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SHORTER ARTICLES

The Effect of Health Insurance Cost Sharing Within Episodes of Medical Care

James A. Ligon

ABSTRACT

This article extends previous research on the effectiveness of health insurance cost sharing by considering its impact upon marginal outpatient expenditures for people with the same diagnosed condition in both fee-for-service and health maintenance organization contexts. The results suggest that there is no difference in mean outpatient expenditures between cost-sharing fee-for-service, full insurance fee-for-service, or health maintenance organization patients.

Moral Hazard Control

It has long been recognized that health insurance can inflate medical care expenditures by introducing moral hazard into the medical care consumption decision (Pauly, 1968; Feldstein, 1971; Feldstein, 1977). By forcing consumers to share in the marginal cost of care, health insurance deductibles and copayments are conventionally considered an effective means of combating moral hazard (see Rejda, 1989, pp. 84-87). However, the effectiveness of consumer cost sharing may be limited to controlling the frequency of a consumer's contact with the medical care system and, possibly, the frequency of hospitalization (Manning et al., 1987; Keeler and Rolph, 1988).

The consumer seemingly controls the initial contact with the medical care system. Hence, deductibles and copayments would be expected to influence the likelihood of a patient contacting a physician and, thus, affect overall expenditures. For example, Lohr, et al. (1986) find that patients subject to cost sharing under their insurance contracts are less likely to make contact with the medical care system than patients with full insurance coverage.

James A. Ligon is Assistant Professor of Finance at the University of Alabama.

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Choices regarding hospitalization generally fall into two categories: those involving elective procedures, where the decision to be hospitalized is the consumer's, and those involving serious illness, where the decision regarding hospitalization is the physician's. One would expect, then, that the effectiveness of consumer cost sharing in controlling inpatient expenditures would depend upon the type of hospitalization involved.

Presumably, some degree of discretion exists regarding outpatient treatment at the margin (e.g., performing an additional lab test, increasing a prescription dosage). The extent of consumer control over such marginal outpatient expenditures is not clear. If physicians match particular treatments to particular health states without regard for the consumer's tastes for the intensity of treatment or the consumer's ability to pay and if consumers acquiesce to the treatments prescribed, deductibles and copayments will not be effective at influencing outpatient expenditures within an episode of care. An episode of care is defined as all treatment for a particular condition or symptom arising out of an initial contact with the medical care system (see Keeler and Rolph, 1988, for example).

Fee-for-service (FFS) physicians generally have marginal revenue greater than or equal to zero for each additional service performed. Health maintenance organization (HMO) physicians generally have marginal revenue less than or equal to zero for each additional service performed. As long as the value of the physician's time is greater than zero, expenditure of additional time without additional marginal revenue is costly to the physician. The HMO delivery system, in effect, imposes cost sharing on the physician.

HMOs have been advocated as a means of controlling consumer moral hazard. Several studies have shown HMOs to have lower expenses than FFS care, primarily because of reduced hospitalization rates (see, for example, Luft, 1981; Manning et al., 1984). One would also expect the financial incentives associated with HMOs to affect the delivery of outpatient care.

This study tests the influence of cost sharing on marginal outpatient expenditures within individual episodes of medical care. The empirical tests go beyond previous work by comparing expenditures for consumers with the same diagnosed condition in both FFS and HMO contexts.[1] The effects of physician compensation systems and consumer characteristics, including insurance

[1] Manning et al. (1987), Keeler and Rolph (1988), and Manning et al. (1984) control for general health status but do not specifically control for particular diagnoses. Thus, their results could not detect the case where relatively healthier people happen to have contracted more expensive conditions during the data period or vice versa. Lohr et al. (1986) control for diagnoses, but their within-episode analysis is limited to an examination of usage rates for particular procedures and drugs. Consistent with the results presented here, they found that cost sharing had no perceptible impact on the use of particular procedures or drugs, given that the patient had initiated contact with the medical care system. Only Manning et al. (1984) consider the impact of HMO delivery systems.

coverage, upon outpatient expenditures of individuals over the age of 14 are compared across 39 diagnoses.[2]

The Data and Empirical Design

Data

The data set used in this analysis is from the Rand Health Insurance Experiment (RHIE), conducted by the Rand Corporation from 1974 to 1982. The experiment was a controlled trial in health care financing funded by the U.S. Department of Health and Human Services. Its purpose was to assess the interrelationship of many factors, including different types of insurance, upon the consumption of health care services and the resulting effects, if any, upon consumer health.

The experiment was conducted at six different sites: Dayton, Ohio; Seattle, Washington; Franklin County and Fitchburg, Massachusetts; and Georgetown County and Charleston, South Carolina. Over 8,200 persons were enrolled in the experiment. Families were assigned to one of a number of insurance plans that varied by coinsurance rate, delivery mode, and maximum out-of-pocket expenditure. Because of the interest in the effects of insurance coverage on health status and attitudes toward health care, data regarding use of health care, health status and attitudes, and underlying demographic information were collected at various points throughout the experiment. More details about the experiment are provided in Manning et al. (1987) and d'Arc et al. (1987).

The data set's construction as a randomized controlled trial eliminates the problem of endogenous insurance choice. The elimination of this problem, which frequently plagues analyses of the effect of insurance upon the demand for medical care, is critical to estimating the true significance of insurance coverage upon expenditures. Further, the data set allows one of the most comprehensive specifications of consumer characteristics possible. This analysis uses separate data sets for 39 diagnoses. The FFS data sets were constructed from episode data files previously created by Rand. Using Rand guidelines, I constructed comparable data sets from the Rand HMO visit files. See Appendix A for a list of the 39 diagnoses.

Empirical Design

The dependent variable is the total charges for an episode of health care adjusted to 1982 dollars.[3] Charges were regressed on a vector of consumer related variables developed in the manner described below.

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[2] HMO type care does not involve any actual marginal expenditures. The HMO "expenditures" used in this analysis were constructed in connection with the Rand Health Insurance Experiment (see the discussion of the data, below) by taking each service performed for HMO patients and pricing it at a comparable FFS rate prevailing in the same community at the same time.

[3] Cost of living data were available for all years of the Rand experiment. The choice of 1982 as numeraire was arbitrary.

The number of explanatory variables available for analysis was large relative to the size of the data sets, and a number of the explanatory variables were found to be collinear. To address both problems, principal components analysis was performed on three groups of independent variables: socioeconomic status, health status, and satisfaction with health care. See Appendix B for a list of the RHIE variables used in the principal components analysis.

Because there is no reason to suppose that consumer related variables would affect expenditures in the same way across all diagnoses, a different functional form was fitted for each diagnosis. Functional form for the explanatory variables was determined for each diagnosis by conducting preliminary regressions. See Table 1 for a list of the explanatory variables tested. The power transformation was used to test for nonlinearities in the independent variables. The criterion for variable retention in the actual analysis was Theil's adjusted R^2.[4]

Because of the particular interest in the effects of insurance coverage, variables indicating whether the insurance coverage was first-dollar FFS coverage or HMO coverage were retained in each diagnostic regression, regardless of whether these variables were significant in the original model-selection regressions. The FFS cost-sharing case was indicated when both variables took on zero values.[5]

The first set of regressions used the inflation adjusted episode charges (real charges) as the dependent variable. Because plots of the Studentized residuals against the predicted values revealed patterns suggestive of heteroskedasticity, additional regressions were performed that used the natural logarithm of the inflation adjusted charges (log(real charges)) as the dependent variable. This transformation of the dependent variable effectively removed the appearance of heteroskedasticity from the residual plots.

The primary difference between the two sets of regressions is that the logarithmic transformation tends to normalize the distribution of the dependent variable and the residuals. Consequently, t-tests on the coefficients in the logarithmic regressions are more reliable. The logarithmic regressions also have slightly greater explanatory power on average (as measured by adjusted R^2) than the regressions where real charges appeared as the dependent variable.

Results

Table 2 presents the number of times coefficient estimates for the consumer variables were statistically significant at the indicated levels in the real charges and log(real charges) regressions. The only consumer variable to have

[4] Detailed discussion of the construction of the data sets used and the statistical procedures applied appear in Chapter 5 and Appendices B, C, and D of Ligon (1991).

[5] Originally, the FFS insurance measures were coded with the specific values for the copayment rate and the upper limit for out-of-pocket payments. However, these variables were, in general, insignificant in preliminary regressions. It was determined that the dummy variable specification was a reasonable approach, since any existent within-episode effect of free care, versus some form of cost sharing, upon mean expenditures might be captured.

Table 1
Variables Used in Regression Analysis

Variables Included Directly	
Insurance Status Variables	
free	A binary variable taking on a value of 1 if the coverage involved no deductibles or copayments
pcthmo	The percentage of charges incurred within an HMO (generally, 1 for HMO members and 0 for nonmembers)
Personal Variables	
sex	A binary variable taking on a value of 1 if the individual is male
aged	The individual's age in years
Cost of Living	
genscol	An index of cost-of-living by site by year, derived from average annual household income by site by year
Variables Derived from the Principal Components Analysis	
Socioeconomic Status	
soceco1	1st principal component
soceco2	2nd principal component
soceco3	3rd principal component
Health Status	
hs1	1st principal component
hs2	2nd principal component
hs3	3rd principal component
Satisfaction	
sat1	1st principal component
sat2	2nd principal component
sat3	3rd principal component

significant coefficient estimates at the 5 percent level in more than 10 of the 39 regressions was the first principal component of health status, hs1, and its square, $hs1^2$. Certain other variables had significant coefficient estimates more times than one would expect by chance. However, the relationship of these variables is not overwhelmingly strong, being significant in roughly one-fifth or one-sixth of the regressions.

The results must be interpreted with some caution. The variables derived from the principal components analysis and the site cost of living variable are imperfect proxies for the variables they purport to measure, and therefore they involve some measurement error. Hence, one might expect the actual relationship between expenditures and the true variables to be stronger than that indicated by these regressions. Unfortunately, the extent of measurement error or the strength of the true relationship cannot be determined.

Because insurance coverage represents an easily observable consumer characteristic and because of our interest in the effectiveness of cost sharing

Table 2
Significance of Regression Coefficients for the Dependent Variables of the Inflation-Adjusted Charges and the Natural Logarithm of the Inflation-Adjusted Charges

		Number of Diagnoses in Which Variable Was Positively (+) or Negatively (-) Significant (N = 39)					
		Real Charges			*Log(Real Charges)*		
		10%	*5%*	*1%*	*10%*	*5%*	*1%*
free	+	3	2	1	2	1	0
	-	1	1	1	1	1	0
pcthmo	+	4	2	2	8	6	4
	-	4	4	1	6	4	2
genscol	+	5	4	2	7	7	6
	-	2	2	2	3	2	0
sex		6	1	1	2	2	0
aged		10	6	1	8	4	2
aged^2		11	7	1	8	6	2
Principal Components Analysis							
soceco1		8	4	2	8	4	4
soceco1^2		5	3	2	4	4	0
soceco2		2	2	1	2	1	0
soceco2^2		3	3	1	1	1	1
hs1		16	13	9	13	11	8
hs1^2		9	7	2	13	11	7
hs2		7	6	2	9	8	3
hs2^2		3	1	1	5	3	2
hs3		5	1	0	6	2	1
hs3^2		8	6	4	7	4	2
sat1		6	2	0	1	0	0
sat1^2		5	3	1	8	5	1
sat2		6	3	1	9	6	1
sat2^2		6	6	1	5	4	2
sat3		3	2	2	6	2	1
sat3^2		4	2	1	6	4	2

Note: Higher significance levels (e.g., 10 percent) include the number of times significant at lower levels (e.g., 5 percent and 1 percent). See Table 1 for the key to variable names.

in controlling expenditure variation within episodes of medical care, the effect of insurance is examined more closely. As indicated above, variables indicating whether an individual had first-dollar FFS insurance coverage (free) or was an HMO member (pcthmo) were included in each of the diagnostic regressions. The number of regressions in which these variables had significant coefficient estimates appears in Table 2.

FFS Cost Sharing

First-dollar coverage is expected to increase expenditures, because it reduces the individual's marginal cost of treatment. However, the coefficient of this variable is significant at the 5 percent level only three times in the real charges

regressions—one of these times it is negative—and only two times in the regressions using log of real charges as the dependent variable—again, one of these is negative.

The data suggest that first-dollar coverage has no effect on the mean expenditure within an episode of outpatient care. Such a conclusion is consistent with the results obtained by Manning et al. (1987) and Keeler and Rolph (1988), who found that variation in expenditure between insurance plans was related primarily to the frequency of consumers' contact with the medical care system and their frequency of hospitalization. To separate the possible effects of including HMO episodes of medical care, the first-dollar coverage variable was also retained in separate regressions of FFS episodes. This produced virtually identical results. In these regressions, this variable was significant only twice—once positive and once negative—in the real charges regressions; in the logarithmic regressions, it was significant only three times—twice positive and once negative.

Censoring. First-dollar coverage may have influenced expenditures in ways unobservable by a comparison of means. One explanation of an absence of a difference in expenditure means is that cost-sharing patients with relatively minor conditions censor themselves from the population; that is, they do not seek a physician's care. Lohr, et al. (1986) suggest that this is, in fact, what happens. Controlling for health status should capture any censoring effect in the sample. However, because health status is measured imperfectly, two tests were conducted for possible censoring effects.

The first test involved a comparison of the variances of the FFS cost-sharing and the first-dollar coverage FFS observations. If censoring is occurring and the means of the distributions are equal, one might infer that the free distribution is made up of a number of small expenditures and a number of large expenditures, while the cost-sharing distribution is relatively more homogeneous. If this is true, the variance of the first-dollar coverage distribution will be greater than the variance of the cost-sharing distribution. Accordingly, the variances of the these two distributions were compared.

Parametric tests for equality of a parameter (e.g., variance) are unreliable when the true underlying distribution generating the parameter is not known. However, the observations of variance for the cost-sharing and free distributions can be regarded as paired observations across all 39 diagnoses. Nonparametric methods such as the sign test can then be used to test for the theoretically indicated relationships.[6]

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[6] The null hypothesis is that the variances of the free and cost-sharing distributions are the same. This is equivalent to assuming a binomial distribution of the differences with $p = 0.5$, because it is just as likely that the free observation will exceed the cost-sharing observation and vice versa.

One could compute the actual binomial probabilities. However, with 39 diagnoses, we can also apply the normal approximation to the binomial using the standard Z formula:

$$Z = \frac{X - \mu}{\sigma} = \frac{X - pN}{\sqrt{p(1-p)N}}$$

with $p = 0.5$, and $N = 39$.

The foregoing sign test indicated that the variance of the free care distribution exceeded the variance of the cost-sharing distribution in 24 out of the 39 diagnoses. This generates a Z statistic of 1.4412, which has a probability value of 0.0749, sufficient to reject a null hypothesis of equality at the 0.10 level but not at the 0.05 level. This test provides some evidence of censoring in the sample. However, the primary concern is whether the regression adjustment for health status controls for differences related to any censoring that may be occurring. The sign test involves no adjustment for health status.

Another test was undertaken that adjusted for health status. The five most frequently occurring FFS diagnoses were split into separate data sets for free care and for cost-sharing care. Only the five most frequently occurring diagnoses were used to insure that an adequate sample size was present in both the free and cost-sharing subsamples to support a full regression analysis. Regressions were run on these separate data sets to control for health status differences and other consumer influences.

The regressions did not differ systematically in explanatory power, nor did the coefficient of variation or skewness of the residuals vary in any systematic way. However, the variance of the residuals was higher for free care in four of the five diagnoses. The distribution of signs on these differences was identical to that of the unadjusted variances (used in the sign test above), and the ratio of variances (i.e., VAR(free)/VAR(cost sharing)) was relatively similar across diagnoses between the unadjusted and the residual variances. Thus, the results of the sign test on the unadjusted variances may be reasonably representative of the distribution of residual variances as well. A summary of relevant cross-validation statistics are presented in Table 3.

Taken together, both analyses suggest that the regression variables for health status only imperfectly captured health differences related to censoring by FFS cost-sharing patients. However, the results are not overwhelming. The rarity with which the coefficient of the cost-sharing FFS variable was significant in the original regressions suggests that its insignificance is unlikely to have been the result of censoring alone.

Table 3
Selected Statistics from Cross-Validation Regressions
Separating Free and Cost-Sharing Care
(Dependent Variable = Real Charges)

	R^2		Coefficient of Variation		Variance Residual		Skewness Residual	
Diagnoses	Free	Cost-Sharing	Free	Cost-Sharing	Free	Cost-Sharing	Free	Cost-Sharing
Hay Fever	0.0454	0.0606	1.24	1.41	20052.88	32277.26	2.357	3.404
Vaginitis	0.0311	0.0867	0.74	0.81	2138.56	2061.12	1.775	2.132
Pharyngitis	0.0340	0.0105	1.47	0.98	5616.74	2518.54	6.431	3.136
Hypertension	0.0772	0.0558	1.23	1.14	31802.85	20570.24	2.766	2.711
Upper Respiratory Infection	0.0540	0.0042	1.31	1.11	5127.20	2622.17	5.007	8.525

HMO Effects

Previous studies based on the RHIE data have failed to analyze by diagnosis the effect of HMO delivery systems upon expenditures per episode of medical care. Additional insight can be provided by comparing the physician cost sharing implicit in HMO compensation systems with consumer cost sharing and by comparing physician cost sharing with no cost sharing (the free or first-dollar FFS case).

HMO-FFS Cost-Sharing Care. The coefficient of HMO coverage was statistically significant at the 5 percent level six times in the real charges regressions—twice positive and four times negative—and ten times in the logarithmic real charges regressions—six times positive and four times negative (see Table 2). Although clearly significant more frequently than the coefficient of first-dollar FFS coverage, the existence of both positive and negative significance reveals that HMO episodes do not have consistently larger or smaller mean expenditures than cost-sharing FFS episodes. Indeed, the differences may be best explained by examining the particular diagnoses involved. Such an examination suggests that the differences may be driven by fundamental differences in the nature of FFS versus HMO practice styles.

Some of the diagnoses for which the coefficient of HMO coverage was significantly positive may indicate the greater emphasis on outpatient surgery (for example, treatment for viral warts and ingrowing nails) and preventive care (for example, treatment for upper respiratory infections and pharyngitis) usually associated with HMOs. Likewise, some of the diagnoses for which the HMO coverage coefficient was significantly negative may reflect less reliance on drug related therapies and greater emphasis on healthy lifestyles (for example, in the treatment of hypertension) associated with HMOs. Thus, the significant differences seem to be related more to practice style, in general, than to differences in individual consumers.[7]

HMO-Free FFS Care. HMO coverage, like free care, involves no marginal cost to the consumer. Hence, HMO patients have no incentive to censor themselves and not seek a physician's care for minor ailments. However, the HMO case differs from free FFS in two significant ways. First, the physician is clearly aware of the consumer's insurance status, and, second, the physician bears a marginal cost (i.e., an uncompensated expenditure of time). A comparison of the coefficients of HMO and free care provide insight into the effect of physician cost sharing upon expenditure in a situation where censoring is not a concern.

The equality of the regression coefficients of first-dollar FFS coverage and HMO coverage was tested using the following test statistic:

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[7] In the logarithmic real charges regressions the six diagnoses for which the HMO coverage variable was significantly positive at the 5 percent level were vaginitis, upper respiratory infection, viral warts, urinary tract infection, pharyngitis, and ingrowing nail. The four diagnoses for which the HMO coverage variable was significantly negative at the 5 percent level were poison venom, hypertension, bronchitis, and ankle sprain.

$$\frac{\beta_{FREE} - \beta_{HMO}}{\sqrt{Var(\beta_{FREE}) + Var(\beta_{HMO}) - 2\ Cov(\beta_{FREE},\beta_{HMO})}} \sim t_{N-p-1}.$$

This comparison reveals a difference in the regression coefficients significant at the 5 percent level in only five of the 39 regressions. In two cases (for treatment of hypertension and bronchitis) the coefficient of free care was significantly greater than that of HMO care, and in three cases (for treatment of vaginitis, viral warts, and pharyngitis) the coefficient of HMO care was significantly greater than that of free care. These diagnoses were significant with the same signs in the HMO-FFS cost-sharing comparisons, providing additional evidence that expenditure differences may be attributable to practice style. There appears to be little systematic difference in outpatient expenditures, regardless of who bears the marginal cost of the episode of medical care. Because neither free care patients nor HMO patients have an incentive to censor, this comparison provides evidence that the apparent insignificance of cost sharing is not attributable to censoring alone.

However, the lack of differences in the mean expenditure does not necessarily imply that the FFS and HMO expenditure distributions are similar. Ligon (1992) examines the higher moments of the FFS and HMO expenditure distributions and finds that significant differences do exist between the two types of care.

Summary

The only consumer characteristic that appears to consistently influence within-episode expenditures is variation in an individual's health status. Other factors, including insurance coverage, do not appear to significantly influence expenditures. The conclusions are tempered, because the extent and effect of variable measurement error and the effect of censoring by FFS cost-sharing patients cannot be measured. However, given the rare significance of the coefficient of the first-dollar FFS variable and the fact that the first-dollar/cost-sharing variance comparisons suggested only a moderate censoring effect, it seems unlikely that censoring alone could have produced the results.

Only outpatient expenditures are measured here. Keeler and Rolph (1988) found the level of insurance coverage to be significant in affecting the likelihood of both initial contact with a physician and hospitalization. However, consistent with my results, they found no significant differences in expenditures within outpatient episodes of medical care.

Physician cost sharing imposed by HMO delivery systems does not alter the results. The mean expenditures of HMO outpatient episodes did not differ from either FFS cost-sharing or free FFS episodes of medical care in most diagnoses. Diagnoses that have statistically significant coefficient differences may suggest that variations in practice style between the two types of care may be important in influencing expenditures.

The results suggest it is possible that physicians practice a style of medicine where intensity of treatment is relatively fixed for each physician but may vary slightly between physicians in different circumstances (e.g., FFS versus HMO). Such fixed practice styles might respond to significant shifts in consumer characteristics, such as universal reductions in health insurance coverage. The differences in insurance coverage in the Rand experiment may have been too small and affected too few people to change practice styles.

The proven effectiveness of deductibles and copayments in controlling the frequency with which people contact their physician implies that deductibles and copayments produce lower overall expenditures on medical care. However, the evidence here suggests that an individual insurer or employer has no reason to expect increased consumer copayments or deductibles on its coverages to decrease mean expenditures per episode of outpatient medical care. The lack of significant differences in mean expenditure across free FFS care, cost-sharing FFS care, and HMO care suggests that the average episode of outpatient treatment is influenced by the physicians' practice style norms, which are not sensitive to whether the consumer, the physician, or the insurer bears the marginal cost associated with an individual episode of health care.

Appendix A
Diagnoses Used in the Analysis

Abdominal Pain
Adult Diabetes Mellitus
Anemia
Ankle Sprain
Arthritis
Bronchitis
Synovitis Bursitis
Cervicitis
Chest Pain
Chronic Ischemic Heart Disease
Colitis
Conjunctivitis
Contusion of Leg
Fibrocystic Disease of Breast
Gastritis
Hay Fever
Headache
Hemorrhoids
Herpes Simplex
Hypertension
Hypothyroidism
Influenza
Ingrowing Nail
Laceration of Hand
Middle Ear Infection
Migraines
Nasopharyngitis
Osteoarthritis
Otalgia
Pharyngitis
Poison Venom
Prostatis
Psoriasis
Rheumatism
Upper Respiratory Infection
Urinary Tract Infection
Uterine Fibroma
Vaginitis
Viral Warts

Appendix B
Variables Used in Principal Components Analysis

Health Status Variables

otherex	Medical expenses for the individual for this calendar year other than the current episode
mdexam	A binary variable taking on value 1 if person had a medical exam in the year preceding entry into the RHIE
pfi	An index of the individual's ability to perform self-care, mobility, and physical activities[1]
symptm	Number of acute symptoms of physical illness within prior 30 days
disea	Number of disease conditions
mhi	Index of mental health
socind	Frequency of social contacts within prior year
worcon	Extent of health related worries and concerns
cig	A binary variable taking on a value of 1 if the person currently smokes
movol	Monthly consumption (in ounces) of ethanol
mclsr	Amount of energy expended weekly on leisure activities
mcwrk	Amount of energy expended weekly on work activities
ovwght	A binary variable taking on value 1 if the person is severely overweight
ghindx	Index of general health

Socioeconomic Status Variables

mar	A binary variable taking on a value of 1 if the individual is married with spouse present
race	A binary variable taking on a value of 1 if the individual is white
educper	Number of years of formal schooling completed
csoph	Index of consumer sophistication about medical care
income	Income of the household to which the individual belongs
estatus	A binary variable taking on a value of 1 if the individual is currently employed

Satisfaction Variables

appt	Satisfaction with waiting time for appointments
conv	Satisfaction with location of medical offices
hour	Satisfaction with medical office hours
park	Satisfaction with parking for medical care
trvl	Satisfaction with travel time to medical care
wait	Satisfaction with waiting time at physician's office
avmd	Satisfaction with availability of family doctor
avsp	Satisfaction with availability of medical specialists
avhos	Satisfaction with availability of hospitals
cost	Satisfaction with the cost of medical care
art	Satisfaction with the interpersonal aspects of medical care
tech	Satisfaction with the technical quality of medical care
mdoff	Satisfaction with the family doctor's office facilities
mgsat	General satisfaction with medical care

[1] This and the remaining health status and satisfaction variables were measured by participants' responses to a questionnaire administered at the beginning and at the end of the Rand experiment. The analysis uses the mean of the two values if both are available. If one is missing, the available value is used.

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