THE SURVEY OF INCOME AND PROGRAM PARTICIPATION

HEALTH INSURANCE COVERAGE AMONG THE ELDERLY

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V. Wilcox-Gok
Department of Economics and
Institute for Health
J. Rubin
Health Care Policy, and Aging Research

U. S. Department of Commerce BUREAU OF THE CENSUS

Abstract

The research reported in this paper examines the decision to have private health insurance by elderly Medicare enrollees. Models allowing both simultaneity and a joint error structure between health insurance and use of medical care are considered. We find that common unobserved variables underlying the joint errors are important determinants in the decision to purchase private health insurance. Simultaneity is present only between the decision to have private health insurance and the probability of visiting a doctor.

Health status and functional limitations are important determinants of the decision to have private health insurance in addition to Medicare coverage. Other personal characteristics (age, sex, race, and education), as well as household income, Medicaid enrollment, and the employment of a family member are also found to be related to the decision to have private health insurance.

Key Words

Medicare
elderly
health insurance

I.   Introduction

The Medicare program provides basic health insurance coverage to over 30 million elderly and disabled people in the United States, more than 10 percent of the U.S. population. The Medicare program is predicted to make payments for health services in excess of $100 billion in 1990. This represents nearly 20% of all personal health care expenditures in the United States.

Even with Medicare coverage, consumers who enter the health care system must pay deductibles, coinsurance fees, and other costs not paid by Medicare. In addition, enrollees choosing nonhospital Medicare coverage (Part B) must pay a premium. Other types of health insurance coverage provide protection for some Medicare enrollees from the out-of-pocket costs for medical care and the premiums for Part B. For example, eleven percent of Medicare beneficiaries are also enrolled in state Medicaid programs, which pay medical care expenses of the poor who qualify for coverage, and approximately 75 percent of Medicare enrollees have some type of private health insurance coverage. The presence of private health insurance, which provides some financial protection against out-of-pocket costs, is likely to affect health care use.

Exactly how Medicare beneficiaries respond to lower costs due to private insurance coverage is unclear. Although the Health Insurance Experiment (HIE) provided information on how younger consumers respond to cost-sharing, it did not include persons over 65 in the study population [Manning et al. (1987)]. Prior studies of the determinants of private insurance coverage for the Medicare population have typically considered the influence of private health insurance on utilization, but have ignored the possible influence of expected utilization on the decision to have private health insurance (Garfinkel et al. (1987), Hu et al. (1988), Taylor et al. (1988)). Because our research indicates that the decision to purchase private health insurance is not independent of utilization, both the probability of medical care use and the quantity of services are treated endogenously in modelling the decision to purchase private health insurance in addition to Medicare coverage.

II. Data

To examine health insurance coverage and utilization among elderly Medicare recipients we use 5232 observations of individuals age 65 or older from wave 3 (1984) of the 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 (Nelson and Short (1990)). 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 which is comprised of noninstitutionalized individuals, SIPP does provide sufficient information to analyze the determinants of health insurance coverage among the majority of elderly Medicare recipients.

III. Estimating Model

Because the demand for medical care may be correlated with the decision to purchase private health insurance, it is necessary to incorporate utilization of medical care in models of the insurance decision and vice versa. Although a number of studies have examined the factors that affect the purchase of private supplemental health insurance [Garfinkel et al. (1987), Long et al. (1982), Rice and McCall (1985), Cafferata (1985)], most have not examined the endogenous link between utilization and private health insurance.

Two recent studies do link the demand for health insurance with the use of medical care. Hu et al. (1988) examined health insurance coverage and medical care expenditures of the elderly, but rejected the endogeneity of private health insurance and medical care use. We examine the endogeneity of private insurance and medical care utilization and model alternative forms of endogeneity. 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, Cameron et al. modelled medical care use as a single decision. We model utilization as a sequential process. First, individuals enter the health care system by seeking the care of a physician. We use probit analysis to determine the factors influential in whether an individual has a least one visit to a physician (DOCTOR VISIT (Y/N)) and at least one hospital stay (HOSPITAL STAY (Y/N)). Second, subsequent use of medical care received is measured by the number of visits made to a physician and the number of days of hospital care (LOG OF DOC VISITS and LOG OF HOSP DAYS) in the previous 12 months. Because our model describes individuals as entering the medical system sequentially, we run the probits of DOCTOR VISIT (Y/N) and HOSPITAL STAY (Y/N) on the full sample and the regressions of LOG OF DOC VISITS and LOG OF HOSP DAYS on the subsample of individuals who have at least one doctor visit or one hospital day, respectively.[1]

Because of endogeneity, our coefficient estimates are drawn from the estimation of four systems of equations. In each system, a probit of private health insurance coverage is estimated in tandem with a regression of medical care use. However, the presence and nature of the endogeneity is not known a priori and must be tested. Therefore we consider four models: (1) A recursive model in which the presence of private health insurance is assumed to affect utilization, but there is no endogeneity. (2) A simultaneous equations model in which private health insurance affects utilization and utilization

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

The data do not allow us to distinguish between cases in which an individual was admitted to a hospital following a doctor visit and those in which a doctor visit occurs after hospital admission. For this reason we do not limit the population for the probit of HOSPITAL STAY (Y/N) to individuals with at least one doctor visit.

affects the decision to have private health insurance. (3) A joint error model in which the error terms of the insurance and utilization equations are assumed to have a standard bivariate normal distribution. (4) A joint error model with simultaneity incorporating the assumptions of both (2) and (3).[2]

The possibility of individuals being concurrently enrolled in multiple public health insurance programs complicates the analysis. Eligibility for public insurance programs may depend on factors that might also influence the purchase of private insurance. In previous work on private insurance among aged Medicare enrollees [Garfinkel et al., (1987)], researchers controlled for Medicaid coverage by including a dummy variable among the explanatory variables of a regression. However, this treatment is not satisfactory because Medicaid coverage may be a choice for Medicare enrollees who have low levels of income and assets and may therefore be endogenous in the decision to have private health insurance. Because very few individuals with both Medicare and Medicaid coverage have private health insurance, we address this problem by estimating the probability of having private health insurance for a population excluding individuals with any public health insurance coverage other than Medicare.[3]

In one study of aged non-Medicaid population researchers found that private supplemental coverage did not vary by health status [Christensen, Long and Rodgers, (1987)]. These authors report that the distribution of health status among those who have Medicare and private insurance is very similar to the distribution of health status for all Medicare enrollees. Their tabular evidence on insurance coverage and health status among the aged Medicare population suggests that a bias resulting from treating the decision to purchase insurance exogenously may not be a significant problem for the (non-Medicaid) Medicare eligible population. Thus, by studying a population with Medicare only or Medicare plus a private supplement, we are selecting a population that appears least likely to show endogeneity of private health insurance and the utilization of medical care. Yet we find that even for this population, private health insurance and use of medical care are endogenous.

Both the insurance and the utilization regressions estimate reduced form equations including both supply and demand factors. We now discuss the supply and demand factors assumed to influence the choice of whether to have private health insurance in addition to Medicare coverage and the utilization of medical care.

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[2]An independent equations model is also estimated to allow the presence of endogeneity to be statistically tested.

[3]The authors have treated Medicaid status endogenously in other work (Rubin and Wilcox-Gok, 1990, and Wilcox-Gok and Rubin, 1990) by including the probability of Medicaid enrollment in the health insurance and utilization equations. The authors are currently developing an appropriate multivariate logit estimation model to allow all possible insurance choices. Note that Medicaid is an option only for individuals with sufficiently low income and assets.

Private Health Insurance. Definitions of all variables are given in Table 1 and means and standard deviations are shown in Table 2. The dependent variable is a dichotomous variable indicating whether an individual has private health insurance (PRIVATE-1) in addition to Medicare coverage. Poor health reported by the survey respondent (POOR HEALTH) and the number of functional limitations (LIMIT) may be indicators of future health care needs and are assumed to affect the likelihood of having private health insurance. Both of these health indicators are included because they may have independent impacts on the individual's demand for private health insurance.

The set of independent variables also includes several other control variables. INCOME represents the individual's ability to purchase supplementary private health insurance. Since the elderly person with Medicare coverage may have private health insurance through an employed family member, a variable indicating whether any family member is employed (FAMWORK) is included. It is also possible that a retired person may have private insurance through a prior employer (de Lissovoy et al. (1990)). Wave 3 of SIPP does not contain the information needed to ascertain whether this occurs. This may be a source of an omitted variable bias in our results, since 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 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 cost of private health insurance.[4]

Utilization of Medical Care. The focus in this paper is on factors determining the presence of private health insurance. However, because utilization of medical care may be endogenous in the decision to have private health insurance, we briefly describe the independent variables included in the utilization regressions. Variables expected to be associated with utilization include AGE, gender (FEMALE), race (WHITE), and education (HIGH SCHOOL, COLLEGE). The variables representing specific disabling conditions (LIMIT) and general health status (POOR HEALTH) capture the effects of an individual's specific health status on the demand for care. Because prepaid private coverage may lower the cost of a physician visit or a hospital stay, the extent of medical insurance, either Medicare only or Medicare plus private health insurance (PRIVATE), represents

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[4]Note that FAKWORK can be expected to influence the decision to have private health insurance, but is not expected to influence the decision to use medical care (other than through the presence of insurance).

the cost of care to the individual. Household income (INCOME) indicates the household's ability to pay for medical care and related items. 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 factors influencing the supply of medical care.[5]

IV. Results

Likelihood ratio tests between a simple independent equation model and models with simple simultaneity and jointly distributed errors support our assumption of endogeneity between private health insurance and physician utilization (DOCTOR VISIT (Y/N) and LOG OF DOCTOR VISITS) and for the probability of a hospital stay (HOSPITAL STAY (Y/N)).[6] The likelihood ratio tests also indicate that for DOCTOR VISIT (Y/N), the model with both simultaneity and joint errors performs significantly better than the simple joint error model, but for LOG OF DOCTOR VISITS and HOSPITAL STAY (Y/N), the simple joint error model performs best. We conclude that unobserved individual characteristics (causing jointly distributed error terms) are important determinants of the presence of private health insurance and the use of medical care. Estimates obtained from models with jointly distributed error terms will yield more efficient coefficient estimates. Simultaneity is found to be of relatively minor importance in the joint determination of insurance and medical care use. For none of the systems of equations is a simple simultaneous equation model appropriate, and only in the joint decision to have private health insurance and to visit a doctor does the joint error model with simultaneity dominate the simple joint error model. Only in this latter instance is there a potential bias in the coefficient estimates for PRIVATE and utilization due to simultaneity (if not properly estimated). It is not surprising that simultaneity is influential in the decision to visit a doctor since this utilization is easily anticipated.

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[5]METRO, DOCS, and BEDS represent supply characteristics that may influence the utilization of medical care, but are not expected to influence the decision to have private health insurance (other than through anticipated utilization).

[6]Since PRIVATE is a dichotomous observation of a latent continuous variable, the standard Hausman-Wu test of exogeneity is not appropriate. However, we may test for endogeneity with a IR test between the independent equations model (IE) and our joint error equations model (JEE). If the error terms in the IE model are correlated, it follows that the latent variable is not orthogonal to usage, i.e., there is endogeneity between the decision to have private supplementary insurance and the use of medical care. IR tests between the IE and the JEE and S&JEE models overwhelmingly reject the orthogonality of the latent private insurance variable and utilization for all of the measures of utilization except LOG OF HOSPITAL DAYS. Table A.1 of the appendix reports the LR tests. A more detailed comparison of these models for elderly Medicare recipients is found in Wilcox-Gok and Rubin (1990).

Hu et al. (1988) rejected endogeneity between private health insurance and medical expenditures of the elderly. Because they examined expenditures, which may be highly weighted by the cost of hospital care, we do not find their rejection of endogeneity surprising. Indeed, in our analysis the results of the likelihood ratio tests indicate that endogeneity between private health insurance and the LOG OF HOSPITAL DAYS must be rejected. Consequently, for this case we report coefficients from a recursive model in which private health insurance is assumed to affect utilization but utilization does not affect the decision to have private health insurance.

In Table 3, we report coefficient estimates from the appropriate models for the probits of whether an individual has private health insurance.[7] There are four probits reported because a probit for private health insurance must be run with each of the utilization equations. The coefficients in the first column in Table 3 are from a bivariate probit estimation of PRIVATE and DOCTOR VISIT (Y/N). The coefficients in the second column are from a probit of PRIVATE estimated with the conditional regression of the LOG OF DOCTOR VISITS, assuming that the error terms have a bivariate normal distribution. The coefficients in the third column in Table 3 are from a bivariate probit estimation of PRIVATE and HOSPITAL STAY (Y/N). The coefficients in the fourth column in Table 3 are from the simple probit of PRIVATE that is the first equation in the recursive model of PRIVATE and LOG OF HOSPITAL DAYS. All of the models reported are highly significant.

Although the coefficients cannot be interpreted as derivatives of the dependent variables with respect to the independent variables, the sign of each coefficient is the same as the sign of the derivative. The first two independent variables of Table 3 are indicators of health status: POOR HEALTH and LIMIT. Previous research has yielded mixed results on the impact of health status on insurance coverage. Both Hu et al. (1988) and Taylor et al. (1988) found a negative relationship between poor health and the probability of having private insurance. Garfinkel et al.(1987) reported a positive and significant effect of functional limitations and no significant effect of self-reported health status on the likelihood of having private insurance. With the exception of the recursive model estimates for POOR HEALTH in the fourth column, we find that poor health and the number of functional limitations are negatively and significantly associated with the presence of private health insurance. One explanation is that individuals with poor health or functional limitations are less able to obtain private health insurance because insurers are able to prevent potentially expensive applicants from obtaining insurance. Another possibility is that people over 65 in poor health may have left the labor force early and consequently lost an opportunity to receive coverage through a former employer.

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.

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[7]Tables containing the utilization regression coefficient estimates are available from the authors.

completed high school in the estimates from the bivariate probit model with the probability of visiting a physician.

Women are more likely to have private health insurance than men. The exception is once again the estimate from the bivariate probit model of PRIVATE (with PHYSICIAN VISIT (Y/N)). Increasing age reduces the probability of having private health insurance among the larger populations used in the bivariate probit estimations, but is not significant in the specifications estimated with the conditional populations. Marital status is significant in two of the four sets of estimates, but not in a consistent pattern.

Higher household income (INCOME) is positively and significantly associated with the probability of having private health insurance. The presence of an employed family member (FAMWORK) is negatively and significantly related to the probability of having private health insurance in two of the four probits. Because employment of the individual or a spouse or other family member may provide a Medicare enrollee with private health insurance, we expected FAMWORK to have a positive sign. Hu et al. (1988) found a positive relationship between the individual's employment and private health insurance among the elderly. It may be, however, that FAMWORK is an indicator of good health. We have only included an indicator of poor health among the explanatory variables. If better health means that there is less need for private health insurance, the expected sign of FAMWORK would be negative.

MIDWEST and NORTHEAST are significant in several of the specifications, and uniformly positive in sign, suggesting that individuals living in these regions are more likely to have private health insurance. Living in the SOUTH is significantly related to the dependent variable in only one instance.

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 (PRVISITHAT) has a large and positive effect on the probability of having private health insurance.

This implies that individuals who have a high probability of visiting a doctor are more likely to have private health insurance.[8]

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[8]The second stage coefficient estimates of the probability of a doctor visit used in the 3SLS estimation of the probability of private health insurance are given in Table A.2 of the appendix.

V.   Discussion

Recent legislative actions have enhanced the importance of private health insurance coverage in limiting out-of-pocket medical care costs for the elderly. Both the repeal of the Medicare Catastrophic Coverage Act of 1988 and the agreement in budget negotiations to control the federal deficit, in part, through reductions in Medicare benefits, increased the potential expenditures facing aged persons in need of medical care. These developments will encourage Medicare beneficiaries to find alternative means to cover deductibles, coinsurance, and other medical care costs not covered by Medicare. Congress, in turn, may need to reexamine current regulation of the elements of Medicare supplemental insurance policies (Pear (1990)). Exactly how any changes will affect insurance purchases and health care utilization should be understood before reforms are instituted. This research provides insight into the determinants of private health insurance supplements for elderly Medicare enrollees.

In this research, ve examine the determinants of private health insurance for elderly Medicare enrollees. The estimates are obtained from models that treat medical care utilization and private health insurance endogenously.

Ability to pay is an important factor in whether an individual has private health insurance: Our results indicate that elderly Medicare enrollees with greater income are more likely to have private health insurance. More surprisingly, we find that individuals in families with an employed member are less likely to have private health insurance. More years of education, being female, being white, being younger, and living in the Midwest or Northeast all increase the probability of having private health insurance.

Health status is an important determinant of whether an individual has private health insurance. Individuals with poor health are less likely to have private health insurance. This result is a partial effect observed while controlling for other factors such as education, income, and utilization, and is consistent with findings in studies of the elderly using other data. Individuals with functional limitations are also found to be less likely to have private health insurance. These results may indicate that individuals with poor health or severe functional limitations have difficulty obtaining private health insurance. Through clauses limiting coverage of expenses for pre-existing conditions, private insurers may discourage these applicants from obtaining coverage.

Although simultaneity between medical care use and private health insurance was considered for all four measures of medical care use, it was observed only in the joint decision to have private insurance and the decision to visit a doctor. The probability of visiting a doctor has a large, positive, and significant effect on the decision to have private health insurance. Since it is relatively easy to predict at least one visit to a doctor, compared to the number of doctor visits or the need for hospital care, it is appropriate that simultaneity is observed in this case and not for the other three measures of utilization.

Overall, the findings suggest that the type of endogeneity used in the estimation model is important in understanding factors that influence the decision to purchase health insurance and use medical care. This research indicates that endogeneity stemming from unobserved characteristics influencing both the decision to have private health insurance and to use medical care is an important type of endogeneity. Ignoring this source of endogeneity causes a significant loss in estimating efficiency. Consequently, future research on the purchase of health insurance and use of medical care should carefully model the relationship between these joint decisions.

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Table 1

Definitions of Variables

'Dependent Variable:	Definition:
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.
LOG OF HOSP DAYS	Log of hospital days over a 12 month period.
AGE	Years of age.
BEDS	Hospital beds per 1000 population in the state.
DOCS	Doctors per 1000 population in the state.
Education: HIGH SCHOOL COLLEGE	Set of dummy variables indicating the level of schooling attainment. Individuals in the HIGH SCHOOL category have received a high school diploma only. The omitted category contains individuals who have not completed high school.
FAMWORK	Dummy variable-I if a family member is employed.
FEMALE	Dummy variable-1 if individual is female.
INCOME	Monthly household income (in thousands) weighted by size of household and averaged over four months.
LIMIT	Number of functional limitations.
MARRIED	Dummy variable-I if the individual is currently married. Includes persons married with the spouse absent.

METRO	Dummy variable-1 if the individual lives in an metropolitan area.
POOR HEALTH	Dummy variable-1 if self-reported health status is poor.
PRVISITHAT	Predicted value of LOG OF DOCTOR VISITS.
Region:	Dummy variables-1 if the individual's residence is in:
MIDWEST	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, or 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.

Table 2

**Means and Standard Deviations of
Regression Variables**

Dependent Variables:	N	Mean	SD
PRIVATE	5232	78	.41
DOCTOR VISIT (Y/N)	5232	.81	.39
DOCTOR VISITS	5232	5.27	8.24
LOG OF DOC VISITS	4246	1.38	.95
HOSPITAL STAY (Y/N)	5232	.20	.40
HOSPITAL DAYS	5232	2.85	10.54
LOG OF HOSP DAYS	1066	2.11	1.02

Independent Variables:			
AGE	5232	73.17	6.05
BEDS	5232	5.59	.83
Education:			
HIGH SCHOOL	5232	.48	.50
COLLEGE	5232	.20	.40
DOCS	5232	2.00	.48
FAMWORK	5232	.26	.44
FEMALE	5232	.58	.49
INCOME	5232	1.61	1.30
LIMIT	5232	1.49	2.19
MARRIED	5232	.57	.50
METRO	5232	.67	.47
POOR HEALTH	5232	.17	.37
PRVISITHAT	5232	1.36	.31
Region:			
MIDWEST	5232	.24	.43
NORTHEAST	5232	.24	.43
SOUTH	5232	.24	.43
WHITE	5232	.92	.27

Table 3
Probits of Supplementary Health Insurance+

Utilization Dependent Variables:	PHYSICIAN VISITS (Y/N)	PHYSICIAN VISITS	HOSPITAL STAY (Y/N)	HOSPITAL DAYS
POOR HEALTH.	-40*	- .15*	- .14*	-.02
	(.09)	(.07)	(.06)	(.12)
LIMIT	- .09*	- .03*	- .03*	- .07*
	(.02)	(.01)	(.01)	(.02)
AGE	- .02*	-.007	- .01*	-.006
	(.004)	(.004)	(.003)	(.008)
FEMALE	.09	.14*	.15*	.23*
	(.07)	(.05)	(.04)	(.10)
WHITE	.81*	.75*	.70*	.89*
	(.07)	(.08)	(.07)	(.16)
MARRIED	.02	.15*	.13*	.11
	(.06)	(.05)	(.05)	(.10)
Education:				
HIGH SCHOOL	.11*	.24*	.20*	.12
	(.06)	(.06)	(.05)	(.12)
COLLEGE	.001	.30*	.26*	.009
	(.07)	(.07)	(.06)	(.17)
INCOME	.22*	.29*	.30*	.37*
	(.03)	(.02)	(.02)	(.06)
FAXWORK	.09	- .14*	- .12*	.11
	(.05)	(.06)	(.05)	(.12)
MIDWEST	.14*	.29*	.23*	.14
	(.06)	(.01)	(.06)	(.14)
NORTHEAST	.09	.17*	.19*	.02
	(.06)	(.06)	(.06)	(.14)
SOUTH	.07	.14*	.09	.08
	(.06)	(.06)	(.06)	(.13)
PRVISITHAT	3.59*			
	(.84)			
RHO	.15*	- .07*	.12*	
	(.03)	(.03)	(.03)	
INTERCEPT	1.78*	.02	.27	.08
	(.56)	(.32)	(.28)	(.64)
# observations	5232	4246	5232	1066
-2(log L)	9762.9*	15006.1*	9853.9*	947.5*
model df	29	27	27	14

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

Table A-1
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	15.21*	31.18*	56.24*
	(2)	(1)	(3)
Simultaneous Equations		[19.70]	41.04*
		(1)	
Joint Error Equations			25.06*
			(2)
LOG OF DOC VISITS:			
Independent Equations	2.72*	7.12*	9.42*
	(2)	(1)	(3)
Simultaneous Equations		[8.02]	6.70*
		(1)	
Joint Error Equations			2.30
			(2)
HOSPITAL STAY (Y/N):			
Independent Equations	.46	15.62*	16.72*
	(2)	(1)	(3)
Simultaneous Equations		[18.88]	16.26*
			(1)
Joint Error Equations			1.10
			(2)
LOG OF HOSP DAYS:			
Independent Equations	.64	.0002	.74
	(2)	(1)	(3)
Simultaneous Equations		[-2.93]	.10
			(1)
Joint Error Equations			.74
			(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 test indicates that models differ significantly with a 90% confidence interval. No significance test for the Schwarz criterion.

Table A. 2
Second-Stage Coefficient Estimates
of Doctor Visits (Y/N)+

POOR HEALTH	.38*
	(.08)
LIMIT	.09*
	(.01)
AGE	'01*
	(.004)
FEMALE	. 18*
	(.05)
WHITE	- .47*
	(.15)
MARRIED	.11*
	(.05)
Education:	
HIGH SCHOOL	.01
	(.06)
COLLEGE	.03
	(.06)
INCOME	- .01
	(.03)
METRO	.08
	(.05)
DOCS	.004
	(.05)
PRIVATEHAT	1.48*
	(.49)
INTERCEPT	-.97
	(.42)
# observations	5232
-2(log L)	2440.4*
model df	13

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