Cost-Sharing and the Patient's Choice of Provider

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PREFACE

Current proposals aimed at halting the rapid growth in the costs of medical care would introduce financial incentives to encourage consumers of such care to shop for the lowest prices. One financial incentive is consumer cost-sharing. The purpose of this research is to investigate the effects of cost-sharing on the consumer's choice of primary care provider; the author examines whether cost-sharing affects the type of provider the patient chooses as the primary care source, and whether cost-sharing affects the costliness of the selected provider.

This research was performed as part of Rand's Health Insurance Experiment under grant 016B80 from the U.S. Department of Health and Human Services. It should be of interest to decisionmakers who formulate health policy, and to the health research community.

SUMMARY

Consumer cost-sharing in health insurance is advocated by some as a means of containing rising health care costs. There is strong evidence that cost-sharing reduces the quantity of medical care demanded. Cost-sharing, it is argued, also may encourage consumers to search for lower-priced providers of care which, in turn, would encourage price competition among physicians as they try to attract or retain patients. This research investigated the effects of cost-sharing on the patient's choice of provider.

The data for this analysis came from the Health Insurance Experiment (HIE), a controlled trial to study the effects of cost-sharing in health insurance. During participation in the HIE, families were randomly assigned to insurance plans with varying cost-sharing requirements. Each patient's primary care provider was determined using claims data submitted by participants in Dayton, Ohio, and Seattle, Washington, during the first two years of the study. Two measures of choice of provider were analyzed: a categorical variable representing the specialty type of provider from which the patient sought care and a variable measuring the relative costliness or prices of the chosen provider.

The level of cost-sharing was found to have little effect on patients' choices about the primary care provider. Among all patients, the probability of choosing a physician in private practice instead of a non-office-based physician provider and the probability of choosing a specialist instead of a general or family practitioner was not significantly related to the generosity of insurance coverage. Among families known to have changed providers, those with free care appear to have been more likely to choose a specialist (primarily a pediatrician) for their children than those on cost-sharing plans; however, the estimates were imprecise. In addition, the average price of physicians selected by persons with full insurance coverage was only about 4 percent higher than the price of physicians chosen by patients with only catastrophic coverage.

If consumers are unable to acquire information about physicians' fees, policies to increase the financial incentive for consumers to search for low-cost providers cannot hope to be effective. If physician fee information were more readily available, the level of insurance coverage might have a more significant impact on the consumer's choice of provider than we were able to detect. However, even among the well educated, who are likely to be more efficient at obtaining comparative

price information than the less educated, we did not find a significant effect of cost-sharing on provider choice.

In sum, we found little evidence that cost-sharing leads consumers to seek lower-priced providers. Our results are tentative and might be altered with increased availability of consumer information, over the longer run, or with higher levels of total out-of-pocket risk than included in the HIE. However, these preliminary results provide scant reason to believe that cost-sharing will lead consumers to search for lower-cost providers of care and thereby enhance the competitiveness of the medical market.

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I. INTRODUCTION

Dramatic increases in expenditures and prices have characterized the health sector during the past two decades. Many observers cite extensive insurance coverage as a major contributor to this inflation. Public and private insurers now pay almost 70 percent of medical care bills (Freeland and Schendler, 1981). Because patients directly pay only a small share of their medical bills, they may be purchasing more health care, and more expensive care, than they would if faced with the full cost. Restoring cost-consciousness on the part of consumers through increased cost-sharing is one of the solutions proposed to contain the growth in health expenditures.

That increased cost-sharing reduces the quantity of care demanded has been demonstrated (Newhouse, Manning, Morris, et al., 1981). However, increased cost-sharing may also affect the sources from which patients seek care. With complete, or nearly complete, insurance, patients have little financial incentive to consider price in choosing their health care provider; at higher levels of cost-sharing, patients may seek less costly sources of care.

Variation within a market in physician fees has been noted in several studies (Newhouse and Sloan, 1972, Cantwell, 1981) and arises from several sources. In part, price variation reflects "quality" or productivity differences stemming from physicians' human capital investments, for example, in specialty training and board certification. "Quality" and price variation among providers may also be due to differences between physicians in attributes such as hospital affiliation or "prestige," and in differences in amenities such as location, waiting times, and office decor. Finally, price variation among providers of the same "quality" may exist because consumers have imperfect information about the prices of alternative sellers and there are costs associated with searching for lower prices.

The consumer weighs the benefits of purchasing higher quality care against its cost and the benefits of additional search for lower prices against the cost of search. With extensive insurance, however, the consumer pays little or nothing for higher quality care and gains little if any of the savings in searching for physicians who charge lower fees. That is, insurance coverage reduces the cost of quality and the benefits of search. Some have suggested that "it is likely that the impact of insurance on the 'quality' of care is a more important determinant of increases in medical expenditures than its effect on quantity" (Frech and Ginsburg, 1978).

Thus far, our discussion of the effect of cost-sharing on the patient's choice of provider has centered on the economic issue: that increased cost-sharing may increase consumers' sensitivity to price differences among providers. However, there may also be quality of care implications stemming from a relationship between the level of cost-sharing and the patient's provider choice. Deficiencies in the provision of care and variation among physicians in their quality of care have been documented. Some studies have found that board-certified physicians provide higher quality care than those without board certification and that physicians with specialty training in the treatment of specific diseases provide better care for those diseases than physicians not so trained.[1] To the extent that cost-sharing affects patients' decisions to seek care from specialty trained physicians and from board-certified physicians, it may also affect the quality of care received. However, evidence that quality varies systematically with physician characteristics is weak and the association needs further investigation if we are to understand the quality of care implications of the patient's provider choice. Here, we will focus on the effects of cost-sharing on the characteristics of the selected provider using data from the Health Insurance Experiment (HIE). Forthcoming research from the HIE will address the relationship between physician characteristics and quality of care.

The remainder of the report is organized as follows: The next section briefly reviews the existing literature concerning the effect of insurance on the patient's choice of provider. Section III develops the analytic framework for the empirical investigation. The data and statistical methods are described in Sec. IV, and the results are presented in Sec. V. The final section discusses implications of the findings for current health financing proposals.

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[1]For reviews of the evidence on the relationship between physician characteristics and quality of care, see Williams and Brook (1978) and Wyszewianski, Wheeler, and Donabedian (1982).

II. PREVIOUS WORK

Existing empirical literature tends to suggest that the demand for quality and the costliness of the patient's chosen provider are sensitive to the level of insurance coverage. Persons with insurance coverage have been found to be more likely to obtain care from physicians in private practice and less likely to receive their care from clinics and emergency rooms than the uninsured (Sloan, 1978; Berkanovic and Reeder, 1973; Dutton, 1979). Among those seeking care from physicians in private practice, the insured have been seen to be more likely than the uninsured to choose specialists over general practitioners (Sloan, 1978) and more likely to choose board-certified specialists if they visit a specialist (Shortell, 1975).

These results, except for the study by Sloan, were based on simple associations between insurance coverage and the type of provider selected. Therefore, the results may be due to the confounding influences of factors other than insurance that affect patient's choice. Furthermore, the data used for Sloan's analysis include physician referred visits as well as patient initiated visits, and a large fraction of the visits to specialists were physician referrals. The level of insurance is known to affect the patient's decision to seek care (Newhouse, Manning, Morris, et al., 1981) and the number of episodes for which the patient seeks care (Keeler and Rolph, 1982); the increased patient contact with a physician may increase the likelihood that the physician treats an illness leading to a specialist referral. In addition, providers may consider the patient's insurance coverage in making referral decisions. Thus, Sloan's results may reflect the effect of insurance coverage on consumer demand for quantity rather than quality, or the effect on physician's treatment decisions rather than consumer quality demand.

Decreases in the consumer's out-of-pocket price (i.e., the price net of insurance payments) have been shown to increase the demand for "quality" pediatric care, as measured by characteristics of the physician (Goldman and Grossman, 1978; Colle and Grossman, 1978). However, because changes in insurance coverage have a direct effect on optimal search time and total price (see the next section), the elasticity of quality demand with respect to price is likely to overstate the elasticity with respect to changes in consumer cost-sharing. Our interest centers on the response to cost-sharing as it is the variable subject to policy manipulation.

Empirical work concerning the effect of insurance on dimensions of quality other than practice setting and physician specialty has produced mixed results. The level of insurance coverage has demonstrated a significant relationship with patient wait time in physicians' offices (Sloan and Lorant, 1977). However, insurance coverage was not significantly related to physician time during a visit (Sloan and Lorant, 1976) nor to the number of laboratory tests ordered during a visit (Danzon, Manning and Marquis, 1984).

There exists little empirical evidence concerning the effects of insurance on consumer search. Analyses of aggregate time series and area data, and studies of physician practices, have found that the average level of insurance of the patient population is related to physician fee levels (Feldstein, 1970; Steinwald and Sloan, 1974; Sloan, 1976; Sloan, 1982). However, these results may reflect normal workings of supply and demand and not an impact on consumer search.

Newhouse and Phelps (1976) used household cross-section data to investigate the effect of insurance on the price of the provider selected. They estimated that a change from no insurance to full coverage would increase by 18 percent the price of the selected physician. Newhouse and Phelps used average expenditure per visit, adjusted for specialty type of provider, as a proxy for price; their measure thus includes variation resulting from intensity of services during a visit, an aspect of quantity. Therefore, some of the effects of insurance on the price measure may reflect the demand for more services per visit rather than an effect on patient search.

A common problem inherent in all of these studies is that insurance is endogeneous. Because families who expect to choose high quality, high priced providers may also choose more generous insurance, the results may overstate the causal impact of insurance on the patient's choice of provider. In the HIE, families were randomly assigned to insurance plans; as a result, the study overcomes the self-selection problem in the other available data. An analysis of the effects of insurance on the patient's choice of mental health provider, based on the HIE data, revealed that increased cost-sharing did not affect the use of formal mental health providers (i.e., psychiatrists, psychologists) relative to the use of informal mental health providers such as general practitioners (Wells, Manning, Duan, et al., 1982). Our purpose here is to examine the evidence from the HIE about the effect of cost-sharing on the choice of primary care provider.

III. ANALYTIC FRAMEWORK

Economic models of the demand for a differentiated product have been considered by a number of authors and applied to the demand for health services by Goldman and Grossman (1978) and Feldman and Begun (1978). When varying levels of "quality" (or characteristics) of a good are available, the consumer chooses both the quality level and the number of units to purchase. We assume that the consumer selects the quality level (q) and quantity (v) of health services and the quantity (x) of another good so as to maximize utility, U(q,v,x).

The total price of a quality unit of health services is assumed to vary with the amount of time the consumer spends in searching for information; consumers can find lower priced providers if they engage in additional search. The out-of-pocket price of a quality unit of health services is a fraction, c, of the total price where c is the coinsurance rate specified in the consumer's insurance policy.

The budget constraint facing the consumer is

$$y + wt - ws = x + cp(s)qv,$$

where

- y = nonwage income,
- w = wage rate,
- t = total productive time available,
- s = time spent in search,
- p(s) = price of a quality unit of health care, and $p' < 0$,

and the good x is the numeraire commodity with a price of unity.

The first order conditions for maximizing utility subject to the budget constraint are

$$U_x - \lambda = 0, \tag{1}$$

$$U_v - \lambda cp(s)q = 0, \tag{2}$$

$$U_q \ \lambda cp(s)v = 0, \tag{3}$$

$$\lambda(w + cp'qv) \geq 0, \tag{4}$$

and the budget constraint, where λ is the marginal utility of money.

Equation (2) defines the shadow price of quantity, cp(s)q, and Eq. (3) gives the shadow price of quality, cp(s)v. The shadow price of quantity is positively related to the quality level and, similarly, the shadow price of quality increases with quantity. These interrelationships and their implications have been discussed by a number of authors investigating demand for goods with quality variations (e.g., Houthakker, 1952; Becker and Lewis, 1973; Willis, 1973).

Consider the effects of an increase in consumer cost-sharing on quality and quantity demand. From Eqs. (2) and (3), an increase in c raises the shadow price of both quality and quantity. The rise in the shadow price of quality would reduce the quality level demanded; however, if quality and quantity are substitutes, the increase in the shadow price of quantity would lead to an increased demand for quality. The net effect on quality demanded may be positive or negative depending on the relative magnitude of the own price and cross price effect. Similarly, the net effect of increased cost-sharing on quantity demanded is uncertain. Although the effect of an increase in cost-sharing on either quality or quantity alone cannot be signed, total consumption of health services, the product of quality and quantity, is expected to fall.[1]

The optimal amount of search time is given by Eq. (4) which indicates that the consumer will search up to a point where the cost of additional search time (w) equals the savings from additional search (cp′qv).[2] At a given level of total health care consumption, an increase in coinsurance directly increases the benefits from search. However, there is also an indirect effect of changes in coinsurance on optimal search time; an increase in cost-sharing will lead to a reduction in total health care consumption, which in turn reduces the benefits of search. Therefore, depending on the magnitude of the change in the demand for health services in response to changes in insurance, an increase in cost-sharing may lead to a reduction in search.

A number of advocates of increased cost-sharing argue that the resulting incentive for patients to search for lower priced physicians will encourage competition among physicians. However, as discussed above, the effects of cost-sharing on consumer search for lower priced

[1]Willis (1973) presents a formal demonstration of the effects of a change in the price of a good that has both quality and quantity dimensions.

[2]The inequality in Eq. (4) holds if insurance provides full coverage, i.e., if c = 0; otherwise the expression on the left hand side of Eq. (4) equals zero.

providers are theoretically ambiguous. Therefore, we will address the issue empirically using data from the HIE.

IV. DATA AND METHODS

THE HEALTH INSURANCE EXPERIMENT

The HIE is a controlled trial to evaluate the effects of varying the level of patient cost-sharing. Families who participated in the study came from six sites and were representative of the population within each site, subject to a few restrictions: Families headed by persons age 61 or older were ineligible to participate. The disabled eligible for Medicare were excluded as were persons eligible for military medical care and persons receiving Supplemental Security Income. Families in the upper 7 percent of the national income distribution were excluded. Other details about the study design have been reported elsewhere (Newhouse, Manning, Morris, et al., 1981).

Each family participating in the study was assigned to an experimental insurance plan. The plans varied on two dimensions: the share of the bill the family paid (the coinsurance) and an upper limit on out-of-pocket expenses.[1] For this analysis the plans were grouped according to the level of the coinsurance rate for ambulatory physician's care: free care (0 coinsurance), 25, 50, and 95 percent. All the plans except the free care plan specified an income-related limit on the family's out-of-pocket expenditures for any one year: either 5, 10 or 15 percent of income, to a maximum of $1000 ($750 in some sites and years). A fifth plan analyzed specified 95 percent coinsurance for outpatient care subject to a $150 per person annual limit on out-of-pocket expenses ($450 for a family); inpatient care was free on this plan. This last plan in effect has an individual outpatient deductible, and we refer to it as the individual deductible plan.

Two measures of choice of provider were analyzed: a categorical variable representing the type of provider from which the patient sought care, and a variable measuring the relative costliness of the chosen provider. The alternative type sources were (1) general practitioner or family practitioner in private practice, (2) specialist (other than family practitioner) in private practice, and (3) a source other than a physician in private practice (e.g., a hospital emergency room or clinic, or a practitioner other than a physician). In analyzing adults'

[1]In one site, a part of the sample was enrolled in an existing prepaid group practice plan. Families in the prepaid group practice are excluded from this analysis because they do not freely choose their physician.

choices, specialist in private practice was further categorized as to (2a) internist and (2b) all other specialists.

Practice setting and physician specialty choices have been used in previous studies to represent the "quality" level of medical care chosen by the consumer (Sloan, 1978; Goldman and Grossman, 1978; Colle and Grossman, 1978). Though practice patterns are known to vary between these sources (see for example, Fishbane and Starfield, 1981; Noren et al., 1980; Dutton, 1979; Bodenheimer, 1970), evidence linking characteristics of providers to the technical quality of care is weak, as noted in the introduction. However, on average, patients pay more for care from specialists (see below) suggesting that they attach value to the specialty characteristic, or perceive care from specialists to be of higher quality. "Quality" choice is thus intended to mean the choice of a characteristic to which consumers attach value and does not necessarily imply technical quality.

In analyses not reported, an expanded choice measure distinguishing between board-certified family practitioners and not board-certified general practitioners and between board-certified versus not board-certified specialists was investigated. However, the set of socio-demographic and plan characteristics used as explanatory variables to explain specialty choice were not significantly related to the choice between board-certified and not board-certified physicians. This is not surprising in view of the finding by Newhouse, Ware, and Donald (1981) that few adults in the sample used here appear to know about physician certification.[2] Furthermore, about 85 percent of patients choosing general or family practitioners used not board-certified general practitioners rather than certified family practitioners, whereas almost the same percentage of patients choosing specialists used a board-certified specialist. That is, given specialty choice, we observed little variation in the decision to choose a board-certified physician.

Costliness of the chosen provider was defined for patients whose usual source of care was a physician in private practice. It was measured as the ratio of the price charged for a standardized visit by the individual's provider to the average charged by physicians of the same specialty type as the chosen provider. Development of the standardized price measure is explained below.

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[2]In contrast, Newhouse et al. (1982) show that the percentage of board-certified physicians in a town increases with population size, a finding consistent with the assumption that the market attaches value to board certification. That result may appear to be in conflict with our finding that economic factors did not explain the choice between board-certified and not board-certified physicians. However, here we are focusing on the patient's initial decision to obtain care. Physicians, in making referral decisions on behalf of their patients, are likely to consider certification status.

The choice measures were developed from insurance claims submitted by participants in two sites—Dayton, Ohio, and Seattle, Washington—during the first two study years.[3] To focus on the patient's decision about whom to go to for common health problems or preventive care, the choice measures were based on the provider visited for well care or for the initial visit in an acute episode.[4] Follow-up visits, referral visits, visits for maternity care, visits for chronic conditions, visits to ophthalmologists, and to mental health practitioners were excluded in defining the provider choice measure.

An individual's choice was measured as the provider type to which most initial treatment contacts were made in the two years. The measure was available for 1102 adults (persons over age 16) and 733 children (persons age 16 and under) who contacted a provider for well care or an acute illness in the first two study years in the two sites; thus, the analysis of patient's choice was conditional on use of care. The distribution of the categorical choice variable is given in Table 1. Participants in Seattle were somewhat less likely than persons in Dayton to choose a private practice physician even though the number of office-based primary care physicians (general and family practitioners, internists, pediatricians) per person is about 40 percent higher in Seattle than in Dayton. Seattle participants choosing office-based physicians were more likely than persons in Dayton to select a specialist; this is not surprising given that specialists account for 42 percent of office-based primary care practitioners in Seattle but only 30 percent in Dayton. In both sites, almost half the adults who visited specialists other than internists were women who chose gynecologists as their primary source of care; 80 percent of children who used specialists for their care obtained that care from pediatricians.

Combining the choices of adults and children, about 80 percent of participants who selected a private physician chose a general practitioner, internist, or pediatrician as their primary care physician according to the definition used here. Recently, Spiegel et al. (1983) used data from the HIE to contrast different methods of defining the primary care source. The three definitions examined were based on (1) the physician providing the majority of care, (2) the physician designated by the patient to receive results of a multiphasic screening examination, and (3) the physician treating common problems. Using the first definition, about 66 percent of patients were identified as choosing a general practitioner, internist, or pediatrician; however, this rose to

[3]Resource constraints prevented us from extending the analysis to include other sites or additional years.

[4]The designation of a visit as well care or initial acute contact came from a treatment history code in the claims data.

Table 1

PERCENTAGE OF PATIENTS CHOOSING ALTERNATIVE PROVIDER TYPES

Provider Type	Dayton	Seattle	Total
Adults (over age 16)			
General practitioner	63	47	55
Internist	10	11	10
Other specialist	21	30	26
Not private practice physician	6	12	9
Children (age 16 and younger)			
General practitioner	51	33	41
Specialist	44	62	54
Not private practice physician	5	6	5

88 percent using the second definition and to 90 percent using the third definition. Spiegel et al. prefer the definitions based on patients' perceptions of their primary physician, or that consider which physician performs tasks commonly associated with primary care, to the more commonly used definition based on majority of care. Our definition,[5] based on physicians visited for well care or the initial visit in an acute episode, provides a categorization that conforms more closely to the second and third definition considered by Spiegel et al. than to the more common majority source definition. Our definition does categorize slightly fewer patients as selecting a general or family practitioner, internist, or pediatrician than Spiegel et al. obtained using their second and third definitions. This might be due to differences in the HIE study sites used here and in their analysis. However, since our definition does not control for the type of acute episode, our choice categorization in some instances will be based on physician contacts that are not typically associated with primary care, for example, treatment for a fracture. The incidence of such episodes should be balanced across

[5] For this analysis, we could not use the Spiegel et al. definition based on the physician designated to receive the multiphasic screening exam results at the time of enrollment. The designated physician would reflect patients' choices before coverage under the experimental plan and so, of course, would not reflect the influence of the generosity of experimental coverage on the choice. The screening exam was repeated at the exit from the study; however, data indicating which physician received the end of study exam results were not available when this analysis was undertaken.

experimental insurance plans and so will not bias estimates of the effects of insurance on choice of provider.

A measure of costliness of the chosen physician required a measure of the price charged by each physician for a standard visit. Units assigned to physician services by the California Relative Value Studies (CRVS), which reflect relative differences in median charges between services, were used to compute a charge per unit of service for each physician office visit (CRVS codes 90000 to 90089). To convert per unit charges to an estimated charge for a standard visit, the per unit charge was multiplied by 6.5, the number of CRVS units assigned to an intermediate examination for an established patient. The standardized price was averaged over all visits by adults and over all visits by children to a particular provider to obtain physician-specific fee measures.[6] Average fees paid for a standard visit by sample persons choosing physicians in primary care practice are shown in Table 2.[7] The ratio of the fee charged by the chosen provider to the average fee paid to physicians of the same specialty type (from Table 2) was the measure of

Table 2

AVERAGE FEES PAID FOR STANDARD VISIT, BY SPECIALTY TYPE

	Dayton			Seattle		
Specialty	Mean	Std. Dev.	Coeff. Variation	Mean	Std. Dev.	Coeff. Variation
			Adults			
General practice	15.43	2.49	0.16	14.60	3.21	0.22
Internal medicine	16.90	2.63	0.15	16.54	3.90	0.24
Other specialties	15.80	3.76	0.24	15.00	3.20	0.22
			Children			
General practice	14.24	2.51	0.18	14.15	3.50	0.25
All specialties	14.73	1.43	0.10	14.35	2.36	0.16

NOTE: In 1975-1976 prices.

[6]In Dayton, the price measures were based on charges for visits during 1975 and 1976, whereas in Seattle the measures were based on visits occurring during the two year period beginning mid 1976. Physician-specific fee measures in Seattle were deflated by 13.5 percent to adjust for 18 months of price inflation.

[7]The entries in Table 2 are standardized fees averaged over patients, not physicians. In effect, each physician's fee is weighted by the number of sample patients the physician treated.

costliness of the chosen physician.[8] Costliness differences reflect differences among patients about search and quality or attribute choices not embodied in choices about specialty.

METHODS OF ANALYSIS

Empirical estimates of the effect of insurance plan and characteristics of the individual on the type of provider chosen were obtained by fitting a sequential probit model (see Amemiya, 1981). The choice decision was assumed to be made sequentially by deciding (1) whether to visit a physician in private practice or some other provider type, then (2) whether to visit a general practitioner or a specialist, given the choice of a private practice physician.[9] Separate models were fit for choices made by adults for their own care and the choices made for the care of children. Among adults, a third choice was modeled: (3) whether to visit an internist or other specialist, given the choice of a specialist. Each choice was assumed to be made according to a dichotomous probit model.

The explanatory variables included: indicators for the experimental insurance plan, site, family income, family size, age, race, sex, level of physician use before enrolling in the experiment, an indicator for undergoing routine treatment for chronic conditions, and education. In the equations modeling decisions for children, the education variable was the education of the mother (or the family head if the mother was not present in the family); the individual's own education was used in the equation fit to explain adults' choices. The explanatory variables are defined in detail in Appendix Table A.1.

The costliness measure was regressed on the same set of explanatory variables to estimate the influence of cost-sharing on the price of the chosen provider. The dependent variable in the costliness analysis is based on the average charge per unit of service made by the patient's chosen provider. Because of differences in the number of observations used to construct the price measure, the residuals in the costliness analysis will have differing variances and the error variance will be proportional to

[8]If a patient visited more than one physician of the selected specialty type (e.g., more than one general practitioner), the numerator of the costliness measure is a weighted average of the price charged by each physician, where the weights are the percentage of contacts to each physician. The costliness measure could not be computed for 2 percent of patients choosing a private practice physician because their provider did not bill for any service within the range of CRVS codes used to develop the standardized price.

[9]In analyses not reported, the multi-response and sequential models were compared and found to yield similar results.

$$\frac{1 + (m - 1)r}{m} \tag{5}$$

where m is the number of observations used to construct the costliness measure and r is the correlation in the standardized price across visits to a physician. The within-physician correlation in the standardized price across visits was estimated to be 0.3 for adults' visits and 0.35 for children's visits. An examination of the residuals from a least squares regression revealed that the error variances were in fact approximately proportional to the factor given in Eq. (5). Therefore, to account for the heteroskedasticity in the costliness measure, a weighted least squares analysis was performed, transforming all of the variables in the costliness model by the square root of the inverse of the factor in Eq. (5).[10]

Choices made by individuals in the same family are likely to be correlated. A variance components model including a family-specific error component was used to account for the positive correlations among family members in the costliness analysis. The variance components regression was applied to the transformed or weighted observations and it is assumed that the variance covariance matrix of the weighted residuals, e*, can be expressed as

$$(e^*e^{*\prime}) = \sigma^2(1 - \rho)I + \sigma^2\rho D,$$

where I is the identity matrix, D is a block diagonal matrix with a block of 1s for each family, and ρ is the intrafamily correlation. The regression parameters and ρ were estimated by maximum likelihood methods.

Statistical tests on the probit equation were corrected for intrafamily correlation using a technique described in Duan, Manning, Morris, and Newhouse (1982) that avoids the computationally expensive multivariate probit model. The univariate probit model was estimated, treating observations as if they were stochastically independent. The intrafamily correlation in the propensities was estimated using a random subsample of two persons from each family and this estimated correlation was then used to compute an upper bound adjustment in the standard errors obtained from the univariate probit model.

Because of policy interest in differential effects of cost-sharing on the poor, interactions between income and plan were investigated. The interactions were not significant and so are not included in the reported equations. Except for a main effect of site, no differences

[10]Estimated coefficients and their standard errors, however, were substantially the same whether or not the transformation was performed.

between sites were observed in the relationship between the set of explanatory variables and the choices, so pooled data from the two sites were used to estimate the equations. Finally, because a change in provider in response to the new experimental plan might not have occurred immediately, differences between year one and year two in the relationship between observed choices and cost-sharing was investigated; because no differences were found, the results presented use a choice measure defined on the basis of the pooled two years of claims data.

The fitted equations were used to predict provider type choices and the price of the chosen provider for various cost-sharing arrangements and for subgroups of policy interest (e.g., income groups). To assess choices under each insurance plan, predictions were made for each person in the sample (each person who chose a physician in private practice for predictions of price) assuming the person to be assigned to the plan being predicted rather than just predicting choices for the subsample assigned to the plan.[11] The predictions were then averaged over all persons to obtain the reported results.

To compare choice patterns for socioeconomic subgroups, predictions were made for each person in the subgroup and then averaged over all persons in the group. For example, to compare choices about the type of provider made by persons with high education with the choices made by persons with low education, the probit equations were used to predict the choice probabilities for each participant in the sample. The predictions for all persons with high education were then averaged and compared with the predicted probabilities averaged over all participants with low education. Since persons with high and low education may differ in other characteristics that affect predicted choice probabilities, such as income, the comparisons in the text for education groups (and other socioeconomic subgroups) reflect the gross effect on choice of education (or other grouping variable) and other characteristics that vary with it. Net effects, that is the effect of one characteristic holding all others constant, can be found in Appendix Tables A.2 – A.4 that present the full equations used to make the prediction.

In many of the tables in the next section, t-statistics for comparisons between subgroups are presented (e.g., comparing the free plan to the 25 percent cost-sharing plan). The statistic tests the significance of the difference in the prediction for the groups and uses the standard error of the predicted difference between the groups.

[11]This is to remove any imbalance in the distribution of other characteristics across plans.

V. RESULTS

EFFECTS OF INSURANCE PLAN

Overall, the level of cost-sharing was not significantly related to patients' choices of provider type from which to seek care nor to the relative price of the selected physician. Joint tests of the significance of the set of plan indicator coefficients are given in Table 3; the estimated effects are not significant at the 5 percent level.

Further, among adults, the probability of choosing a particular provider type neither consistently increased nor decreased as the level of cost-sharing increased (Table 4). Comparing the cost-sharing plans with the free care plan, the only significant difference was a lower probability of choosing an internist as the primary care provider among participants on the 50 percent coinsurance plan. This may be because plans were somewhat confounded with site, however. All of the participants on the 50 percent coinsurance plan in the sample were in the Dayton site. Participants in Dayton also had a lower propensity to choose internists as their primary care provider than did Seattle participants.

Although there was not a consistent trend in the relationship between the level of cost-sharing and the family's choice of type of primary care physician for its children, a family that paid 95 percent of its initial outpatient bills—one on the 95 percent coinsurance and one on the individual deductible plan—was less likely than a family with lower cost-sharing to choose a specialist as its child's primary care

Table 3

TESTS OF INSURANCE PLAN EFFECTS ON CHOICE MEASURES

Choice Measure	Adults' Test Statistic	Children's Test Statistic
Type of provider	χ^2 (12) = 12.63	χ^2 (8) = 9.39
Costliness of private practice physician	F(4,966) = 1.60	F(4,663) = 1.25

NOTE: $\chi^2(12,.05)=21.03$; $\chi^2(8,.05)=15.51$; $F(4,966,.05)=3.32$; $F(4,663,.05)=3.32$.

Table 4

EFFECTS OF INSURANCE PLAN ON PREDICTED PROVIDER TYPE CHOICE PROBABILITIES

Plan	Any Physician in Private Practice		Any Specialist in Private Practice		Any Internist in Private Practice	
	Prob.	t-test vs free	Prob.	t-test vs free	Prob.	t-test vs free
Adults						
Free	0.91	—	0.36	—	0.11	—
	(0.015)		(0.028)		(0.017)	
25% coinsurance	0.91	0.20	0.36	−0.02	0.08	−1.33
	(0.019)		(0.035)		(0.019)	
50% coinsurance	0.90	−0.30	0.36	0.03	0.05	−2.16*
	(0.042)		(0.061)		(0.025)	
95% coinsurance	0.94	1.32	0.41	1.12	0.14	0.90
	(0.017)		(0.037)		(0.025)	
Individual deductible	0.88	−1.04	0.33	−0.53	0.11	−0.16
	(0.025)		(0.039)		(0.024)	
Children						
Free	0.94	—	0.57	—		
	(0.016)		(0.035)			
25% coinsurance	0.95	0.33	0.57	0.02		
	(0.019)		(0.044)			
50% coinsurance	0.93	−0.24	0.59	0.31		
	(0.045)		(0.078)			
95% coinsurance	0.96	0.77	0.44	−2.14*		
	(0.018)		(0.048)			
Individual deductible	0.96	0.67	0.51	−0.83		
	(0.021)		(0.059)			

* Significant at the 5 percent level.
NOTE: Standard errors in parentheses.

provider (Table 4). However, the probability of choosing a specialist by a family on the individual deductible plan did not significantly differ from the other plans.

The predicted price of the chosen provider, relative to the average for the specialty type selected, tended to decrease as the level of cost-sharing increased except for a reversal among participants with 50 percent coinsurance. However, differences are small and generally insignificant (Table 5). Two of the four comparisons between the costliness

Table 5

EFFECTS OF INSURANCE PLAN ON PREDICTED RELATIVE PRICE OF CHOSEN PHYSICIAN

	Adults		Children	
Plan	Prediction	t-test vs free	Prediction	t-test vs free
Free	1.01	—	1.03	—
	(0.011)		(0.012)	
25% coinsurance	1.01	0.22	0.99	−1.63
	(0.014)		(0.016)	
50% coinsurance	1.03	0.77	1.00	−0.66
	(0.022)		(0.029)	
95% coinsurance	0.99	−0.63	0.98	−2.03*
	(0.014)		(0.017)	
Individual deductible	0.97	−2.02*	1.00	−0.72
	(0.016)		(0.019)	

* Significant at the 5 percent level.
NOTE: Standard errors in parentheses.

of the provider selected by persons with 95 percent cost-sharing and persons with free care are statistically significant. The predicted difference between adults on the individual deductible plan and the free plan in the price of the selected provider is significant as is the difference between children on the 95 percent plan and the free plan. However, comparisons between other cost-sharing plans and the free plan are not significant. Based on the predicted relative price, an increase from full coverage to full cost-sharing for initial outpatient visits would reduce the price of the selected provider by only about 4 percent.

EFFECTS OF PLAN FOR PATIENTS WHO CHANGED PROVIDERS

Because of the limited time period of our observations, it is possible that the previous estimates underestimate the potential for greater cost-sharing to increase competition in the medical market. Patients who have established physician relationships may be reluctant to change physicians for an experiment of three to five years duration or may respond to coinsurance changes only slowly. We have based our

measures on patients' choices during only the first two years of the experiment. As noted in Sec. III, differences between year one and year two in the relationship between observed choices and cost-sharing were investigated, but no differences were detected. However, over the longer run, patients facing high levels of cost-sharing may be more likely to change to lower priced providers.

Although we cannot investigate whether the temporary nature of the experiment biased the rate of provider change, we can investigate whether cost-sharing affected choices among patients who did change providers. At the time of exit from the experiment (after three years for 62 percent of this sample, five years for the remainder), participants self-reported whether they had changed their usual source of care since enrolling in the experiment. Responses were obtained from 91 percent of the sample studied here; 29 percent of responders reported a change in provider.

The choice models were re-estimated allowing for a different response to cost-sharing among persons reporting a provider change than all other persons. The predicted specialty choices and relative price choices by plan for patients changing providers are shown in Tables 6 and 7. Although the predictions for those who changed provider are imprecise because of the small sample size, in general the results mirror those for all participants. Among adults, there is no consistent relationship between increases in coinsurance and the probability of choosing a particular provider type. The probability of choosing a physician in private practice for the treatment of children was not related to plan. Point estimates indicate that adults on the individual deductible plan and children on the 95 percent plan selected providers whose fees were about 5 percent lower than fees of physicians selected by patients in the free plan; however, patients on the other cost-sharing plans did not select lower priced providers than patients on the free plan.

The one divergent result is the effect of cost-sharing on the probability of choosing a specialist (primarily a pediatrician) for children. The predicted probability is more than 10 percentage points lower on all cost-sharing plans, except for the individual deductible plan, than on the free plan; however, the confidence intervals around the estimates are wide because of the small sample size. Nonetheless, the result suggests that if a widespread cost-sharing change encouraged more patients to change providers than did so in the experiment, patterns of specialty choice for children may be affected.

The modal provider during the first two years may not reflect the new provider selected by all of the patients who made a change, since for some the change may have occurred somewhat later in the

Table 6

EFFECTS OF INSURANCE PLAN ON PREDICTED PROVIDER CHOICE PROBABILITIES FOR PATIENTS REPORTING A CHANGE IN PROVIDER

	Any Physician in Private Practice		Any Specialist in Private Practice		Any Internist in Private Practice	
Plan	Prob.	t-test vs free	Prob.	t-test vs free	Prob.	t-test vs free
			Adults			
Free	0.89	—	0.32	—	0.14	—
	(0.031)		(0.049)		(0.034)	
25% coinsurance	0.89	0.02	0.31	−0.09	0.03	−2.57*
	(0.045)		(0.067)		(0.024)	
50% coinsurance	0.87	−0.14	0.46	1.18	0.06	−1.32
	(0.081)		(0.113)		(0.052)	
95% coinsurance	0.94	1.18	0.46	1.44	0.19	0.69
	(0.039)		(0.006)		(0.066)	
Individual deductible	0.90	0.32	0.33	0.13	0.05	−1.95
	(0.041)		(0.062)		(0.031)	
			Children			
Free	0.93	—	0.59	—		
	(0.031)		(0.066)			
25% coinsurance	0.96	0.72	0.44	−1.22		
	(0.038)		(0.100)			
50% coinsurance	0.96	0.67	0.43	−0.80		
	(0.059)		(0.186)			
95% coinsurance	0.98	1.17	0.42	−1.36		
	(0.028)		(0.103)			
Individual deductible	0.96	0.83	0.57	−0.17		
	(0.034)		(0.099)			

* Significant at the 5 percent level.
NOTE: Standard errors in parentheses.

Table 7

EFFECTS OF INSURANCE PLAN ON PREDICTED RELATIVE PRICE OF CHOSEN PROVIDER FOR PATIENTS REPORTING A CHANGE IN PROVIDER

	Adults		Children	
Plan	Prediction	t-test vs free	Prediction	t-test vs free
Free	1.03	—	1.01	—
	(0.019)		(0.019)	
25% coinsurance	1.03	0.18	0.99	−0.48
	(0.019)		(0.021)	
50% coinsurance	1.07	1.03	1.01	−0.05
	(0.029)		(0.038)	
95% coinsurance	1.03	−0.250	.96	−1.24
	(0.021)		(0.023)	
Individual deductible	0.98	−1.92	1.01	0.21
	(0.021)		(0.022)	

NOTE: Standard errors in parentheses.

experiment. However, some heterogeneity in the population in the likelihood of changing physicians is to be expected and the subpopulation examined here are persons most likely to respond. Thus, the absence of response to cost-sharing among this subpopulation, except perhaps in specialty choice for children, suggests limited potential for cost-sharing to increase competition in the medical market.

EFFECTS OF EDUCATION

Policies to increase the financial incentive for consumers to shop for low cost providers can be effective only if consumers can acquire information on which to base choices. Advertising restrictions make it difficult for consumers to compare prices of different providers, and it is generally agreed that such restrictions are a factor reducing the competitiveness of the medical market.[1] There is also a concern that many consumers are unable to assess the technical quality of health care providers and, so, financial incentives to encourage price shopping might lead some consumers to turn to less qualified providers who charge lower prices (Weisbrod, 1978; Wyszewianski, Wheeler, and Donabedian

[1]See for example Feldman and Begun (1978) for a theoretical and empirical analysis of the effect of advertising restriction on the price of eye examinations.

1982). Public and private sector efforts to provide consumers with more information may be necessary if increased financial incentives are to have intended effects (Office of Technology Assessment, 1982).

To assess these issues indirectly, we investigated how cost-sharing affected the choices of individuals with different levels of education. Persons with high education are likely to be more efficient at obtaining comparative price information and better able to assess technical quality.[2] Thus, the educated (or "informed") consumer may be successful in finding lower cost providers of a given quality level when faced with increased cost-sharing, whereas the response among less educated consumers may be manifested in changing "quality" levels.[3] The lack of evidence of an overall effect of cost-sharing on choice may be due to different behavioral responses depending on the consumers' shopping skills. To test for the differential response, we added an education interaction with the plan indicator variables. The test of the interaction of cost-sharing and education in the equations to explain adult choices about type of provider was χ^2 (12) = 10.96, and in explaining provider type choice for children, the test was χ^2 (8) = 6.12; these are not significant at the 5 percent level. Similarly, there was not a significant interaction between cost-sharing and education in explaining the relative price of the selected physician (F(4,659) = 0.54 for children, F(4,962) = 1.54 for adults). Though education is an imperfect proxy for the "informed" consumer, the result suggests that increased cost-sharing may not encourage consumers to price shop for physicians even if coupled with an increased availability of information. On the other hand, there is also no evidence to support the concerns that increased cost-sharing will lead uninformed consumers to choose lower "quality" type providers to obtain lower priced care.

The level of education did affect the type of provider selected for primary care (Table 8).[4] In particular, persons with high education were more likely than those with low education to choose a specialist in private practice.

The likely effect of education on the relative price of the selected physician is a priori ambiguous. If more educated individuals are more efficient in obtaining information, the costs of search are reduced. On

[2]Newhouse, Ware, and Donald (1981) found that education was significantly related to consumers' level of knowledge about a number of aspects of the medical care system.

[3]As noted earlier, "quality" is used here to reflect a characteristic and not meant to imply technical quality.

[4]The predictions given in Table 7, and predictions given for other socioeconomic subgroups, reflect the gross effect of the characteristic studied and all other characteristics that vary with it. For the net effects, that is holding other things constant, see the regression results in Appendix Tables A.2 – A.4.

Table 8

EFFECTS OF EDUCATION ON PREDICTED PROVIDER TYPE CHOICE PROBABILITIES

	Any Physician in Private Practice		Any Specialist in Private Practice		Any Internist in Private Practice	
Level of Education[a]	Prob.	t-test	Prob.	t-test	Prob.	t-test
			Adults			
Less than 12 years	89	—	30	—	8	—
12 years	91	1.60	36	4.02*	10	1.44
More than 12 years	91	0.73	42	3.04*	12	1.76
			Children			
Less than 12 years	93	—	44	—		
12 years	95	1.4	51	2.8*		
More than 12 years	96	1.2	62	3.6*		

NOTE: t-test is on the comparison with the predicted probability for those with less than 12 years of education.

* Significant at the 5 percent level.

[a]Own education for adults; mother's education for children.

the other hand, higher education is likely to be associated with a higher opportunity cost of time (an explicit measure for the value of time was not included in the regression), tending to raise the costs of search. If these factors on balance raise the cost of search for more educated individuals, we could expect price to vary positively with education; if search costs are lower for the educated, price would also be expected to be lower. Moreover, the relative price measure studied may reflect variation in quality as well as search, for the measure does not control for all dimensions of quality. If the relative price measure is dominated by quality variation, then we could expect to observe higher relative prices among the educated because the provider type choice results suggested a positive association between education and "quality" demanded. Empirically, the relationship between education and the relative price of the selected physician was positive, but the effect was small; holding all other things constant, five additional years of schooling were associated with an increase in the price of the selected physician of only 2 percent.

EFFECTS OF INCOME AND RACE

Financial barriers faced by the poor in obtaining health care were significantly reduced with the introduction of Medicaid. However, there remains concern that the removal of financial barriers did not produce equal access and that the type of care obtained by the poor differs qualitatively from care obtained by those at higher economic levels (Donabedian, 1981). There is also concern that increased cost-sharing would exacerbate this difference.

Although there was no evidence of differential response to cost-sharing by economic class, as indicated in Sec. III, significant differences did exist between low and high income persons and between whites and blacks in the mix of primary care providers chosen. Blacks relied much more heavily on hospitals and other non-office-based physician sources than did whites (Table 9). The difference was particularly pronounced among adults; white adults were almost 20 percent more likely than black adults to select private practice physicians.

Blacks whose primary care source was an office-based physician, however, were significantly more likely to choose a specialist than whites with a primary source in private practice.[5] A similar pattern of quality choice by race was reported by Colle and Grossman (1978) in their study of pediatric care.

Table 9

EFFECT OF RACE ON PREDICTED PROVIDER TYPE CHOICE PROBABILITIES

Race	Any Physician in Private Practice	Any Specialist in Private Practice	Any Internist in Private Practice
		Adults	
White	92	36	10
Black	76	45	18
	t=2.85*	t=1.38	t=−1.58
		Children	
White	95	53	
Black	84	56	
	t=2.00*	t=−0.33	

* Significant at the 5 percent level.

[5] See Appendix Table A.3 for the test of the effect of race in the conditional model.

The costliness of the selected physician for children, given the specialty type chosen, was significantly higher among blacks than whites (see Appendix Table A.4). This may reflect the selectivity effect noted above: Blacks are more likely to choose non-office-based sources of care than whites, but blacks who do select a private practice physician exhibit a strong preference for "quality" providers.

Persons in high income families were more likely than poorer families to choose physicians in private practice. This result is shown in Table 10, which contrasts provider type choices of persons in families with income in the upper and lower quartiles of the distribution. Family income was also positively associated with the probability of choosing a specialist as the primary care provider for children. However, income was not significant in explaining the relative price of the selected provider (see Appendix Table A.4).

Table 10

EFFECT OF INCOME ON PREDICTED PROVIDER TYPE CHOICE PROBABILITIES

Income Quartile	Any Physician in Private Practice	Any Specialist in Private Practice	Any Internist in Private Practice
		Adults	
Lowest	87	35	11
Highest	93	39	11
	t=−2.48*	−1.02	0.26
		Children	
Lowest	90	47	
Highest	96	58	
	t=−2.22*	−2.07*	

* Significant at the 5 percent level.

VI. CONCLUSIONS

This research has investigated determinants of the patient's choice of type of medical care provider and the relative costliness of the selected provider, focusing on the impact of cost-sharing on the choices. Among all patients, the level of cost-sharing in insurance had no impact on the specialty type of the provider. Among patients known to have changed providers, families with free care were more likely to choose specialists for their children than families on the cost-sharing plans, though the results were imprecise. However, the finding does suggest a potential impact of cost-sharing on the mix of providers used for children if the temporary nature of the experiment inhibited some families from changing providers in response to the insurance change. Though there were mixed results as to whether patients who have free care select higher priced physicians than patients who have catastrophic coverage, any differences are minimal.

Some large and significant differences in the choice of provider among socioeconomic subgroups were detected. Higher income and higher education are associated with an increased probability of choosing a specialist in private practice; blacks are less likely than whites to choose office-based physicians for their care. However, cost-sharing did not differentially affect these choices.

Although we found few effects of cost-sharing on the type or price of the selected provider, these are only two dimensions of provider choice. Other HIS research has demonstrated that insurance does not affect the cost of an ambulatory episode (Keeler and Rolph, 1982), expenditures per hospitalization (Newhouse, Manning, Morris, et al., 1981; Keeler and Rolph, 1982) nor laboratory tests per visit (Marquis, 1982). These results imply that patients with generous insurance do not select doctors who deliver a greater intensity of care or perform more procedures, nor do they choose relatively more costly hospitals than patients with less generous insurance.[1]

These results have implications for the proposals aimed at stemming the rising costs of health care. These strategies are labeled "pro-competitive" because they attempt to introduce financial incentives for

[1]This conclusion assumes that the severity of treated illness does not differ by plan. If illness severity does differ, then any tendency for patients with generous insurance to more often choose providers who deliver a higher "quality" or greater intensity of care than do patients with stingy insurance might be offset by the lesser health needs of patients with generous insurance. Future HIE research examining plan effects on specific diagnoses will investigate the severity mix across plans.

consumers to shop for the lowest prices for medical care. Consumer price shopping, in turn, is expected to increase price competition among providers of care as they try to attract or retain patients. One financial incentive proposed is to increase consumer cost-sharing; at high levels of cost-sharing the consumer pays most of the difference between high and low priced providers out of pocket and may become more sensitive to fee differences between providers.

There is little doubt that increased cost-sharing would reduce the demand for medical care and so reduce the total resources devoted to health care. Interim results from the Health Insurance Experiment showed that persons with only catastrophic insurance for medical care spent about 33 percent less than persons with first dollar coverage. However, our results provide scant reason to believe that increased cost-sharing would also lead consumers to search for lower priced care and thereby enhance the competitiveness of the medical market. The difference in the average price paid by persons with full coverage and those with catastrophic coverage, given the specialty of the physician, was at most about 4 percent.

The theory outlined in Sec. II, showed that a substantial demand response to changes in coinsurance may offset, or even outweigh, the potential benefits to additional search resulting from a higher out-of-pocket share of costs; that is, the gains from search depend not only on the share of the price the consumer pays, but also on the quantity of services used. The substantial decrease in demand that occurs when cost-sharing is increased, which has been demonstrated by the HIE, may explain why there is no evidence that effective consumer search increased with increased coinsurance.

The potential deleterious effects of cost-sharing on the quality of medical care, particularly for economically disadvantaged groups, has concerned many observers. Forthcoming analyses based on the HIE data will investigate the effects of cost-sharing on quality for different economic subgroups by assessing process and health outcomes. However, the interim results from the HIE on the effects of cost-sharing on demand for medical care and the results presented here give preliminary indications that income related cost-sharing is unlikely to differentially affect the quality of care received by different economic groups. Cost-sharing did reduce the demand for medical care, but the form of cost-sharing in the HIE, which was reduced for the low income groups, did not selectively affect the poor (Newhouse, Manning, Morris, et al., 1981). The mix of providers used by the rich and poor did differ, but the level of cost-sharing had no apparent effect on this mix. Both of these results relate to cost-sharing when coupled with an out-of-pocket risk limit related to income. If the level of total risk

shared by high and low income families was the same, the results, at least pertaining to demand for care, would likely be different.

Although this analysis suggested that price is not an important factor in patients' choices of their providers of medical care and that increased cost-sharing would not significantly affect consumer price shopping behavior, for a number of reasons our results might understate the potential for greater cost-sharing to increase competition in the medical market. First, the response to increased coinsurance might differ if information about physician fees were more readily available, for example, if advertising restrictions were eliminated or if insurers or other groups provided shopping guides. Preferred provider organizations are one approach to providing both the financial incentives for consumers to use efficient providers and also the information to consumers about who are the low cost providers. The insurer or sponsor informs the consumer by designating members of the preferred provider panel. Although the patient is typically free to select any provider, either cost-sharing, or premiums, or both are reduced if the patient chooses a provider from the panel. Thus, there are financial incentives to select a preferred (presumptively efficient) provider. Whether preferred provider organizations or consumer education efforts will change consumer price shopping behavior is yet to be directly tested. However, we did not find that the well educated, who are likely to be more knowledgeable about the health care system and better able to develop information than the less educated, were more likely to seek low cost providers in response to increased cost-sharing. Education is only a very imperfect proxy for knowledge of physician fees, but the result does suggest that factors other than price may play a more important role in a patient's choice of physician even if more information is made available.

A second reason that we may be underestimating the full effect of increased coinsurance on the price of the chosen provider is the short and limited time period of our observations. Although cost-sharing did not appear to affect the costliness of the provider selected by patients who changed providers during the experiment, it is possible that these patients were less sensitive to the cost-sharing levels of a known temporary experimental insurance plan in establishing a new physician relationship than would be the case if a widespread policy with a longer anticipated duration were adopted.

A final reason that our estimates might underestimate the impact of increased cost-sharing, under the health insurance packages now being proposed, is the limited risk faced by any family in the HIE, even those with high cost-sharing arrangements. This also may explain the divergence between the results of this analysis and the earlier studies

reviewed in Sec. II. All of the HIE coinsurance plans had an income-related limit on out-of-pocket expenditures with a maximum risk faced by the high income families of $1000. In contrast, existing literature has, on the whole, compared choices made by the insured and the uninsured. Health insurance packages now being proposed couple cost-sharing with catastrophic coverage; however, whether provider choice decisions would show greater response to coinsurance if the overall risk to the family was increased is unknown.

In sum, increased cost-sharing is one solution offered to the problem of the high cost of health care. This strategy would have significant effects on total health care expenditures because it would substantially affect the demand for care. Many argue that it would also provide the incentive for consumers to search for the lowest price of medical care and so encourage greater competition in the medical market. However, we found little evidence that increased cost-sharing did lead consumers to shop for lower priced providers. Though our results are tentative and might be altered with increased fee information available to consumers, the results give little reason to be optimistic that increased cost-sharing will also lead to greater price competition.

Appendix

THE ESTIMATED EQUATIONS

Table A.1

DEFINITIONS AND MEANS OF EXPLANATORY VARIABLES

Variable	Definition	Mean Value	
		Adults	Children
P25	Indicator for 25% coinsurance plan	0.210	0.232
P50	Indicator for 50% coinsurance plans	0.080	0.074
P95	Indicator for 95% coinsurance plans	0.197	0.198
PID	Indicator for individual deductible plan	0.168	0.139
Race	1 if white, 0 otherwise	0.938	0.935
Sex	1 if male, 0 if female	0.417	0.512
LnInc	Ln (Family Income)	9.26	9.32
NoMdVis	1 if no doctor visits in year before baseline, 0 otherwise	0.161	0.132
InvMdVis	1 if 0 or 1 doctor visits in year before baseline, reciprocal of no. of visits otherwise	0.469	0.522
LnFam	Ln (Family Size)	1.04	1.45
Rcron	1 if received care for chronic conditions in first two study years	0.414	0.185
Age	Age of individual	34.9	7.14
Ed	Education of self for adults, Education of mother for children	12.7	12.5
Sea	Indicator for participants in Seattle	0.534	0.524

Table A.2

PROBABILITY OF CHOOSING A PHYSICIAN IN PRIVATE PRACTICE
(Probit Equation)

	Adults			Children		
Variable	Coeff.	t	$(\partial P/\partial X)^a$	Coeff.	t	$(\partial P/\partial X)^a$
Intercept	−1.107	1.34		−2.22	1.62	
P25	0.035	0.20	0.004	0.078	0.32	0.008
P50	−0.083	−0.30	−0.012	−0.096	−0.25	−0.009
P95	0.242	1.27	0.034	0.199	0.740	.020
PID	−0.184	−1.08	−0.027	0.188	0.63	0.019
Race	0.739	3.69	0.219	0.700	2.53	0.154
Sex	−0.375	−2.90	−0.040	−0.212	−1.12	−0.015
LnInc	0.276	2.85	0.038	0.299	1.97	0.026
NoMdVis	0.033	0.16	0.005	−0.369	−1.20	−0.029
InvMdVis	−0.138	−0.65	−0.019	0.132	0.37	0.011
LnFam	0.008	0.06	0.001	0.429	1.40	0.038
Rcron	0.179	1.28	0.027	0.164	0.62	0.015
Age	−0.012	2.25	0.002	−0.038	−1.96	−0.003
Ed	0.002	0.11	0.000	0.015	0.34	0.001
Sea	−0.318	−2.17	−0.034	−0.059	−0.28	−0.005
	χ^2 (14) = 52.13			χ^2 (14) = 22.20		

[a]Change in the probability with respect to a change in the explanatory variable. For continuous variables, the derivative is calculated at the mean of all variables. For indicator variables the derivative is calculated by setting all of the indicators for the characteristic (e.g., the four insurance plan indicators) to zero and all other variables at their mean.

Table A.3

PROBABILITY OF CHOOSING A SPECIALIST IF PRIVATE PRACTICE PHYSICIAN IS CHOSEN
(Probit Equation)

	Adults						Children		
	Probability of Specialist			Probability Internist if Specialist			Probability of Specialist		
Variable	Coeff.	t	$(\partial P/\partial X)^a$	Coeff.	t	$(\partial P/\partial X)^a$	Coeff.	t	$(\partial P/\partial X)^a$
Intercept	−0.617	−0.82		0.624	0.53		−2.469	2.21	
P25	−0.009	−0.07	−0.003	−0.324	−1.45	−0.110	−0.012	−0.07	−0.005
P50	0.023	1.14	0.009	0.728	−1.90	0.248	0.109	0.40	0.043
P95	0.117	0.87	0.045	0.079	0.38	0.027	−0.422	−2.35	−0.167
PID	−0.043	0.29	−0.016	0.034	0.15	0.012	−0.208	−1.00	−0.082
Race	−0.665	−3.04	−0.251	−0.389	−1.35	−0.148	−0.399	−1.39	−0.129
Sex	−0.318	−3.08	−0.125	0.463	2.71	0.128	0.022	0.17	0.009
LnInc	0.013	0.15	0.005	−0.137	−1.03	−0.044	0.316	2.72	0.125
NoMdVis	0.092	0.53	0.035	0.136	1.78	0.043	−0.319	−1.38	−0.127
InvMdVis	−0.194	−1.13	−0.074	−0.546	−0.44	−0.176	−0.113	−0.49	−0.045
LnFam	−0.048	−0.47	−0.018	−0.437	−2.69	−0.140	−0.218	−1.02	−0.087
RCron	0.265	2.52	0.097	0.271	1.61	0.080	0.131	0.78	0.052
Age	0.000	0.15	0.000	0.018	2.65	0.006	−0.067	−4.81	−0.027
Ed.	0.057	2.94	0.022	0.026	0.89	0.008	0.058	1.84	0.023
Sea	0.448	4.16	0.156	−0.235	−1.32	−0.081	0.061	4.21	0.024
	χ^2 (14)=57.04			χ^2 (14)=43.29			χ^2 (14)=79.50		

[a]Change in the probability with respect to a change in the explanatory variable. For continuous variables, the derivative is calculated at the mean of all variables. For indicator variables the derivative is calculated by setting all of the indicators for the characteristic (e.g., the four insurance plan indicators) to zero and all other variables at their mean.

Table A.4

EQUATION TO PREDICT RELATIVE PRICE OF PHYSICIAN, GIVEN SPECIALTY

	Adults		Children	
Variable	Coeff.	t-statistic	Coeff.	t-statistic
Intercept	0.907	9.08	0.792	6.44
P25	0.004	0.23	−0.033	−1.63
P50	0.020	0.77	−0.021	−0.66
P95	−0.011	−0.63	−0.043	−2.03
PID	−0.040	−2.02	−0.017	−0.72
Race	−0.012	−0.41	0.111	3.60
Sex	−0.005	0.40	0.003	−0.31
LnInc	0.001	0.12	0.007	0.53
NoMdVis	−0.026	−1.25	−0.006	−0.37
InvMdVis	0.025	1.22	0.001	0.07
LnFam	0.021	1.55	0.004	0.15
Rcron	−0.001	0.07	−0.008	−0.68
Age	0.001	1.54	0.003	2.23
Ed	0.004	1.50	0.004	1.05
Sea	0.002	0.13	−0.004	−0.23
	F(14,966) = 1.20		F(14,663) = 1.88	

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