, Iowa, Kansas, Michigan, Minnesota, Missouri, Nebraska, North Dakota, Ohio, or Wisconsin.
NORTHEAST	Connecticut, Delaware, District of Columbia, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, or Vermont.
SOUTH	Alabama, Arkansas, Florida, Georgia, Kentucky, Louisiana, North Carolina, South Carolina, Tennessee, Virginia. The omitted states are predominantly Western (Arizona, California, Colorado, Idaho, Hawaii, Montana, Nevada, New Mexico, Oklahoma, Oregon, Texas, Utah, Washington, and Wyoming) but also include Mississippi, South Dakota, and West Virginia (for sampling reasons).
WHITE	Dummy variable = 1 if the individual is white.
WORK	Dummy variable = 1 if the individual is employed.

Table 3
Specification Tests of Independent Equations, Simultaneous Equations, and Joint Error Equations Models of Medical Care Use*

	Simultaneous Equations	Joint Error Equations	Simultaneous & Joint Error Equations
DOCTOR VISIT (Y/N):			
Independent Equations	6.16*	22.73*	31.08*
	(2)	(1)	(3)
Simultaneous Equations		[25.22]	24.92*
			(1)
Joint Error Equations			8.35*
			(2)
LOG OF DOC VISITS:			
Independent Equations	1.31	3.90*	5.24
	(2)	(1)	(3)
Simultaneous Equations		[11.04]	3.94*
			(1)
Joint Error Equations			1.34
			(2)
HOSPITAL STAY (Y/N):			
Independent Equations	.51	12.14*	12.69*
	(2)	(1)	(3)
Simultaneous Equations		[20.07]	12.18*
			(1)
Joint Error Equations			.55
			(2)

+Chi-squared values from Likelihood Ratio tests are reported for LR tests between the IE and SE models, the IE and JEE models, the IE and S&JE models, and the SE and S&JEE models since all of these are nested. The degrees of freedom are shown in parentheses. The Schwarz Criterion is used between the SE and JEE models since they are not nested. The number in brackets is twice the difference in the Schwarz Criterion figure of the JEE model and the SE model.
*LR tests indicates that models differ significantly with a 95 % confidence interval.
No significance test for the Schwarz criterion.

Table 4
Coefficient Estimates of Private Insurance Coverage+

	I	II	III
POOR HEALTH	- .31*	-.001	- .16*
	(.09)	(.004)	(.06)
LIMITATIONS	- .08*	- .06*	- .06*
	(.02)	(.01)	(.01)
AGE	- .007** - .16*	- .001	
	(.004)	(.06)	(.004)
FEMALE	.04	.15*	.15*
	(.07)	(.05)	(.05)
WHITE	.51*	.52*	.52*
	(.08)	(.08)	(.08)
MARRIED	.03	.11**	.11**
	(.05)	(.06)	(.06)
HIGH SCHOOL	.12*	.21*	.21*
	(.06)	(.06)	(.06)
COLLEGE	.06	.30*	.30*
	(.07)	(.07)	(.07)
INCOME	.20*	.22*	.22*
	(.02)	(.03)	(03)
MCAIDHAT	-1.80*	-1.71*	-1.71*
	(.34)	(.38)	(.38)
WORK	.06	.06	.06
	(.07)	(.08)	(.08)
MIDWEST	.26*	.36*	.36*
	(.06)	(.06)	(.06)
NORTHEAST	.17*	.21*	.20*
	(.06)	(.06)	(.06)
SOUTH	.10**	.15*	.14*
	(.05)	(.06)	(.06)
DOCVISITHAT	1.95*		
	(.85)		
INTERCEPT	-1.05**	-.12	-.12
	(.60)	(.31)	(.31)
# observations	5697	4658	4658
-20(Log L)	10825.3*	16763.1*	9390.0*
model df	31	29	29

+Asymptotic standard errors in parentheses. The column numbers indicate the utilization regression in Table 5 with which the PRIVATE probit was jointly estimated.
*Significant with a 95% confidence interval.
**Significant with a 90% confidence interval.