The University of Chicago
Center for Health Administration Studies

Medicaid Fees and Use of Physicians' Services

Joel Cohen
Service Fellow
Agency for Health Care Policy and Research

The Winter Quarter Workshop Series
24 January 1991
3:30-5:00 P.M.
Rosenwald 405

DRAFT--NOT TO BE QUOTED OR CITED

Medicaid Physician Fees And Use of Physician and Hospital Services

Joel W. Cohen
Agency for Health Care Policy
and Research

The views expressed are solely those of the author. No official endorsement by the Department of Health and Human Services or the Agency for Health Care Policy and Research is intended or should be inferred.

I. Introduction

The Medicaid program was created by the Social Security Amendments of 1964 as Title XIX of the Social Security Act. Although originally designed as a means of expanding access to medical care for certain classes of poor people, namely families with dependent children and the aged, blind, and disabled (Stevens and Stevens 1974), through much of the decade of the 1980s the program's focus tended to be less on access and more on cost containment (Holahan and Cohen 1986).

Physician services have always been a popular target of Medicaid cost containment efforts by states. Unlike the situation for hospitals and nursing homes, federal Medicaid regulations have traditionally given states wide latitude in determining how to pay physicians for services delivered to program beneficiaries. Thus, in the 1970s, while hospitals and nursing homes were paid on the basis of their own individual costs of providing service many Medicaid programs began increasingly to pay doctors according to fixed fee schedules or with stringent ceilings on the levels of fees they considered reasonable (Holahan 1984).

These cost containment efforts have, in turn, raised questions about their potential negative effects on access to important ambulatory care services among Medicaid eligibles, and also even about whether or not they have been successful in reducing program spending. Several analysts have argued that too much constraint on physician fees may simply force Medicaid

beneficiaries into the relatively expensive institutional system -- hospital outpatient departments and emergency rooms -- for services that could be provided more cost effectively in a doctors office. To the extent this is true, any direct savings on physician expenditures under Medicaid may be more than offset by increased use of hospitals, both outpatient and inpatient.

Increased use of inpatient hospitals may be another unintended consequence of very tightly constrained physician fees, as program beneficiaries entering the health care system through institutionally-based primary care providers may be more likely to be hospitalized than those with better access to office-based primary care. Beneficiaries with little access to office-based services may also be more likely to be hospitalized as a result of not having been able to obtain adequate preventive care or medical intervention in an early stage of illness. This issue has become even more important in recent years, as Congress mandated a series of eligibility expansions under Medicaid for poor women and children (see, for example, Hanft 1990) without addressing the question of how low physician reimbursement affects their access to and quality of care.

The purpose of this study will be to examine these questions using data from nationally representative survey of medical care utilization and spending. The empirical work will focus on the relationship between Medicaid physician fees and the probability of seeing a physician most frequently in the main settings of interest -- private offices and hospital outpatient departments

or emergency rooms -- and between the site in which recipients usually receive physician care and the level of use of services in both those settings and the inpatient hospital. The results of this work should provide useful information on the impact of low physician fees on access to ambulatory physician care, and quality of care in general, for Medicaid beneficiaries, and on the question of whether or not constraining fees appears to be successful as an cost containment approach. These results should be of interest to both researchers and policymakers concerned with how physician reimbursement policy affects health care for the poor in the United States.

II. Background and Importance

Throughout most of the 1980s there was a general trend of strong constraints on physician fees paid under the Medicaid program. As illustrated in Table 1, for example, Medicaid fees, relative to Medicare fees, fell in nearly every state between 1980 and 1984. By 1984 relative Medicaid fees were particularly low in many of the states with the largest Medicaid programs, such as California, with a fee ratio of .48; Illinois, with a fee ratio of .42; New York, with a fee ratio of .23; and Pennsylvania, with a fee ratio of .22. These states represent 4 of the top 10 in terms of 1987 total Medicaid spending (Chang and Holahan 1989). A more recent survey of Medicaid fees done by the National Governors' Association and the Physician Payment Review Commission found that on average Medicaid payments nationally were approximately 68% of the maximum charges allowed under Medicare (Physician Payment Review Commission 1990).

Although efforts at constraining physician fees have been successful in holding down growth in expenditures for that component of the Medicaid program--inflation-adjusted spending on physician services grew at an annual rate of only 3.4% between 1984 and 1987, compared to 5.7% between 1978 and 1981 (Chang and Holahan 1989)--the effects of these efforts on access and utilization of services by program beneficiaries is not so easy to evaluate. According to traditional economic theory, under a fixed payment program like Medicaid, the lower the Medicaid fee

the fewer physicians will participate in the program and the fewer Medicaid patients each participating physician will accept, causing beneficiaries' access to care to suffer. This suggests that low fees should be associated with lower utilization of physician services under Medicaid.

In fact, there is a great deal of empirical evidence to support the hypothesis that lower Medicaid fees, relative to fees paid directly by consumers or under less stringent insurance programs, adversely affects physician participation in Medicaid. A study of physician's Medicaid participation in California based on Blue Shield claims data from the mid-1970s, for example, showed that both Medicaid and private prices were important determinants of physicians' participation in the program (Held and Holahan 1985). All else being equal, as Medicaid prices increased physicians were found to be more willing to take Medicaid patients and as private prices increased they were less willing.

A study by Sloan, Cromwell, and Mitchell (1978), based on a survey of physicians fielded by NORC in 1976, generated similar results. With respect to Medicaid, analysis of these data showed that physician participation was highly sensitive to the level of fees paid under the program. The empirical findings established an elasticity of .7 for the effect of Medicaid reimbursement levels on physician participation in the program; that is, for every 10% increase in reimbursement levels the results indicated a 7% increase in physician participation. The authors concluded

that states paying low fees in an attempt to keep program expenditures low would "pay the price" in terms of physician cooperation with the program.

Another analysis of NORC physician survey data from 1977 and 1978 (Mitchell 1983) indicated that Medicaid participation by specialists, as well as doctors in general, is sensitive to Medicaid reimbursement levels. According to the results of this study, for physicians in the 15 specialties represented in the survey a 10% increase in Medicaid fees was associated with a 3% increase in program participation. The results of a separate study of the same data (Mitchell and Schurman 1984) suggested that Medicaid fees for OB-GYNs, whose participation in Medicaid is exceptionally low, could be improved by raising reimbursement rates, because OB-GYNs were at least as sensitive to fee levels as pediatricians and general surgeons.

A study by Gabel and Rice (1985) analyzed evidence from several "natural" experiments, in which physician fees were manipulated under government sponsored programs--primarily Medicaid--to determine the effect of changes in fees on program access and costs. The authors concluded that these experiments were highly consistent in their findings that the level of fees had a direct impact on physician participation in public programs. Where physician fees had been raised participation increased and where they had been lowered participation decreased. In addition, these authors argued that lowering Medicaid physician fees is not an effective cost containment

mechanism, since the evidence from the studies they analyzed suggested that physicians could and did compensate for lower fees by simply providing, or at least billing for, more expensive services.

Using surveys conducted by the American Academy of Pediatrics in 1978 and 1983, Perloff, Kletke, and Neckerman also examined the influence of Medicaid policies on the participation of pediatricians in the program. In one study (Perloff, Kletke, and Neckerman 1986) the authors compared the influence of program policies and other factors, such as the supply of physicians and various market characteristics, on Medicaid participation in both 1978 and 1983 and found Medicaid fee ratios (the ratio of Medicaid payment to the physician's usual fees) to be significantly associated with participation in both years, although by 1983 the strength and magnitude of the association had declined.

In another study using the same data, these same authors (Perloff, Kletke, and Neckerman 1987) examined the factors associated with pediatricians' decisions to limit or not limit the extent of their participation in Medicaid. They found that Medicaid reimbursement levels, again compared to the physician's usual fees, were a significant factor differentiating full from limited participants, with full participants being reimbursed at levels closer to their usual fees. In addition, they found that Medicaid reimbursement was positively associated with the extent of participation among physicians who reported they accepted

Medicaid patients without restriction. The authors concluded that increasing Medicaid fees is one of a shrinking number of policy variables that can be used to encourage limited participants to become full participants, and to increase the level of participation by physicians who do not otherwise limit their involvement in Medicaid.

Although there is abundant evidence that participation in Medicaid by office-based physicians is positively associated with Medicaid fee levels, it does not necessarily follow that access to physician care by Medicaid beneficiaries is solely a function of participation by those physicians. A number of analysts have hypothesized that lack of access to office-based physician care simply diverts beneficiaries into alternative sites at which such care can be received. Holahan, for example, in his analysis of methods and rates of payment for physician services in Medicaid programs across the U.S. (Holahan 1984) suggested that in states with many alternatives to office-based physicians reducing Medicaid physician fees is unlikely to produce cost savings, because recipients may simply be diverted into more expensive outpatient departments and emergency rooms to receive care.

A study by Gold of the demand for hospital outpatient services (Gold 1984) provided some empirical support for the hypothesis that low physician fees may simply shift the site at which Medicaid recipients obtain care, rather than decrease overall utilization. This study used data from a variety of sources, including the American Hospital Association's Annual

Survey for 1978, the American Medical Association's Master File of Physicians, the U.S. Census Survey of Income and Education, and the Bureau of Health Profession's Area Resource File, to examine the factors associated with demand for hospital outpatient services and the relationship between the availability and price of other sources of care, particularly office-based physicians, and use of outpatient services.

With respect to the relationship between outpatient and office-based care, the results indicated a negative relationship between the demand for outpatient services and the generosity of states' physician reimbursement under Medicaid. According to the findings, a 1% increase in physician fees was associated with a .25% increase in the number of outpatient visits per capita. The author concluded from this that states should carefully consider any plans to reduce Medicaid fees for office-based physicians, since the expected cost savings would likely be at least partially offset by increases in the demand for outpatient care.

In a direct examination of the site shifting issue, Long, Settle, and Stuart (1986) used the 1976 and 1978 Health Interview Surveys to estimate the effects of Medicaid physician reimbursement levels on beneficiaries' probability of seeing a physician and, in a separate analysis, the site at which physicians are seen. This study found that Medicaid payment levels, relative to Medicare's, had no effect on whether or not a beneficiary visited a physician. Neither the probability of use

nor the level of use was greater as relative Medicaid fees increased.

With respect to the site of care, however, Medicaid reimbursement did appear to have an impact. The results showed that a 10% reduction in relative Medicaid payment levels was associated with a 3% decrease in utilization of office-based physician care. They also indicated that about half of the recipients diverted from the office setting received physician care in a free-standing clinic, approximately one-third in hospital outpatient departments, and the remainder in hospital emergency rooms. Thus, the study indicated that lack of participation by office-based doctors did negatively affect access to office-based physician care, but that this lack of access was fully offset by use of other sites, at least for the two week period covered by the data.

An analysis of the effects of physician payment levels on aggregate spending, rather than utilization, for Medicaid physician and hospital outpatient services (Cohen 1989) also addressed the site shifting issue and again found evidence that low reimbursement rates affect the setting in which physician care is obtained, rather than whether or not it is obtained at all. This study used aggregate data on Medicaid expenditures and numbers of recipients collected annually by the federal government from the states. The results indicated that in the long-run the number of physician service recipients was not affected by relative Medicaid fees, computed as the ratio of

Medicaid to Medicare fees for two specific procedures. There was, however, a negative relationship between the Medicaid fee ratio and numbers of hospital outpatient care recipients, indicating substitutability between private physician and hospital outpatient department services.

The results of this study also suggested an expenditure offset, with outpatient spending appearing likely to be negatively related to the physician fee ratio, although this finding was statistically significant only at a .10 level. Nonetheless, the indication was that where physician fees were lower, although Medicaid expenditures for physician services were also lower, higher expenditures for outpatient services offset some of those savings. This suggests that while stringent physician reimbursement does not result in an overall loss of access to physician care for Medicaid beneficiaries, even though it does reduce access to care provided in private offices, it does produce changes in patterns of utilization that are potentially cost increasing.

At present, there has been little research on the issue of how site of physician care affects utilization of inpatient hospital services. One exception is a study by Gold and Greenlick (1981), which looked at the effect of primary care setting on physicians' propensity to use inpatient hospitals for 36 internists practicing in the Kaiser-Permanente Medical Care Program in Oregon. The analysis was based on an examination of

slightly more than 5,600 hospitalizations over a two year period between 1969 and 1971 by these physicians.

The authors found that hospital-based internists were more likely to hospitalize their patients than internists who practiced primarily in free-standing clinics. The empirical analysis indicated that hospital-based internists used an average of 44 more hospital days per 1,000 ambulatory visits, although there were no apparent differences in patient-mix between the two groups. The authors noted that the results suggest substantial cost implications associated with the site at which primary care is obtained.

Fleming and Jones (1983) also examined this issue, specifically in the context of its impact on Medicaid, using Medicaid claims data from the state of Texas. These authors drew a sample of claims for persons receiving benefits under the Texas Aid to Families with Dependent Children (AFDC) program in 1980 and compared average costs for ambulatory services and utilization of inpatient hospital services for individuals classified according to their usual source of ambulatory care. Assignments to a usual source were made according to the site at which an individual's utilization of services was highest. The usual source classifications were office-based physician and hospital outpatient department or emergency room.

The results of this study indicated that individuals whose usual source of care was the outpatient department or emergency room had higher costs per visit, higher inpatient hospital

utilization, and greater total costs, despite fewer total ambulatory visits, than those whose usual source of care was an office-based physician. The authors estimated that the Texas Medicaid program could have saved $8.5 million in 1980 by shifting the usual source of care for AFDC recipients from outpatient departments and emergency rooms to physicians' offices.

Building on the work just described, this study provides a link between previous research on the effects of Medicaid physician reimbursement on usual source of ambulatory physician care, and the effects of usual source of care on total utilization of physician and inpatient hospital services. It augments previous research on the effects of Medicaid fees on the site at which recipients obtain ambulatory physician care by using more recent and detailed data on site specific utilization of physician services by Medicaid beneficiaries, and adding an examination of recipients' use of inpatient hospital services based on the site at which they usually receive physician care. It also advances previous work on the indirect effect of physician fees on use of inpatient services under Medicaid by adding an examination of how fees directly affect recipients' usual sources of physician care, and by using a nationally representative sample of Medicaid beneficiaries.

The results of this study should provide policymakers with better information than is currently available on the effects of fees on use of physician services under Medicaid, and the

implications of such use for overall program costs. Moreover, by examining the association between usual source of physician care and probability of inpatient admission, it provides some indirect evidence on the effects of physician fees on quality of care. The results should help inform efforts to strike a better balance among the often competing goals of improving beneficiaries' access to primary care services, maintaining quality of care for Medicaid recipients, and containing costs within the Medicaid program.

III. Conceptual Framework

Availability of Office-based Services

Much of the research on participation by office-based physicians in the Medicaid program is based on what has been called the dual market model (see, for example, Sloan, Cromwell, and Mitchell 1978; Cromwell and Mitchell 1984; and Held and Holahan 1985). This economic model postulates that physicians discriminate among patients on the basis of price, providing services to non-Medicaid patients based on their willingness to pay, but to Medicaid patients on the relationship between the state determined Medicaid price and the prices paid by non-Medicaid patients.

According to this model, physicians practice in two different markets: one, the non-Medicaid market, in which they are price setters, that is, the price of their services is determined by the quantity of services they choose to provide, and second, the Medicaid market, in which the price is set independently by the state. The non-Medicaid market is characterized by a downsloping demand curve, higher prices meaning a lower quantity of services demanded by patients, but because the price paid by Medicaid patients themselves is essentially zero -- federal regulations prohibit significant cost sharing -- demand for Medicaid services depends only on the number of people eligible for the program, and the proportion of those eligible who desire to see a physician for care.

The dual market theory assumes that the allocation of services across the two markets is determined by the marginal revenue associated with each of the two types of patients. The theory predicts that physicians will allocate their services to non-Medicaid patients up to the point at which the Medicaid price equals non-Medicaid marginal revenue, since marginal revenue from non-Medicaid patients is higher until then. Beyond that point, however, marginal revenue from Medicaid patients will exceed that of non-Medicaid patients, so physicians will prefer Medicaid patients until there are either no more Medicaid eligibles seeking care or the physician's marginal cost of providing care equals the Medicaid price, the quantity at which the higher of the two marginal revenues equals marginal cost being the point at which the physician will stop providing services altogether.

Although this model typically has been used for analyses of physician participation in the Medicaid program. It also provides a good beginning framework for examining the issue of utilization of services among Medicaid enrollees by delineating the primary factors that, at least in theory, determine the allocation of services to Medicaid eligibles. First, it indicates that the level of fees set by the state is a critical determinant of the availability of office-based physician care under the program. According to the model, as Medicaid fees fall the amount of care supplied to program beneficiaries will fall also.

Second, it suggests that program eligibility in itself does not guarantee access to office-based care for Medicaid beneficiaries. If Medicaid fees are set at levels that result in excess demand for care by those eligible for the program, expanding eligibility may simply increase the queue of those seeking care, rather than increase utilization. That is, expanding eligibility may simply increase Medicaid demand without changing the quantity of care provided to Medicaid enrollees.

Third, the model shows that factors which affect non-Medicaid supply and demand will affect the availability, and thus use, of office-based care for Medicaid beneficiaries. As non-Medicaid demand increases private prices will rise and, if Medicaid fees are not raised proportionately, the Medicaid price will decline in relation to the non-Medicaid price and some non-Medicaid patients will be substituted for some of those covered by Medicaid.

Similarly, the supply of physicians will have an important effect on the availability of care to Medicaid beneficiaries. As physician supply increases the non-Medicaid demand for any individual physician's services will decline, causing non-Medicaid prices to fall, Medicaid prices to become more attractive to physicians, and thus Medicaid patients to be substituted for some of the lower paying non-Medicaid ones.

Conversely, following the same logic, as non-Medicaid demand falls the availability of care to Medicaid eligibles should

increase, and as the supply of office-based physicians falls Medicaid access to care should decline.

In sum, this model provides a good starting point for examining utilization of physician services under Medicaid by indicating that use of office-based services should be largely a function of Medicaid and non-Medicaid fees paid and the supply and demand characteristics of the market in which Medicaid beneficiaries seek care.

Availability of Office Substitutes

As described previously, lack of access to office-based physicians does not mean that physician services are unavailable to Medicaid beneficiaries. Another factor that has a significant impact on Medicaid beneficiaries use of office-based physician services is the availability of alternative sources of such care. Both common sense and standard economic theory suggest that as the price, in terms of access and convenience as well as out-of-pocket cost, of one good increases another similar good is likely to be employed as a substitute. In the case of Medicaid office-based physician care, there are several alternatives available to beneficiaries as substitutes--primarily care in hospital outpatient departments and emergency rooms, and community-based clinics.

As the research previously described demonstrates, access to physician care under Medicaid does not depend entirely on the participation of office-based physicians, but also on the availability of other providers of ambulatory physician care.

Consequently, utilization of physician services under Medicaid should be affected by program policies related to outpatient departments, emergency rooms, and clinics--as well as office-based physicians--and by factors related to the overall markets for these types of care, which again would affect allocations of services to Medicaid beneficiaries.

Use of Inpatient Services

Another important component of this study concerns the theory that greater utilization of institutionally based ambulatory care as a substitute for office-based care may result in a substantial increase in the total amount of resources used under the program. As previously discussed, a number of analysts have hypothesized, and some limited empirical evidence suggests, that use of outpatient departments and emergency rooms as a primary source of care may result in increased utilization of expensive inpatient services, both because of greater use of preventive services by office-based physicians and a higher probability of being hospitalized with institutional-based care. Thus, both theory and available evidence suggest that site of ambulatory care is an important factor in determining the number of inpatient hospitalizations under Medicaid.

In addition, we can assume hospitals allocate services to Medicaid enrollees according to the same dual market model faced by office-based physicians. The only difference is that because nearly all hospitals are organized as non-profit institutions they are often assumed to maximize something other than just

profits, such as the quantity of services provided, or some combination of quantity and quality (Davis 1972, Jacobs 1984). This does not mean that hospitals necessarily behave differently from profit maximizing firms, however. Pauly and Redisch, for example, have postulated a model in which the non-profit hospital serves as a physicians' cooperative with the objective of maximizing physicians' net incomes (Pauly and Redisch 1973). Moreover, as argued by Dranove (1987), we can reasonably assume that non-profit institutions behave like profit maximizers, except that the profits go somewhere other than to owners or stockholders, for example, to hospital managers in the form of perks, or as a subsidy from one group of patients (e.g., the privately insured) to another (e.g., the uninsured).

In any case, as with physician services, the two market model indicates that market supply and demand characteristics are likely to affect the provision of inpatient services to Medicaid beneficiaries, as are Medicaid policies for inpatient care. Consequently, these factors must also be taken into account in analyzing the effect of site of physician care on the likelihood of inpatient admission.

Demand for Care

The final piece of the conceptual framework for this study is a theory of the demand for services by Medicaid beneficiaries. Economic theories of the demand for medical care have focused on the utility produced by medical services, with the price of those services relative to the price of all other goods and services,

subject to a total income constraint, determining the amount of medical services used. Some of these theories do not specify precisely how medical care produces utility (Acton 1976), while others explicitly postulate health as a good in the utility function and medical services as an element in the production of health (Grossman 1972). In general, regardless of the particular specification involved, these theories focus on price, either in terms of the actual cost of care, cost in terms of time spent traveling to obtain care, or cost in terms of time spent waiting to see a provider. Thus, income, price paid by the recipient (which is zero for most Medicaid beneficiaries), and travel and waiting time (which, in this study, will depend upon the supply of services and the participation of providers in the Medicaid program, as well as on individual choices made by recipients) are important determinants of the demand for care and should be included in the model.

Noneconomic factors also enter into individuals' decisions about when and how much to use formal medical services. A useful formulation of medical care utilization that delineates these factors is provided by Andersen (Andersen 1968; Andersen and Newman 1973). The Andersen model postulates a family's use of medical services as the outcome of a behavioral process which comprises 3 main components: the family's predisposition to use medical care, called the predisposing component; its ability to obtain services, called the enabling component; and its need for services, called the need component.

While the enabling component overlaps with the market factors discussed in the various economic models previously presented, the other two components identify important factors associated with medical care use that tend not to fit as neatly into an economic framework, perhaps because they are associated more with how preferences are developed than how external factors affect those preferences in the marketplace. Individual preferences are, however, critical to explaining variations in use of medical care across individuals, and thus are important both conceptually and empirically for this study. Predisposing factors include variables associated with family composition, such as age, sex, and family size; social structure, such as employment status and education of the family head, race, and ethnicity; and health beliefs, such as attitude toward the use of physician services and knowledge of diseases. Need factors include variables such as medical conditions, diagnoses, and general state of health. Predisposing and need factors are included as characteristics of the beneficiary in the conceptual model for this study to account for these otherwise uncontrolled for determinants of the demand for Medicaid physician care.

Model Specification

Based on the framework just described, the model for this study can be expressed as follows:

1) PROB,SITE = f(REIMBURSEMENT,POLICIES,MARKET1,BENEFICIARY)

2) VISITS = f(SITE,REIMBURSEMENT,POLICIES,MARKET1,BENEFICIARY)

3) INPAT,ADMISSIONS = f(SITE,HOSPITAL,MARKET2,BENEFICIARY)

where	PROB	=	the probability of any physician service use by those enrolled in the Medicaid program,
	SITE	=	the site at which physician care is usually received for those who use any ambulatory physician services,
	VISITS	=	the total number of ambulatory physician visits at all sites.
	INPAT	=	the probability of inpatient admission for those who use any physician services,
	ADMISSIONS	=	the total number of inpatient admissions for those who use any inpatient services,
	REIMBURSEMENT	=	Medicaid physician fee levels and reimbursement methods for outpatient hospitals,
	POLICIES	=	Medicaid utilization control policies,
	HOSPITAL	=	Medicaid inpatient hospital reimbursement and utilization control policies,
	MARKET1	=	supply and demand characteristics of the market for ambulatory physician services in which Medicaid beneficiaries seek care,
	MARKET2	=	supply and demand characteristics of the market for inpatient hospital services in which Medicaid beneficiaries seek care,
	BENEFICIARY	=	characteristics of Medicaid covered individuals,

This model states first that the probability of any contact with a physician for those enrolled in the Medicaid program and the site at which Medicaid physician service users usually receive such care is determined by 1) Medicaid policies that affect the attractiveness of Medicaid payments to providers; 2) Medicaid

policies that directly affect the utilization of ambulatory physician services; 3) the characteristics of the ambulatory care market in which Medicaid enrollees live, such as the numbers and types of available providers and area demographics; and 4) the characteristics of Medicaid covered individuals likely to be associated with seeking care, such as health status, age, sex, and income. Second, the model states that the total number of ambulatory physician visits for those who receive any physician care depends upon the site at which recipients usually receive that care. The third stage of the model states that the probability of using inpatient services for those who receive any physician care is determined by the site at which they usually receive that care, Medicaid payment and utilization policies for inpatient hospitals, characteristics of the market for inpatient hospital services, and characteristics of the Medicaid recipients themselves. In addition, this functional relationship should extent to the number of admissions for those who are admitted as inpatients.

Based on this model, the following hypotheses are postulated:

1) The level of Medicaid physician fees relative to non-Medicaid fees will not affect the probability that Medicaid beneficiaries use ambulatory physician care.

2) Medicaid beneficiaries who use ambulatory physician services will be more likely to use office-based sites as their usual source of physician care where Medicaid physician fees are higher relative to non-Medicaid fees.

3) Medicaid beneficiaries who use ambulatory physician services will be more likely to use substitutes such as hospital outpatient departments or emergency rooms, and clinics as their usual source of physician care where Medicaid physician fees are lower relative to non-Medicaid fees.

4) The total number of ambulatory physician visits for Medicaid beneficiaries who use physician services will be higher when office-based sites are their usual source of ambulatory physician care.

5) Medicaid beneficiaries who use any physician services will be more likely to have an inpatient admission when their usual source of physician care is a hospital-based site.

6) Medicaid beneficiaries who have at least one inpatient admission will have more total admissions when their usual source of physician care is a hospital-based site.

Thus, the main purpose of this study is to determine whether stringent physician payment policies under Medicaid function according to the apparent expectations of state policymakers, and simply reduce what could be considered unnecessary use of office-based physician services under Medicaid, or whether there are unintended side effects to such policies that result in more rather than fewer resources being consumed, as well as potential reductions in the quality of care.

IV. Research Methods

Econometric Model

The econometric model for this study assumes that utilization of physician services by Medicaid beneficiaries is most appropriately specified as a sequential process. The first part of this process involves a decision by the individual to obtain care, the second the selection by those individuals who choose to obtain care of site to go to, and finally a determination, made by the physician rather than the individual, of how much and what type of care is to be received. The progressive nature of this series of choices means that the probability of any physician use, site of most frequent use, and probability of inpatient admission can be analyzed in terms of a sequential response model (Maddala 1983). Sequential response models consist of a series of binary choices, with each choice progressively dividing the sample according to the outcome so that the successive equations are estimated using only those observations having the outcome that necessarily precedes the next choice. In the present model, for example, the first choice is whether or not to seek physician care. The second choice is then whether or not to seek such care from an office-based physician, which is contingent upon first having chosen to obtain care. Consequently, the estimation of the first equation is on the entire sample, and the second on only the subset of individuals who actually saw a physician.

This sequential approach is appropriate as long as the choices at each stage are independent of the choice at the previous stage (Maddala 1983). Both the conceptual model for this study and previous research indicate that for receipt of physician care under Medicaid this is the case; choice of site is, in fact, independent of the probability of obtaining care. Without this initial premise there would be no basis for the hypothesis that substitutability produces cost increasing patterns of care. In addition, because decisions about hospitalization are made by the physician, rather than the individual, they are independent of both the individual's decision to seek care and the individual's choice of site.

Following the lead of Long, Settle, and Stuart (1986) the first step in this analysis, examining probability of any physician use, is estimated using a binary probit model. Ordinary least squares (OLS) can not be used in this case because the non-normal distribution of residuals resulting from estimating an equation with a categorical dependent variable makes OLS an inefficient estimator. More importantly, estimating the model with OLS can produce an estimated probability that lies outside the range of the dependent variable, which is between 0 and 1, meaning that OLS estimation in categorical dependent variable models can produce a behaviorally impossible result. This problem can be corrected, but only by incorporating unrealistic kinks at 0 and 1 in the model (Amemiya 1981).

The probit model provides a method of generating efficient and unbiased parameter estimates in cases for which the dependent variable is a categorical choice, as it is here. With probit, we assume that the relationship between receiving physician care and a set of individual and other characteristics of Medicaid beneficiaries is described in terms of an underlying response variable y_i^* as follows (Maddala 1983):

$$y_i^* = \beta' x_i + \mu_i$$

Because the continuous variable y_i^* is unobservable, however, it is defined in terms of a dummy variable such that

$$y_i = 1 \text{ if } y_i^* > 0$$
$$y_i = 0 \text{ otherwise}$$

Combining these equations

$$Prob(y_i = 1) = Prob(\mu_i > -\beta' x_i)$$
$$= 1 - F(-\beta' x_i)$$

where F is the cumulative distribution function for μ. If we assume the μ_i are normally distributed with a mean of 0 and a variance of σ^2, F is the cumulative normal distribution and this is the probit model.

Using this formulation, the ßs can be estimated using a maximum likelihood technique. An econometric package called

LIMDEP, which is designed to accommodate the estimation of models with categorical dependent variables, was used to estimate the probit equations in this study.

The probability of use, most frequent site of use, and probability of inpatient admission equations were all estimated using binary probits. Although site of use was originally formulated as a three category choice -- office, hospital, or clinic -- analysis of the frequency of visits to each site showed that none of the Medicaid beneficiaries in the sample used a clinic more often than at least one of the other sites. That is, if they saw a physician in a clinic at all, they still had more visits to physicians in either an office or a hospital-based site. Consequently, the site equation became a binary choice model by default.

The analysis also includes equations to estimate the total number of physician visits for ambulatory physician service recipients (i.e., conditional on positive use) and number of inpatient admissions for inpatient hospital service recipients, to examine the effect of usual source of physician care on the amount of care provided under the program. Following the method developed by researchers at RAND to analyze data from their Health Insurance Experiment, probability of use is estimated in first stage equations using probit as previously described, and OLS is used as the estimating technique for the level of use equations (Duan, et. al. 1983). The OLS equations are run only on the sub-sample of beneficiaries that had positive utilization.

Because of the skewed distribution of numbers of physician visits, the log transformed rather than raw values of total ambulatory physician visits were used the dependent variable in this equation. The level of use equations are of the form:

$$\log(Y_i \mid Y_i > 0) = B_k X_i + e_i$$

where Y_i is utilization for individual i, e_i is a normally distributed error term with a mean of zero and a variance s^2, and the remaining terms are as defined above.

Although the model just described, with site as a dependent variable in one equation and an independent variable in another, appears to treat site as endogenous, in this case it is not necessary to use a simultaneous equation procedure to estimate these equations. Site of care is postulated as a function of Medicaid policies and market and individual characteristics, all of which are determined outside of the system modeled. Level of use, in turn, is postulated as a function primarily of doctors' practice styles and recipients medical conditions, which again are determined outside the system modeled. Thus, site in the first instance represents the outcome of a decision to seek care by beneficiaries while in the second it represents the outcome of decisions made by physicians. This formulation is consistent with other analyses of the demand for medical care that model utilization of services as a sequential process (Duan et. al. 1984; Maddala 1985; Manning et. al. 1988). The first step involves a decision to seek care, and the second separately determining level of use once any care is obtained. This

sequential process means that utilization can be estimated separately from the decision to seek care (Duan et. al. 1983), which means that site of care and conditional levels of use can be estimated in two separate equations, as in this specification.

Although a selectivity bias model might have been used in this analysis, as argued by Duan et. al. the interpretation of such models may not be as appropriate for some analyses of health service utilization as it is in other areas. Because they are based on a joint, rather than a sequential, determination process, selectivity bias models provide estimates of what would happen in the unconditional case. That is, nonusers are treated as cases of missing data, rather than true zeros, and estimates from this type of model would indicate what would happen if the nonusers could use services at less than the minimum observable level. For this study, however, the non-users are not cases of missing data but true zero level users, and what we are interested in is what happens to Medicaid beneficiaries who actually use services, not what would happen if we could observe the nonusers use. Thus, for purposes of this study, the sequential rather than the joint model was preferred.

Finally, two technical adjustments were made in the methods to account for the complex survey design of the Household Component of NMES. First, all equations were weighted using a person level population weight variable. Second, because the survey design includes stratification, clustering, and disproportionate sampling, valid variance estimates cannot be

calculated with procedures that assume simple random sampling. The technique used to adjust for survey sample design in this study was the SAS procedure SURREGR, which uses the Taylor series linearization method. Details of this method can be found in Cox and Cohen (1985).

Variables

The dependent variables for this analysis consist of dummy variables representing any physician use (yes or no), usual source of ambulatory physician care (office versus hospital), inpatient admission (yes or no), and total numbers of ambulatory physician visits and inpatient admissions. All of the categorical variable were coded 0,1, with 1 representing the presence of the attribute in question. The unit of observation for the analysis is the Medicaid beneficiary. Only individuals under the age of 65 and covered by Medicaid for the entire year are included. Those over age 65 are excluded because their physician care is much more likely to be paid for under Medicare than Medicaid, and as a result their behavior would not be a function of Medicaid policies. Part year enrollees were excluded because their use of physician services over the entire year is also likely to be as much or more a function of either other programs under which they may have been covered for part of the year, or their own economic circumstances, if they had no insurance coverage, than Medicaid policies.

There are three basic sets of independent variables in the empirical analysis which, subject to data availability, cover the

primary factors expected to have an impact on probability of use, choice of site, and levels of use. As discussed previously, these factors are Medicaid policies, market characteristics, and characteristics of the beneficiary.

The first set of independent variables reflects the primary state Medicaid policies expected to affect use of ambulatory physician care, which are those related to reimbursement and utilization control. The physician reimbursement variable is a fee ratio that provides a measure of the attractiveness of Medicaid fees relative to non-Medicaid fees. This ratio consists of the statewide average Medicaid fee for a brief office exam (CPT4 code 90040) as the numerator, and the Medicare average allowed charge in a locality for the same procedure as the denominator. Medicare allowed charges are the best available measure of non-Medicaid prices, and are likely to reflect private prices as well, since insurers such as Blue Cross/Blue Shield often pay physicians according to Medicare reimbursement principles. This ratio provides a single measure of the relative attractiveness of Medicaid fees to physicians, with a ratio of 1.00 indicating Medicaid is on a par with other payors and ratios less than 1.00 indicating lower Medicaid than non-Medicaid fees. The higher this fee ratio the more likely Medicaid recipients should be to obtain the majority of their physician care in an office.

Although using only one procedure to create the fee ratio is not ideal, the brief office visit fee is often used as an

indicator for the program. In addition, because this study focuses on ambulatory physician services, the ratio need not be representative of fees paid for services such as surgical procedures or inpatient hospital or nursing home visits. The study does assume, however, that the brief office visit fee ratio is representative for other types of ambulatory care procedures.

Unfortunately, direct measures of hospital outpatient department and emergency room reimbursement levels are not as available as Medicaid physician fees. Consequently, to account for the generosity of outpatient hospital reimbursement, two dummy variables were constructed to represent differences in payment policies for outpatient and emergency room services (which are reimbursed in the same manner). The first is a variable representing the use of a fee schedule. The second is a variable representing the use of some other alternative to a cost-based system, primarily prospective payment, but also methods based on inpatient per diems or a negotiated approach. Cost-based systems are the omitted group.

Previous research has shown that cost-based systems tend to be the most generous, since they base rates on providers' own expenses, and fee schedules the least generous, since they provide states with maximum control over amounts paid for various services (Holahan 1984). Thus, all else being equal, we expected cost-based systems to be associated with the highest probability and level of use, and fee schedules with the lowest.

Utilization control policies were also constructed as dummy variables to represent the presence or absence of various types of direct controls on resource use. As presently constituted these policies are virtually impossible to measure on any kind of numerical scale. Some states, for example, have limits on physician services that specify a maximum number of office visits per day, others a maximum per month, others a maximum per year. Still others specify a maximum on combined visits--for example office, outpatient department, and clinic together--per month or year. This wide variation makes it difficult to establish a dummy variable classification scheme for these policies that accounts for differences in stringency among them.

These policies do tend to sort out into two distinct types, however, the first consisting of those which limit visits in individual service sites, and the second with limits that are not related to site. As a result, the dummy utilization control variable scheme for this analysis comprises one variable representing direct limits on office visits, one representing direct limits on outpatient visits, and a third representing a limit on total number of visits regardless of site. The omitted category is states with no visit limits. Clearly states with limits should have lower levels of use, and perhaps a lower probability of use, than those without limits, but the relative stringency of the three types of limits compared among each other could not be determined a priori.

The inpatient hospital reimbursement and utilization control variables consist of the following: a set of dummy variables representing the various inpatient reimbursement methods used by states in their Medicaid programs, comprising individual variables for diagnosis related grouping (DRG) systems, all payer systems, retrospective systems, and selective contracting, with prospective reimbursement being the omitted category; and a set of dummy variables representing the various inpatient utilization control policies, comprising variables for day limits for all procedures, day limits under certain conditions only, requiring second surgical opinions, requiring prior authorization for all elective procedures, and requiring prior authorization for only selected procedures. The more stringent reimbursement methods, with selective contracting being the most stringent and retrospective being the least, and the presence of utilization control policies were expected to be associated with lower probabilities of inpatient admission.

Market characteristic variables are measured primarily at the county level, and include factors related to the supply of ambulatory and inpatient services and area demographics. The supply variables include percent of hospitals with emergency rooms, percent of hospitals with outpatient departments, hospital beds per capita, number of HMOs, percent of patient care physicians who are general practitioners, and a dummy variable representing whether or not part of the county is classified as a health manpower shortage area. With each of these variables the

greater the supply the more likely should be use of the particular service involved. For example, the higher the percentage of hospitals with outpatient departments the more likely Medicaid recipients should be to use hospital-based sites for physician care (and the less likely to use office-based sites), and the higher the percentage of typically lower paid GPs among patient care doctors the more likely recipients should be to use physicians' offices (and the less likely to use hospital-based sites). The number of HMOs was hypothesized to be negatively related to inpatient service use, and to perhaps have an effect on ambulatory physician use through differences in local medical practices, although the direction of that effect is not clear.

Because of the importance of physician supply and private demand to the two market model on which the provision of office-based physician services depends, rather than simply include a variable for physician supply in a single equation, the sample was split into high and low physician supply areas and separate equations run for each. In this way, the models control for more of the factors that affect physician supply and demand than are possible to measure with available data. It was hypothesized that inadequate control for these factors is what led some previous researchers to the surprising conclusion that physician supply, contrary to well established economic theory, was negatively related to use of office-based physicians under

Medicaid (Fossett et. al. 1989). The sample was split at the median number of patient care physicians per capita.

Other market characteristics are related to factors associated with the demand for medical care, and include household median income, which is measured at the census tract rather than the county level, percent non-white, which is also measured at the census tract level, AFDC recipients per physician, which is intended as a rough measure of Medicaid beneficiaries time price, representing potential queuing by Medicaid patients (unfortunately the latest county level information on AFDC recipients is from the 1980 census, so the validity of this variable is open to question), geographic region, which research has shown is associated with differences in medical practice patterns, and physician input prices, as measured by a geographic price index created by the Urban Institute for use in setting a relative value based fee schedule for the Medicare program (Zuckerman, Welch, and Pope 1989).

Other potential supply and demand factors are accounted for in the equations by several dummy variables representing degree of urbanization. These variables consist of one for fringe metropolitan areas, one for other metropolitan areas, and one for non-metropolitan areas, with core metropolitan areas as the omitted category. These variables are constructed on the basis of the Human Resource Profile County codes established by the Office of Management and Budget. Core counties are defined as those in greater SMSAs with a population of 1,000,000 or more.

Fringe counties are non-core counties in metropolitan areas of more than 1,000,000 population. Other metropolitan areas are defined as counties in metropolitan areas with populations of 50,000 to 999,999, and the remaining counties are classified as non-metropolitan.

A set of variables representing census region is also included, with variables for Northeast, West, and South -- the Midwest being the omitted category -- to account for variation in styles of medical practice previous research has shown exists across areas of the country.

Beneficiary characteristic variables account for factors related to demographics and health status, which affect the individual's demand for care. The individual demographic variables include binaries for female; age categories less than 1, 1 to 5, 6 to 13, 14 to 29, and 30 to 49; females age 14 to 29, to account for likely higher use related to pregnancy; non-white; high school education (9-12 years); college education (more than 12 years) and below poverty family income. Although one might expect all of the Medicaid enrolled population to have low incomes, most states take advantage of the option to cover the medically needy -- that is, individuals whose income is low enough for eligibility only if medical expenses are subtracted out. This means that higher income families can and are covered under the program. As a result, in addition to controlling for any effects of income on the propensity to use services, this variable serves as a control for health status, to account for

individuals who are on the program only because of their high use of medical care. The final individual level demographic variable is family size, which previous research has shown has an impact on use of services.

The health status variables include dummy variables for having a self assessed health status of poor or fair, for having one or more dependency in activities of daily living (ADLs), having one or more dependency in instrumental activities of daily living (IADLs) if no ADL dependencies, and having a serious condition or having had a serious accident. In addition, for those who used any physician or inpatient services the health status variables include the number of conditions and the number of conditions squared. These variables were included only in the use models because the condition information was available only for individuals who had at least one contact with a provider.

Table 2 summarizes the variables contained in each equation. Tables 3-5 present the variable means and standard deviations.

Data Sources

The primary source of data for this study is the household component of the 1987 National Medical Expenditures Survey (NMES), conducted by the National Center for Health Services Research (now the Agency for Health Care Policy and Research). NMES is the latest in a series of health care surveys looking at health status, health insurance, and medical care utilization and expenditures for a national probability sample of the U.S. non-institutionalized population. The NMES household survey was

fielded in four rounds of personal and telephone interviews at four month intervals, with a short telephone interview constituting a fifth and final round. The reference period for the survey is calendar year 1987. Detailed descriptions of the survey methods and questionnaires can be found in Edwards and Berlin (1989).

The survey contains baseline data on household composition and employment and insurance characteristics, and detailed information on all use of and expenditures for medical care services, including sources of payment. Because of continuing policy concern with populations having restricted access to the health care delivery system, low income families and minorities were oversampled in the survey. There are 2418 individuals who were covered by Medicaid for the entire year in the NMES household sample.

Medicaid policy information comes from a database of Medicaid and insurance regulations developed specifically for use with NMES. The Medicaid data are based on information gathered primarily from the Health Care Financing Administration, the Commerce Clearing House Medicare and Medicaid Guides, the National Governors' Association, and in some cases directly from states.

Data for the market supply and demand variables come primarily from the area resource file (ARF), which is compiled by the Department of Health and Human Service's Bureau of Health Professions. The ARF contains an extensive array of county level

health related information derived from both government and non-government sources, such as the American Medical Association's Physician Masterfile, the American Hospital Association's Annual Survey of Hospitals, and various data sets compiled by the Census Bureau and the Health Care Financing Administration. The census tract data on household income and racial characteristics come from the National Planning Council's zip code level demographic data base.

V. Results

Probability of Use

Table 6 presents the results of the probit equations for probability of any physician use, including individuals with no ambulatory physician visits but at least one inpatient admission. The results indicate, consistent with previous research (Long, Settle, and Stuart 1986), that the Medicaid fee ratio is not associated with the probability of any physician use. Thus, to the extent any contact with a physician is an appropriate measure of access to care, low Medicaid fees do not appear to result in access problems for beneficiaries.

The results do suggest, however, that stringent outpatient reimbursement may be a barrier to access in areas with relatively high supplies of physicians. The coefficient on the outpatient fee schedule variable indicates that beneficiaries in high supply areas in states that use fee schedules for reimbursing hospitals for outpatient services are significantly less likely to see a physician than those in states that use a retrospective outpatient reimbursement system. This implies that in areas where the hospital outpatient department serves as a substitute for office-based physician care, attempts at cost containment for outpatient services may be more of an access problem than similar measures aimed at physicians.

Not surprisingly, the variables that are most associated with use of physician services are those that relate to

individual characteristics and medical needs of beneficiaries. The most significant factor associated with probability of use is, as might be expected, whether or not the individual has a serious condition or was involved in a serious accident. In addition, more general health status measures are significant determinants of use, with individuals in high supply areas who consider themselves to be in poor or fair health more likely to see a physician, and individuals in low supply areas with an ADL dependency more likely to see a physician. Age also appears to be an important determinant of physician use, with infants (those less than age 1 at the beginning of the year) more likely to see a physician than children between the ages of 6 and 13, or young adults (ages 14 to 29).

Another interesting result is the significance of race as a determinant of physician use among Medicaid beneficiaries. In both high and low physician supply areas, non-whites were less likely to see a physician than whites, controlling for other area and individual characteristics, and health status. It is not clear exactly what factors race represents in this context, however. It may be that race is essentially a proxy for general attitude toward traditional medical care, variables specifically pertaining to which were not available for this study, with non-whites being less favorably disposed toward formal providers than whites. Unfortunately, to what extent this is the case can not be determined from these data.

Usual Source of Care

Table 7 presents the results of the probit equations for usual source of care. These equations were run using only observations for those individuals who actually had at least one ambulatory physician visit or an inpatient admission. As described previously, usual source was either the physician's office or a hospital-based site--emergency room or outpatient department--and was assigned according to where the individual actually went most often. In cases where there was an equal number of physician visits to office-based and hospital-based sites, the usual source was considered to be the physician's office. Individuals who had an inpatient admission but no ambulatory physician visits were assigned the hospital as their usual source of care.

The results in Table 7 indicate that the Medicaid fee ratio is significantly associated with where Medicaid beneficiaries usually receive care, but only in areas with greater than average supplies of physicians. This is consistent with the theory that a greater supply of physicians, and consequently lower demand for any individual physician's services, enhances the effect of Medicaid fees as a determinant of the amount of office-based physician care delivered to Medicaid beneficiaries. The effect of the fee ratio on the probability of having an office-based physician as the usual source of care was not particularly large, however. Holding other factors constant at the mean, these results suggest that a 10% increase in the fee ratio results in a

1.4% increase in the probability of having an office-based physician as a usual source of care.

The fee ratio was, nonetheless, the only policy related variable which had a direct positive impact on regular use of office-based physicians. In the high supply equation the only other significant policy variable was that representing the presence of overall limits on numbers of physician visits, and the coefficient indicates it was associated with a significant reduction in the probability of having an office-based usual source of care.

In the low supply equation, there was evidence that outpatient reimbursement and utilization control policies affect regular use of office-based physicians through site shifting. Reimbursement of hospital outpatient services at a percentage of the inpatient per diem, or rates arrived at by negotiation with hospitals (both of which are likely to be even more generous than a cost-based system) reduced the probability of having an office-based physician as a usual source of care (or, conversely, increased the probability of using a hospital as the usual source), while direct limits on numbers of outpatient visits had a significant positive impact on regular use of physician's offices (or a negative impact on use of hospitals as a usual source).

Few of the area characteristics had a significant impact on usual sources of care for Medicaid beneficiaries. The percent of hospitals with emergency rooms, number of HMOs, and locations in

the Northeast were all negatively associated with use of a physician's office as a usual source of care in low supply areas, while household median income and non-metropolitan locations were positively associated with use of the physician's office in high supply areas.

There were some interesting results, however, on the individual characteristics variables. In the low supply model, the only individual variable to show a significant association with use of a physician's office as a usual source of care was the one representing the 6 to 13 year old age category, which had a positive impact. In the high supply model several variables were significant, but the direction of their effects suggests access problems for those with greater care needs. Both an ADL dependency and a serious condition or accident were negatively associated with having a physician's office as a usual source, and infants were less likely than older adults to more often see a physician in an office than in a hospital setting. Only number of conditions was positively associated with using the office as the usual source. These results suggest that for many of those most likely to need physician services over an extended period--for example, infants for preventive services--care is more likely to be received in a hospital than in an office-based setting. To the extent regular care in a physician's office is preferable to regular care in a hospital setting this indicates there may be an access problem for Medicaid beneficiaries in areas with relatively high supplies of providers.

Number of Visits

Regression results for total number of visits are presented in Table 8. Both the low and high supply equations indicate that having a physician's office as a usual source of care, as opposed to a hospital, was associated with having a higher number of visits, approximately 58% higher in low physician supply areas, and 41% higher in high physician supply areas. The Medicaid fee ratio shows no significant impact in either of the equations, indicating that on average Medicaid fees do not independently affect the number of times Medicaid beneficiaries visit a physician. This result lends no support to the theory, often put forth with respect to physicians' responses to cost containment under Medicare, that low fees are compensated for through higher volumes, at least with respect to the Medicaid program.

In fact, the only reimbursement and utilization control variables to show any significant effects were the outpatient visit limit and combined visit limit variables in the low supply equation. The results for these variables suggest that the former policy does function to reduce the number of times Medicaid beneficiaries visit a doctor, but that the latter actually shows the opposite effect. This result suggests that combined visits limits in low physician supply areas are at best ineffective and perhaps even counterproductive as a method of utilization control.

Area characteristics appear to have little association with the frequency of physician visits for Medicaid beneficiaries.

The only significant association was the percent general practitioners (GPs) in the high supply equation, which showed a negative relationship with total numbers of visits. This result suggests there may be some differences in practice patterns between GPs and specialists which are at least partly manifested in lower frequencies of visits.

The primary factors associated with numbers of visits, however, are those related to the health status of individuals. In the high supply equation being in poor or fair health and number of conditions were positively related to the number of times beneficiaries visited a physician. In the low supply equation number of conditions was positively associated with frequency of visits also. In addition, family size and being between the ages of 6 and 13 were negatively associated with number of visits in the low supply equation. The family size and age group results may reflect greater costs associated with visits to the physician for larger families -- for example, child care for other children may be a significant impediment to taking a sick child to the doctor -- and older childrens' reduced need for medical care in general, controlling for other factors.

Probability of Inpatient Admission

Table 9 presents the results of the probit equation for probability of having an inpatient admission. This equation was estimated using the subset of Medicaid beneficiaries who had any contact with a physician, either in an ambulatory or inpatient setting. The results indicate that there is a difference in the

probability of having an inpatient admission depending on whether the individual's usual source of care is a physician's office or a hospital outpatient department or emergency room. The coefficient on the variable representing a physician's office as the usual source of care is significant and negative in both the low and high supply equations. Holding all other factors constant at the mean, the coefficient in the low supply equation indicates that Medicaid beneficiaries with a physician's office as their usual source were approximately 7% less likely to have an inpatient admission, and in the high supply were approximately 13% less likely to have an inpatient admission.

These results suggest either that there are differences in the propensity of physicians to hospitalize individuals associated with the site at which they practice, or that Medicaid beneficiaries who usually receive care at hospital-based sites are more severely ill, after accounting for self-perceived health status, ADL and IADL dependencies, serious conditions or accidents, and the number of conditions, than those who usually receive care in a physician's office. Because of the controls for severity included in the model, and the fact that number of conditions was positively associated with office-based care, this effect appears to be more likely a function of medical practice than severity of illness.

Interestingly, several other policy variables were significantly associated with the probability of inpatient admission. In the low supply equation selective day limits were

negatively related to inpatient admission, and in the high supply equation comprehensive day limits were likewise negatively related to inpatient hospitalization. These results suggest day limits may function to discourage any use of inpatient services, rather than just length of stay once an individual is hospitalized. This may be an indication of some appropriate substitutions of ambulatory for inpatient services -- for example, encouraging outpatient surgeries for certain services -- or possibly some access problems in states with such limits. Prior authorization was also significant in the low supply equation but, as was the case with combined visit limits in the total visits equation, the effect was in the opposite of the expected direction. This suggests that prior authorization in low physician supply areas is not an effective method of discouraging inpatient hospital use.

A number of the area characteristic variables were also significant in these equations. In the high supply equation both hospital beds per capita and percent GPs were negatively associated with inpatient admission. The former result may be an indication of greater competition for beds in high supply/high demand areas. That is, where overall demand for hospital beds is higher, Medicaid beneficiaries may have more difficulty securing an inpatient bed, since in a multi-payor market they are likely to be the least preferred of the insured patients. In addition, these areas may be those most likely to have high private prices and low Medicaid reimbursement levels, making Medicaid

unattractive even if there are empty beds. The latter result is similar to that found in the total visits model, and again is consistent with the idea that GPs practice somewhat differently than specialists. The implication is that in addition to seeing their patients less often, GPs may be less likely to hospitalize them. It is not clear if this result represents different overall practice patterns in areas with a higher proportion of GPs among patient care physicians, or simply better access by Medicaid beneficiaries to GPs, and their evidently less resource intensive practice style, where general practitioners are more plentiful.

In the low supply equations, locational variables were those most associated with the probability of inpatient admission. Medicaid beneficiaries located in the fringe counties of large metropolitan areas, and in the Northeast and West census regions were more likely to be hospitalized than those located in inner city counties or the Midwest, respectively.

Among the individual characteristics, age appears to have had an important influence on inpatient use. As expected, the variables related to child birth, those representing young women (female age 14 to 29) and infants (age less than 1), showed a significant and positive relationship to inpatient admission in both equations. The variable representing older children (age 6 to 13) was significant and negatively associated with inpatient admission in both equations, again apparently indicative of that age groups' general low use of medical services in comparison

with older adults. Interestingly, among the health status variables, only number of conditions in the low supply equation was significant at the .05 level. This suggests that inpatient hospitalization among this population is most highly associated with market and individual demographic characteristics, in addition to usual source of care, with some of the demographic variables--for example, the variable representing women of child bearing age--clearly, in part, functioning as proxies for an increased likelihood of requiring inpatient care.

Number of Admissions

Table 10 presents the results for the regression on number of inpatient admissions. This equation was estimated only for those Medicaid beneficiaries who had at least one inpatient stay. Because of the small number of individuals in this subset of the sample, the low and high supply samples were combined in this case. The results indicate that in addition to being associated with a lower probability of having at least one inpatient admission, among beneficiaries who had at least one admission, those who had a physician's office as a usual source of care averaged fewer admissions in total. Again, this suggests that office-based physicians have a lower propensity to hospitalize Medicaid patients, whether it is the first or subsequent admissions. As noted previously, although this result could be interpreted as reflecting unmeasured differences in severity of illness among recipients according to their usual source of physician care, the evidence presented above with respect to

health status measures and usual source of care suggests this is not the case. In addition, research on this topic has indicated little difference between patients seen in hospital outpatient departments and patients seen by private office-based physicians (Lion and Altman 1982).

Other variables associated with number of admissions include hospital beds per capita, again negatively related, perhaps indicating access difficulties for Medicaid patients in some areas, and two health status measures--poor or fair health and the presence of an ADL dependency--each of which was positively associated with number of admissions.

VI. Discussion

Reimbursement and Utilization Control Policies

The results presented in the previous chapter indicate that low Medicaid physician fees, relative to Medicare fees, do not result in a loss of access to physician services by Medicaid beneficiaries. As Long, Settle, and Stuart (1986) argue in their study, the effect of low Medicaid fees seems to be in the site at which such care is received, rather than whether or not it is received at all. Where there is an ample supply of physicians, higher Medicaid fees apparently do enhance Medicaid beneficiaries access to office-based physician services, resulting in their being more likely to see a physician in an office than a hospital-based setting. Combined visit limits, on the other hand, decrease the likelihood of having an office-based site as a usual source of physician care.

In areas with lower supplies of physicians, evidence of site shifting still exists, but the findings suggest it is more related to outpatient than physician reimbursement and utilization control policies. The probit results in Table 7 indicate that more generous outpatient reimbursement makes beneficiaries more likely to receive the bulk of their ambulatory physician care in hospital-based settings, while direct limits on the number of outpatient visits that will be paid for by Medicaid have the opposite effect.

Together, the results in both high and low physician supply areas suggest that reimbursement and utilization control policies are effective tools for encouraging or discouraging particular sources of physician care, without necessarily harming overall access. Access apparently can be harmed, however, if constraints are so tight that site shifting can not be accomplished. The results for outpatient fee schedules in Table 6 indicate that in higher physician supply areas outpatient fee schedules are associated with a reduced probability of receiving any physician services, controlling for other relevant factors. Given that there is on average more reliance on hospitals as a usual source of care in higher supply areas, and generally lower Medicaid fee ratios, this suggests that there is a point at which additional reimbursement policy constraints make site shifting no longer a viable alternative and overall access is harmed.

Usual Source of Care

While the evidence just discussed suggests that physician and outpatient hospital reimbursement and utilization control policies can be used to influence the site at which Medicaid beneficiaries receive physician care, it does not lead to a conclusion as to which of the two primary sites is preferable. The results of the equations for total number of physician visits and probability of inpatient use do provide some evidence on this question, however.

To the extent higher levels of utilization are desirable it is clear that having a physician's office as the usual source of

care is the preferred alternative. Medicaid recipients who usually received ambulatory physician services in an office-based setting had between 40 and 60 percent more visits than those who had a hospital-based setting as their usual source of care. This did not appear to be related to any trade-off between volume and fees, because the Medicaid fee ratio was not significantly associated with total numbers of visits. If physicians were compensating for low fees by inducing demand, there should have been a significant negative relationship between the fee ratio and total number of visits.

An optimistic interpretation of the greater number of visits for individuals with a physician' office as a usual source of care is that office-based physicians are more likely to see their patients for preventive services, or for office-based alternatives to more resource intensive types of care. The results of the inpatient equations tend to support this interpretation, since Medicaid recipients with an office-based site as a usual source were significantly less likely than those with a hospital-based usual source to be admitted to the hospital. Moreover, if they were admitted, the office oriented patients were on average less likely to be readmitted; they showed approximately 25% fewer total admissions on average. Thus, it would appear that the additional visits received by those primarily cared for by office-based physicians were compensated for by reductions in inpatient use. The implication is that on average, for Medicaid beneficiaries in need of medical

care, having an office-based physician as a usual source of care is associated with more desirable outcomes.

Policy Implications

The primary reason for maintaining low physician fees under Medicaid is to control program costs. The results of this study suggest, however, that under certain circumstances constraining physician fees may alter recipient utilization patterns enough to offset, perhaps even more than offset, any direct cost containment impact lower fees might have. To the extent low fees discourage regular use of office-based physicians by program beneficiaries, they apparently also increase inpatient hospital service utilization, which is much more expensive than ambulatory physician care. According to NMES expenditure data, for example, the average charge for a visit to a physician in an office or clinic for the all year under 65 Medicaid population in 1987 was $49, compared with $5,171 on average for each inpatient stay. These figures indicate that a large amount of additional physician care could be financed through a reduction in use of inpatient hospital services, which this study suggests could be accomplished by greater use of office-based physicians as a usual source of care. Although this study does not directly address the question of whether the net impact of reimbursement policy changes aimed at increasing the use of office-based physicians would be cost increasing, due a combination of higher payments per visit and more visits per recipient for those shifted from hospital-based to office-based usual sources of care, or cost

decreasing, due to the offsetting effects of lower use of inpatient hospitals, it does provide empirical evidence that a trade-off between greater use of office-based physicians and lower use of inpatient services does in fact exist.

In addition, these results provide some indirect evidence on the question of quality of care, which could not be addressed if the focus were on expenditures rather than utilization. That Medicaid recipients who use a physician's office as a usual source of care have more visits than those who use hospital-based sites, and are also less likely to be hospitalized, is consistent with the hypothesis that better access to office-based care is associated with more effective provision of preventive services. To the extent a lower probability of being hospitalized is indicative of higher quality of care, this suggests that increased use of office-based physicians may be desirable from the perspective of quality, in spite of the potential impact on costs.

It is possible that the reduced probability of being hospitalized results in overall cost decreases as well, but, as noted above, whether or not this is the case depends on the magnitudes of the relative cost increases and decreases, respectively, for ambulatory physician and inpatient care. Although this study did not directly examine costs, we can take an educated guess as to cost impacts using information on aggregate Medicaid expenditures for 1987 reported to the Health Care Financing Administration (HCFA), the federal agency

responsible for administering the Medicare and Medicaid programs, by the states (as reported in Chang and Holahan 1989), and the results of the preceding empirical analysis.

For example, consider the following very rough estimation, summarized in the top half of Table 11, of the cost impact of a hypothetical across-the-board 10% increase in Medicaid physician fees on overall Medicaid spending. Although these estimates are only speculative, and even then are applicable only in terms of relative effects, not absolute magnitudes, they do provide some focus for further thought and research, and perhaps even suggest some areas for experimentation by one or more state Medicaid programs.

As the starting point, assume a 10% increase in Medicaid physician fees. This would cause a 10% increase in physician expenditures at pre-increase levels of utilization and, according to the results of this analysis, roughly an additional 41% increase in total number of visits, which we will assume are all visits to an office-based physician, for the 1.4% of recipients who shift from a hospital-based to an office-based usual source of care. Assuming also for the sake of simplicity that all recipients live in high physician supply areas, the total increase in physician expenditures from raising fees would be 10%, plus .6% (41% times 1.4%) of the amount that otherwise would have been spent. Using actual 1987 total Medicaid physician expenditures as a base, this would lead to an increase in total

Medicaid spending, in 1987 dollars, of $336.3 million ($3.173 billion times 10.6%).

At the same time, however, 13% of the 1.4% of recipients who switched from a hospital-based to an office-based usual source of physician care would be expected to avoid inpatient hospitalization altogether, resulting in savings of approximately .2% of inpatient expenditures, or $22.6 million ($11.312 billion times .2%). Moreover, the portion of the shifted 1.4% of recipients who were hospitalized (87% of the 1.4%) could be expected to have on average 25% fewer total admissions, which would result in savings of approximately $34.4 million (87% times 1.4% times 25% times $11.312 billion). Thus, the net impact of a 10% increase in physician fees would be an increase in total Medicaid spending of approximately $280 million, or about 1.9% of total physician and inpatient spending.

Although this example provides only an extremely rough approximation of the relative effects of fee increases on Medicaid spending, it nonetheless illustrates why states may be reluctant to increase their Medicaid physician fees in an across-the-board manner. As long as fee increases apply to services that would have been in a physician's office prior to the increase, as well as services to recipients who would shift from a hospital-based to an office-based usual source of care, it is unlikely they would be even budget neutral, much less cost saving. As illustrated in the example just described, the projected additional expenditures from the 10% increase in costs

for pre-existing physician services are likely to dwarf the projected savings on inpatient admissions from the potential new office-based usual source of care recipients.

If we focus only on the recipients who would shift usual sources of care, however, the bottom half of Table 11, the cost implications are much different. Using the same spending figures, and assuming the fee increases could be targeted to services for those beneficiaries, the additional costs are only $3.2 million for pre-existing services (1.4% times 10.0% times $3.173 billion), and the same $19 million for new services. In this case, the additional costs total $22.2 million, instead of $336.3 million, which is a good deal less than the $67.8 million estimated as savings on inpatient hospitalizations. Thus, to the extent physician fee increases under Medicaid could be targeted to services for the subset of recipients with the greatest potential to be shifted from hospital to office-based usual sources of care, it would appear that raising fees might be cost-effective, as well as quality enhancing.

According to the findings presented previously, there are several area and individual characteristics that could be used for determining where and toward whom fee increases might be most effectively targeted. First, the empirical results suggest that increases should be limited to areas with a relatively high supply of patient care physicians, since the fee ratio was significant only in the high supply equation. Second, because Medicaid recipients in non-metropolitan counties are apparently

generally more likely to use office-based physicians than those in inner cities, increases could be limited to counties in and around larger cities. Third, the results for individual factors suggest that targeting should concentrate on those with an ADL dependency or serious condition, and on infants. Finally, the results for combined visit limits suggest that in terms of utilization control policies, it may be preferable to limit visits by site, rather than on an overall basis, because combined limits were associated with a lower probability of using office-based physicians, while direct limits on physician and outpatient visits showed no significant impact on site of usual source of care.

VII. Conclusions

This analysis suggests that although low Medicaid physician fees do not appear to harm Medicaid beneficiaries overall access to physician care, they are associated with greater use of hospital-based over office-based physician services for those beneficiaries who actually receive care. Thus, in areas with a sufficient supply of patient care physicians, setting the level of fees appears to be an effective policy tool for influencing the site at which Medicaid beneficiaries usually receive physician services.

The analysis also shows that use of office-based physicians as the primary source of such care is associated with higher levels of utilization and a lower probability of having an inpatient admission. This is consistent with the hypothesis that office-based physicians are more likely to provide preventive services (e.g., immunizations), or perhaps are in a better position to intervene earlier or more aggressively when problems develop, which then results in less need for inpatient hospital care. Lower rates of hospitalization may also indicate more reluctance in general on the part of office-based physicians to hospitalize patients, compared with their hospital-based counterparts.

In any case, the empirical evidence suggests that there is a trade-off between use of office-based physician services and inpatient admissions, with increased use of office-based services

resulting in decreased use of inpatient hospitals. While determining the specific mechanism by which this trade-off is produced is beyond the scope of this study, the evidence nonetheless implies that use of office-based physicians may be preferable from the perspective of quality of care.

Any cost saving potential of this trade-off is apparently not easy to exploit with simple across-the-board fee increases, however, given the relatively small effect of Medicaid fees on the site at which recipients' usually receive physician care, and the fact that more than 70% of recipients already receive the majority of such care in a physician's office. Indiscriminant use of fee increases to precipitate a shift in usual source of care for recipients currently using primarily hospital-based physicians would likely mean large increases in costs for those already using office-based physicians as a usual source of care, as well as those who could be shifted. At the same time, only among the latter group would there be any expected offsetting decreases in inpatient costs, which means that unless fee increases could be targeted on the recipients with the greatest potential to shift, simply increasing fees would more likely be cost increasing than cost saving.

The Medicaid program does provide enough flexibility to create payment policies that target higher fees to certain areas and recipients, however. Federal regulations regarding levels of reimbursement only require that payment for services be consistent with efficiency, economy, and quality of care, and

that they be sufficient to attract enough providers into the program to assure that services are available to Medicaid beneficiaries to the same extent they are available to the general population (Commerce Clearing House, Inc.). Thus, it should be possible for states to design physician reimbursement systems that pay higher rates for office visits in metropolitan areas with a relatively large supply of doctors, and for services to infants, those with a particularly serious condition, and the ADL dependent.

The potential impact of fee increases on total Medicaid spending, however, suggests the need for more specific research on the cost implications of raising fees for office-based physician services. Although the results of this study indicate some potentially worthwhile modifications to physician payment policies under states' Medicaid programs, they are still more suggestive than conclusive because they are based on fees for only one type of service and then only indirectly address the issue of program costs.

At the same time, this research, as well as previous research on the effects of low physician fees, suggests that in addition to further research using existing nonexperimental data, it might be useful to have some careful experimentation with innovative Medicaid physician reimbursement policies by at least a few states. Secondary data analyses suggest that selectively raising payments to physicians could have some beneficial impacts on the program. Some well designed field experiments aimed at

testing the effects of higher fees would provide an opportunity to more conclusively answer the question of how Medicaid physician fees affect program quality and costs.

References

Acton, J. P., 1976, "Demand for Health Care Among the Urban Poor, with Special Emphasis on the Role of Time," in The Role of Health Insurance in the Health Services Sector, R. Rosett, ed. New York: National Bureau of Economic Research.

Amemiya, T., 1981, "Qualitative Response Models: A Survey," Journal of Economic Literature, 19: 1483-1536.

Andersen, R., 1968, A Behavioral Model of Families' Use of Health Services, Research Series #25, Chicago: Center for Health Administration Studies, University of Chicago.

Andersen, R. and J. F. Newman, 1973, "Societal and Individual Determinants of Medical Care Utilization in the United States," Milbank Memorial Fund Quarterly, 51: 95-124.

Chang, D. and J. Holahan, 1989, "Medicaid Spending in the 1980s: The Access-Cost Containment Trade-off Revisited," Urban Institute Working Paper 3836-01 (Washington, D.C.) July.

Cohen, J., 1989, "Medicaid Policy and the Substitution of Hospital Outpatient Care for Physician Care," Health Services Research (Spring): 33-66.

Cox, B. and S. Cohen, 1985, Methodological Issues for Health Care Surveys: Statistics, Textbooks and Monograph Series, Vol. 61 (Dekker: New York).

Cromwell, J. and J. Mitchell, 1984, "An Economic Model of Large Medicaid Practices," Health Services Research (June): 197-218.

Davis, K., 1972, "Economic Theories of Behavior in Nonprofit, Private Hospitals," Economic and Business Bulletin (Winter): 1-13.

Dranove, D., 1987, "Pricing by Non-profit Institutions: The Case of Hospital Cost Shifting," Graduate School of Business, University of Chicago, July 24.

Duan, N., W. Manning, C. Morris, and J. Newhouse, 1983 "A Comparison of Alternative Models for the Demand for Medical Care," Journal of Business and Economic Statistics (April): 115-126.

Edwards, W.S., and M. Berlin, 1989, Questionnaires and Data Collection Methods for the Household Survey and the Survey of American Indians and Alaska Natives: National Medical Expenditures Survey Methods 2, DHHS Publication No. (PHS) 89-3450, Agency for Health Care Policy and Research, Rockville, MD: Public Health Service.

_____, 1984, "Choosing Between the Sample-Selection Model and the Multi-Part Model," Journal of Business and Economic Statistics (July): 283-289.

Fleming, N. and H. Jones, 1983, "The Impact of Outpatient Department and Emergency Room Use on Costs in the Texas Medicaid Program," Medical Care 21(9): 892-910.

Fossett, J., and J. Peterson, 1989, "Physician Supply and Medicaid Participation: The Causes of Market Failure," Medical Care (April): 386-396.

Gabel, J. and T. Rice, 1985, "Reducing Public Expenditures for Physician Services: The Price of Paying Less," Journal of Health Politics, Policy and Law (Winter): 595-609.

Gold, M., 1984, "The Demand for Hospital Outpatient Services," Health Services Research (August): 384-412.

Gold, M., and M. Greenlick, 1981, "Effect of Hospital-Based Primary Care Setting on Internists' Use of Inpatient Hospital Resources," Medical Care (February): 160-171.

Grossman, M., 1972, "The Demand for Health," Occasional Paper #119, New York: National Bureau of Economic Research.

Hanft, R., 1990, "Recent Changes in Medicare and Medicaid," Journal of Health Care for the Poor and Underserved (Summer): 31-38.

Held, P. and J. Holahan, 1985, "Containing Medicaid Costs in an Era of Growing Physician Supply," Health Care Financing Review (Fall): 49-60.

Holahan, J., 1984, "Paying for Physician Services in State Medicaid Programs," Health Care Financing Review (Spring): 99-110.

Holahan, J. and J. Cohen, 1986, Medicaid: The Tradeoff Between Cost Containment and Access to Care, (Washington, D.C.: The Urban Institute Press).

Jacobs, P., 1984, "A Survey of Economic Models of Hospitals," Inquiry (Summer): 83-97.

Judge, G., W. Griffiths, R. Hill, H. Lutkepohl, and T. Lee, 1985, The Theory and Practice of Econometrics (New York: John Wiley and Sons).

Lion, J., and S. Altman, 1982, "Case-Mix Differences Between Hospital Outpatient Departments and Private Practice," Health Care Financing Review (September): 89-98.

Long, S., R. Settle, and B. Stuart, 1986, "Reimbursement and Access to Physicians' Services Under Medicaid," Journal of Health Economics 5: 235-251.

Maddala, G., 1983, Limited-Dependent and Qualitative Variables in Econometrics (New York: Cambridge University Press).

Maddala, G., 1985, "A Survey of the Literature on Selectivity Bias as it Pertains to Health Care Markets," in Advances in Health Economics and Health Services Research: Biased Selection in Health Care Markets, R. Scheffler and L. Rossiter, eds., Volume 6 (Greenwich, CT: JAI Press, Inc.).

Manning, W. G., J. P. Newhouse, N. Duan, E. Keeler, B. Benjamin, A. Leibowitz, M. S. Marquis, and J. Zwanziger, 1988, Health Insurance and the Demand for Medical Care: Evidence From a Randomized Experiment, (Santa Monica, CA: The RAND Corporation).

Mitchell, J., 1983, "Medicaid Participation by Medical and Surgical Specialists," Medical Care (September): 929-938.

Mitchell, J., and R. Schurman, 1984, "Access to Private Obstetrics/Gynecology Services Under Medicaid," Medical Care (September): 1026-1037.

Newhouse, J. P. and C. E. Phelps, 1974, "Price and Income Elasticities for Medical Care Services," in The Economics of Health and Medical Care, M. Perlman, ed., New York: Halsted Press.

Pauly, M., and M. Redisch, 1973, "The Not-for-profit Hospital as a Physicians' Cooperative," American Economic Review 63(1): 87-99.

Perloff, J., P. Kletke, and K. Neckerman, 1986, "Recent Trends in Pediatrician Participation in Medicaid," Medical Care (August): 749-760.

_____, 1987, "Physicians' Decisions to Limit Medicaid Participation: Determinants and Policy Implications," Journal of Health Policy, Politics and Law (Summer): 221-235.

Physician Payment Review Commission, 1990, "State Medicaid Physician Payment," unpublished.

Sloan, F., 1978, "The Demand for Physicians' Services in Alternative Practice Settings: A Multiple Logit Analysis," Quarterly Review of Economics and Business 18(1) 41-61.

Sloan, F., J. Cromwell, and J. Mitchell, 1978, Private Physicians and Public Programs (Lexington MA: D.C. Heath and Company).

Stevens, R. and R. Stevens, 1974, Welfare Medicine in America: A Case Study of Medicaid, (New York: The Free Press).

Zuckerman, S., W. P. Welch, and G. Pope, 1989, "A Geographic Index of Physician Practice Costs," Urban Institute Working Paper 3839-01-03 (Washington, D.C.) July.

Table 1. Ratio of Medicaid to Medicare Fees, 1979-1984

State	1979	1980	1981	1982	1983	1984
Nevada	1.13	1.06	1.09	1.00	.92	.87
Delaware	1.06	NA	NA	.91	.88	.83
Minnesota	1.06	.99	1.09	1.00	.92	.87
Louisianna	1.02	.95	.94	.86	.79	.56
Indiana	1.00	NA	NA	.50	.46	.71
Iowa	1.00	NA	NA	NA	.87	.86
Nebraska	1.00	NA	NA	NA	.83	.88
North Carolina	1.00	.93	.90	.82	.76	.72
Oklahoma	1.00	.103	.97	.98	.99	.94
Texas	1.00	.93	.86	.83	.76	.72
Utah	1.00	.93	.86	1.14	1.05	.99
Wisconsin	1.00	.94	.96	.96	.80	.78
Wyoming	1.00	1.02	1.04	1.04	1.03	1.02
Kentucky	.99	.88	.81	.86	.79	.90
North Dakota	.98	.92	.91	.83	.77	.72
South Carolina	.95	.93	.90	.74	.67	.64
New Mexico	.94	.88	.81	.74	.68	.64
Hawaii	.93	.83	.80	.81	.78	.66
Arkansas	NA	NA	.43	.40	.36	.32
Oregon	.90	.84	.78	.75	.72	.71
South Dakota	.90	1.03	.95	.87	.80	.75
Tennessee	.90	.88	.81	.77	.71	.80
Idaho	.89	.83	.76	.65	.60	.57
Georgia	.88	NA	.87	.83	.76	.72
Alabama	.83	NA	NA	.99	.91	.86
Washington	.80	.67	.66	.64	.59	.57
Michigan	.78	.73	.61	.56	.51	.49
Mississippi	.77	.72	.66	.61	.54	.67
Montana	.76	.78	.79	.73	.74	.70
Ohio	.74	.69	.64	.58	.54	.51
Vermont	.72	.71	.65	.60	.55	.52
Colorado	.71	.87	1.04	.95	.87	.86
Kansas	.70	.65	.60	.57	.53	.50
New Hampshire	.69	.64	.59	.54	.50	.47
District	.68	.64	.58	.56	.51	.70
West Virginia	.68	.65	.60	.54	.50	.47
Maine	.65	.61	.56	.51	.47	.44
California	.62	.63	.63	.61	.50	.48
Massachusetts	.62	.65	.60	.47	.50	.48
Virginia	.62	.58	.53	.51	.47	.45
Illinois	.61	.57	.53	.49	.45	.42
Rhode Island	.59	.55	.57	.52	.48	.45
Connecticut	.54	.61	.56	.51	.47	.45
Missouri	.54	.55	.50	.46	.43	.40
Florida	.52	.49	.45	.41	.38	.36
Maryland	.51	.48	.45	.42	.41	.39
New Jersey	.41	.38	.35	.33	.31	.29
Pennsylvania	.37	.35	.32	.30	.24	.22
New York	.33	.31	.29	.26	.24	.23

NA = not available.

Source: J. W. Cohen, "Medicaid Policy and the Substitution of Hospital Outpatient Care for Physician Care," Health Services Research, April 1989.

Table 2. Variables and Equations

Independent Variables	Dependent Variable: Any Use	Site of Physician Care	Number of Visits	Inpatient Use	Number of Admissions
Physician's office as usual source of care			X	X	X
Medicaid fee ratio	X	X	X		
Outpatient fee schedule	X	X	X		
Outpatient other alternative payment method	X	X	X		
Direct limits on physician office visits	X	X	X		
Direct limits on outpatient visits	X	X	X		
Combined visit limits	X	X	X		
DRG reimbursement system				X	X
All payer reimbursement system				X	X
Retrospective reimbursement system				X	X
Selective contract reimbursement system				X	X
Day limits for all hospitals and procedures				X	X
Day limits for some procedures or types of hospitals				X	X
Second surgical opinions required				X	X
Prior authorization for all elective procedures				X	X
Prior authorization for selected procedures				X	X
Hospital beds per capita				X	X
Part of county health manpower shortage area	X	X	X	X	X
Percent of hospitals with emergency rooms	X	X	X		
Percent of hospitals with outpatient departments	X	X	X		
Percent GPs, all patient care physicians	X	X	X	X	X
Number of HMOs	X	X	X	X	X
Household median income	X	X	X	X	X
AFDC recipients per doctor	X	X	X	X	X
Fringe metropolitan area	X	X	X	X	X
Other metropolitan area	X	X	X	X	X
Non-metropolitan area	X	X	X	X	X
Northeast region	X	X	X	X	X
West region	X	X	X	X	X
South region	X	X	X	X	X
Geographic input price index	X	X	X	X	X
Percent non-white	X	X	X	X	X

(Table 2 continued.)

Female age 14 to 29	X	X	X	X	X
Female	X	X	X	X	X
Below poverty income	X	X	X	X	X
Non-white	X	X	X	X	X
Family size	X	X	X	X	X
Poor or fair health	X	X	X	X	X
ADL dependency	X	X	X	X	X
IADL dependency	X	X	X	X	X
Serious condition or accident	X	X	X	X	X
Age less than 1	X	X	X	X	X
Age 1 to 5	X	X	X	X	X
Age 6 to 13	X	X	X	X	X
Age 14 to 29	X	X	X	X	X
Age 30 to 49	X	X	X	X	X
High school (9-12 years of education)	X	X	X	X	X
College (more than 12 years of education)	X	X	X	X	X
Number of conditions		X	X	X	X
Number of conditions squared		X	X	X	X

Table 3. Variable Means and Standard Deviations for Probability of Any Physician or Inpatient Use Equation

Variable	Low Physician Supply Areas (N=1224)		High Physician Supply Areas (N=1194)	
	Mean	Standard Deviation	Mean	Standard Deviation
Any use	.75	.43	.73	.45
Medicaid fee ratio	.79	.35	.70	.25
Outpatient fee schedule	.42	.49	.47	.50
Outpatient other alternative payment method	.07	.26	.23	.42
Direct limits on physician office visits	.05	.22	.11	.32
Direct limits on outpatient visits	.39	.49	.58	.49
Combined visit limits	.32	.47	.25	.43
Part of county health manpower shortage area	.55	.50	.72	.45
Percent of hospitals with emergency rooms	83.2	29.8	87.9	13.3
Percent of hospitals with outpatient departments	66.6	35.5	77.8	19.7
Percent GPs, all patient care physicians	50.1	24.1	28.7	12.4
Number of HMOs	.52	1.5	5.5	5.7
Household median income	24055	5904	25394	7736
AFDC recipients per doctor	133.5	88.8	70.7	40.8
Fringe metropolitan area	.12	.33	.07	.25
Other metropolitan area	.28	.45	.34	.47
Non-metropolitan area	.41	.49	.08	.27
Northeast region	.22	.42	.25	.43
West region	.06	.24	.19	.39
South region	.45	.50	.24	.42
Geographic input price index	.96	.15	1.04	.13
Percent non-white	34.3	31.4	44.3	33.1
Female age 14 to 29	.18	.38	.18	.39
Female	.58	.49	.62	.49
Below poverty income	.52	.50	.52	.50
Non-white	.58	.49	.69	.46
Family size	3.9	1.9	3.7	1.8
Poor or fair health	.29	.45	.23	.42
ADL dependency	.05	.21	.03	.18
IADL dependency	.04	.18	.03	.17
Serious condition or accident	.56	.50	.48	.50
Age less than 1	.07	.25	.07	.26
Age 1 to 5	.18	.38	.19	.39

(Table 3 continued.)

Age 6 to 13	.22	.42	.20	.40
Age 14 to 29	.26	.44	.26	.44
Age 30 to 49	.18	.38	.18	.39
High school (9-12 years of education)	.28	.45	.31	.46
College (more than 12 years of education)	.04	.20	.06	.24

Table 4. Variable Means and Standard Deviations for Usual Source of Care, Total Number of Visits, and Probability of Inpatient Use Equations

Variable	Low Physician Supply Areas (N=898)		High Physician Supply Areas (N=853)	
	Mean	Standard Deviation	Mean	Standard Deviation
Physician's office as usual source of care	.79	.41	.70	.46
Total number of visits (log)	1.35	.91	1.33	1.00
Inpatient admission	.24	.43	.22	.42
Medicaid fee ratio	.79	.34	.69	.24
Outpatient fee schedule	.45	.50	.46	.50
Outpatient other alternative payment method	.07	.25	.22	.41
Direct limits on physician office visits	.04	.20	.11	.31
Direct limits on outpatient visits	.38	.49	.55	.50
Combined visit limits	.33	.47	.25	.43
DRG reimbursement system	.39	.49	.30	.46
All payer reimbursement system	.21	.41	.19	.39
Retrospective reimbursement system	.02	.15	.03	.17
Selective contract reimbursement system	.06	.23	.23	.42
Day limits for all hospitals and procedures	.57	.49	.45	.50
Day limits for some procedures or types of hospitals	.03	.17	.15	.36
Second surgical opinions required	.29	.45	.27	.44
Prior authorization for all elective procedures	.32	.47	.22	.42
Prior authorization for selected procedures	.38	.48	.36	.48
Hospital beds per capita	.0035	.0019	.0056	.0021
Part of county health manpower shortage area	.54	.50	.71	.45
Percent of hospitals with emergency rooms	82.6	30.6	87.9	13.8
Percent of hospitals with outpatient departments	65.7	35.6	77.5	20.0
Percent GPs, all patient care physicians	50.8	24.7	29.1	12.7
Number of HMOs	.51	1.49	5.3	5.7
Household median income	23987	6031	25520	7749
AFDC recipients per doctor	133.6	89.4	69.7	41.3
Fringe metropolitan area	.12	.33	.07	.25
Other metropolitan area	.26	.44	.35	.48
Non-metropolitan area	.42	.49	.08	.28
Northeast region	.23	.42	.25	.43
West region	.06	.23	.19	.39
South region	.45	.50	.24	.43

(Table 4 continued.)

Geographic input price index	.97	.15	1.0	.13
Percent non-white	33.7	31.5	42.7	33.0
Female age 14 to 29	.19	.39	.18	.38
Female	.61	.49	.62	.48
Below poverty income	.53	.50	.53	.50
Non-white	.55	.50	.65	.48
Family size	3.7	1.9	3.5	1.8
Poor or fair health	.33	.47	.27	.44
ADL dependency	.06	.24	.04	.20
IADL dependency	.04	.20	.04	.19
Serious condition or accident	.69	.46	.61	.49
Age less than 1	.09	.28	.09	.29
Age 1 to 5	.18	.39	.19	.40
Age 6 to 13	.17	.38	.17	.36
Age 14 to 29	.26	.44	.24	.43
Age 30 to 49	.19	.39	.19	.39
High school (9-12 years of education)	.31	.46	.30	.46
College (more than 12 years of education)	.04	.20	.07	.26
Number of conditions	3.0	2.4	2.8	2.7
Number of conditions squared	15.0	25.7	14.9	35.3

Table 5. Variable Means and Standard Deviations for Number of Inpatient Admissions Equation

Variable	Mean (N=398)	Standard Deviation
Number of admissions	1.36	.84
Physician's office as usual source of care	.63	.48
DRG reimbursement system	.35	.48
All payer reimbursement system	.20	.40
Retrospective reimbursement system	.02	.15
Selective contract reimbursement system	.18	.38
Day limits for all hospitals and procedures	.46	.50
Day limits for some procedures or types of hospitals	.10	.30
Second surgical opinions required	.26	.44
Prior authorization for all elective procedures	.26	.44
Prior authorization for selected procedures	.38	.49
Hospital beds per capita	.0043	.0020
Part of county health manpower shortage area	.63	.48
Percent GPs, all patient care physicians	42.6	22.3
Number of HMOs	2.66	4.85
Household median income	24999	6486
AFDC recipients per doctor	107.1	79.6
Fringe metropolitan area	.12	.33
Other metropolitan area	.29	.46
Non-metropolitan area	.26	.44
Northeast region	.26	.44
West region	.16	.36
South region	.34	.47
Geographic input price index	1.00	.14
Percent non-white	34.8	31.1
Female age 14 to 29	.23	.42
Female	.64	.48
Below poverty income	.54	.50
Non-white	.57	.50
Family size	3.6	2.0
Poor or fair health	.36	.48
ADL dependency	.09	.28
IADL dependency	.06	.25
Serious condition or accident	.65	.48

(Table 5 continued.)

Age less than 1	.28	.45
Age 1 to 5	.09	.29
Age 6 to 13	.02	.15
Age 14 to 29	.26	.44
Age 30 to 49	.19	.39
High school (9-12 years of education)	.34	.47
College (more than 12 years of education)	.06	.24
Number of conditions	3.4	3.0
Number of conditions squared	20.7	36.3

Table 6. Results for Probability of Any Physician or Inpatient Service Use

Independent Variables	Dependent Variable = 1 for Users of Physician or Inpatient Services	
	Low Physician Supply Areas	High Physician Supply Areas
Reimbursement and Utilization Controls:		
Medicaid fee ratio	-.21 (-.79)	-.31 (-1.02)
Outpatient fee schedule	.08 (.43)	-.59* (-4.22)
Outpatient other alternative method	.09 (.44)	-.34 (-1.54)
Direct limits on physician office visits	-.54 (-1.73)	.19 (.88)
Direct limits on outpatient visits	-.08 (-.37)	-.07 (-.45)
Combined visits limits	.11 (.43)	.39 (1.60)
Area Characteristics:		
Part of county health manpower shortage area	-0.17* (-1.98)	-.02 (-.13)
Percent of hospitals with emergency rooms	.001 (0.00)	-.0001 (-.03)
Percent of hospitals with outpatient departments	-.001 (-.84)	.0002 (0.00)
Percent GPs, all patient care physicians	.004 (1.15)	.01 (1.05)
Number of HMOs	.03 (.91)	.007 (.52)
Household median income	-.000004 (-.22)	.000001 (-.11)
AFDC recipients per doctor	-.0001 (-.17)	-.002 (-.86)
Fringe metropolitan area	-.07 (-.29)	-.23 (-.91)
Other metropolitan area	-.29 (-.97)	.24 (1.13)
Non-metropolitan area	-.29 (-.73)	0.30 (.82)
Northeast region	-0.03 (-.14)	.24 (.97)
West region	-.18 (-.87)	-.07 (-.32)
South region	.29 (1.19)	.13 (.76)
Geographic input price index	.54 (.47)	2.62* (2.96)

Percent non-white	.003 (.76)	.002 (.67)
Individual Characteristics:		
Female age 14 to 29	.52* (2.47)	.40 (1.76)
Female	-.001 (-.006)	.009 (.09)
Below poverty income	.07 (.62)	.15 (1.10)
Non-white	-.36* (-2.09)	-.40* (-2.25)
Family size	-.05 (-1.29)	-.001 (0.00)
Poor or fair health	.10 (1.00)	.40* (2.53)
ADL dependency	1.23* (4.23)	.24 (.88)
IADL dependency	.44 (1.18)	.56 (1.34)
Serious condition or accident	1.32* (11.58)	1.43* (13.22)
Age less than 1	.76* (3.72)	.61* (2.25)
Age 1 to 5	-.42 (-1.82)	-.40 (-1.78)
Age 6 to 13	-.86* (-3.63)	-.56* (-2.27)
Age 14 to 29	-.69* (-3.53)	-.68* (-2.67)
Age 30 to 49	-.30 (-1.17)	-.32 (-1.32)
High school (9-12 years of education)	.0005 (.005)	-.17 (-1.05)
College (more than 12 years of education)	-.46 (-1.60)	.14 (.50)
Intercept	0.44 (.25)	-2.04 (-1.60)

* Statistically significant at the .05 level or better

Table 7. Results for Probability of Physician's Office as the Usual Source of Care, Physician or Inpatient Service Users Only

Independent Variables	Dependent Variable = 1 for Physician's Office as the Usual Source of Care	
	Low Physician Supply Areas	High Physician Supply Areas
Reimbursement and Utilization Controls:		
Medicaid fee ratio	.37 (1.43)	.61* (2.15)
Outpatient fee schedule	.01 (.06)	-.04 (-.25)
Outpatient other alternative method	-.59* (-2.66)	-.24 (-1.39)
Direct limits on physician office visits	.26 (.64)	.22 (1.16)
Direct limits on outpatient visits	.53* (2.19)	.18 (1.15)
Combined visits limits	-.41 (-1.38)	-.66* (-2.62)
Area Characteristics:		
Part of county health manpower shortage area	-.10 (-.92)	.05 (.32)
Percent of hospitals with emergency rooms	-.005* (-2.24)	.004 (.83)
Percent of hospitals with outpatient departments	-.003 (-1.55)	.0009 (.28)
Percent GPs, all patient care physicians	-.003 (-1.10)	-.01 (-1.05)
Number of HMOs	-.13* (-2.30)	.002 (.13)
Household median income	.0001 (.66)	.00002* (2.70)
AFDC recipients per doctor	-.0007 (-1.01)	.002 (.99)
Fringe metropolitan area	.12 (.44)	.12 (.41)
Other metropolitan area	.35 (1.21)	-.04 (-.20)
Non-metropolitan area	-.02 (-.06)	.76* (2.19)
Northeast region	-.44* (-2.07)	-.13 (.60)
West region	-.58 (-1.72)	-.13 (-.63)
South region	-.07 (-.23)	.24 (1.16)

(Table 7 continued.)

Geographic input price index	1.29 (.88)	.83 (.74)
Percent non-white	.001 (-.46)	.0001 (.06)
Individual Characteristics:		
Female age 14 to 29	.10 (.36)	.13 (.47)
Female	-.23 (-1.62)	.03 (.25)
Below poverty income	-.12 (-.98)	-.01 (-.08)
Non-white	.22 (1.37)	-.09 (-.62)
Family size	-.02 (-.45)	-.04 (-1.01)
Poor or fair health	.16 (1.49)	-.33 (-1.73)
ADL dependency	-.28 (-1.17)	-.70* (-2.46)
IADL dependency	-.40 (-1.18)	-.24 (-.74)
Serious condition or accident	-.11 (-.77)	-.28* (-2.55)
Age less than 1	-.06 (-.23)	-.71* (-2.28)
Age 1 to 5	.08 (.33)	.13 (.51)
Age 6 to 13	.37* (2.15)	.13 (.45)
Age 14 to 29	.14 (.63)	-.10 (-.33)
Age 30 to 49	.20 (.84)	-.16 (-.72)
High school (9-12 years of education)	-.21 (-1.30)	.07 (.40)
College (more than 12 years of education)	-.10 (.44)	-.56* (-2.15)
Number of conditions	.02 (.39)	.11 (2.25)
Number of conditions squared	-.002 (-.44)	-.004 (-1.48)
Intercept	0.22 (.13)	-1.15 (-1.51)

* Statistically significant at the .05 level or better

Table 8. Results for Total Number of Physician Visits, Ambulatory Physician Service Users Only

Independent Variables	Dependent Variable = Log of Total Visits	
	Low Physician Supply Areas	High Physician Supply Areas
Policy Related:		
Physician's office as usual source of care	.58* (5.06)	.41* (5.76)
Medicaid fee ratio	-.15 (1.19)	.10 (.49)
Outpatient fee schedule	-.008 (-.14)	.10 (1.55)
Outpatient other alternative method	.12 (.74)	-.03 (-.26)
Direct limits on physician office visits	.14 (1.17)	.05 (.44)
Direct limits on outpatient visits	-.17* (-2.34)	-.10 (-1.91)
Combined visits limits	.22* (3.05)	-.05 (-.57)
Area Characteristics:		
Percent GPs, all patient care physicians	-.0009 (-.86)	-.01* (-2.37)
Fringe metropolitan area	-.06 (-.57)	.20 (1.47)
Other metropolitan area	-.18 (-1.41)	.006 (0.00)
Non-metropolitan area	-.04 (-.33)	-.10 (-.57)
Northeast region	-.13 (-1.53)	-.06 (-.91)
West region	-.14 (-1.17)	.05 (.68)
South region	-.12 (-1.01)	.09 (.81)
Geographic input price index	-.008 (0.00)	-.59 (-1.24)
Percent non-white	-.002 (-1.24)	.0006 (.42)
Individual Characteristics:		
Female age 14 to 29	.17 (.96)	.16 (.91)
Female	-.02 (-.20)	-.003 (0.00)
Below poverty income	-.08 (-1.01)	-.02 (-.26)
Non-white	.04 (.67)	.02 (.17)

(Table 8 continued.)

Family size	-.03* (-2.18)	-.04 (-1.51)
Poor or fair health	.14 (1.87)	.19* (2.30)
ADL dependency	-.17 (-1.43)	.09 (.47)
IADL dependency	.15 (.56)	.20 (1.26)
Serious condition or accident	-.07 (-.93)	.07* (.81)
Age less than 1	.16 (1.02)	.02 (.14)
Age 1 to 5	-.07 (-.60)	-.13 (-.83)
Age 6 to 13	-.35* (-3.03)	-.21 (-1.61)
Age 14 to 29	-.17 (-.90)	-.21 (-1.21)
Age 30 to 49	-.18 (-1.71)	.04 (.32)
High school (9-12 years of education)	.007 (.10)	-.03 (-.35)
College (more than 12 years of education)	.08 (.52)	.09 (.39)
Number of conditions	.33* (8.33)	.30* (10.71)
Number of conditions squared	-.01* (11.33)	-.01* (-10.30)
Intercept	0.70 (1.13)	1.27* (2.11)

* Statistically significant at the .05 level or better

Table 9. Results for Probability of Inpatient Admission, Physician or Inpatient Service Users Only

Independent Variables	Dependent Variable = 1 for use of inpatient services Low Physician Supply Areas	 High Physician Supply Areas
Policy related:		
Physician's office as usual source of care	-.32* (-2.40)	-.65* (-3.80)
DRG reimbursement system	.09 (.42)	.24 (1.02)
All payer reimbursement system	-.41 (-.83)	.18 (.53)
Retrospective reimbursement system	-.37 (-.64)	.16 (.40)
Selective contract reimbursement system	.59 (1.13)	.75 (1.81)
Day limits for all hospitals and procedures	.25 (1.39)	-.44* (-2.71)
Day limits for some procedures or types of hospitals	-2.00* (-3.28)	.10 (.24)
Second surgical opinions required	.37 (1.95)	.26 (1.12)
Prior authorization for all elective procedures	.08 (.33)	.57 (1.87)
Prior authorization for selected procedures	.53* (2.74)	-.14 (-.67)
Area Characteristics:		
Part of county health manpower shortage area	-.04 (-.30)	.12 (.66)
Hospital beds per capita	54.52 (1.55)	-112.93* (-2.60)
Percent GPs, all patient care physicians	.001 (.37)	-.014* (-1.98)
Number of HMOs	.02 (.46)	-.02 (-.75)
Household median income	-.00003* (-3.32)	-.000004 (-.30)
AFDC recipients per doctor	.0008 (1.22)	-.0001 (-.04)
Fringe metropolitan area	.74* (2.12)	-.27 (-.76)
Other metropolitan area	.15 (.57)	-.05 (-.31)
Non-metropolitan area	-.15 (-.44)	.62 (1.93)
Northeast region	.83* (2.53)	.15 (.37)
West region	1.97* (3.06)	-.36 (-.99)

(Table 9 continued.)

South region	.29 (1.04)	.54* (2.57)
Geographic input price index	-.99 (-.86)	.40 (.36)
Percent non-white	-.002 (-.54)	-.002 (-.65)
Individual Characteristics:		
Female age 14 to 29	.80* (2.40)	.98* (2.42)
Female	-.21 (-1.46)	-.05 (-.31)
Below poverty income	.05 (.38)	.09 (.91)
Non-white	.02 (.15)	-.07 (-.53)
Family size	-.0009 (0.00)	.05 (1.31)
Poor or fair health	.06 (.46)	.10 (.74)
ADL dependency	.11 (.47)	.36 (.86)
IADL dependency	-.01 (0.00)	.59 (1.86)
Serious condition or accident	-.14 (-1.09)	-.05 (-.33)
Age less than 1	1.27* (4.08)	1.70* (3.93)
Age 1 to 5	-.40 (-1.49)	-.58 (-1.76)
Age 6 to 13	-1.37* (-4.08)	-.99* (-2.57)
Age 14 to 29	-.57 (-1.53)	-.57 (-1.46)
Age 30 to 49	-.18 (-.77)	-.10 (-.31)
High school (9-12 years of education)	.03 (.21)	.03 (.16)
College (more than 12 years of education)	-.01 (0.00)	.004 (.01)
Number of conditions	.17* (3.32)	.13 (1.90)
Number of conditions squared	-.006 (-1.79)	-.005 (-1.28)
Intercept	-.15 (-.12)	-.45 (-.35)

* Statistically significant at the .05 level or better

Table 10. Results for Number of Inpatient Admissions, Inpatient Service Users Only

Independent Variables	Dependent Variable = Log of Total Admissions
Policy related:	
Physician's office as usual source of care	-.34* (-3.55)
DRG reimbursement system	-.10 (-.67)
All payer reimbursement system	.10 (.39)
Retrospective reimbursement system	.50 (1.20)
Selective contract reimbursement system	-.18 (-.61)
Day limits for all hospitals and procedures	-.12 (-.69)
Day limits for some procedures or types of hospitals	-.23 (-.93)
Second surgical opinions required	-.03 (-.28)
Prior authorization for all elective procedures	.16 (.61)
Prior authorization for selected procedures	.17 (1.32)
Area Characteristics:	
Part of county health manpower shortage area	-.05 (-.46)
Hospital beds per capita	-53.70* (-2.74)
Percent GPs, all patient care physicians	-.005 (-1.75)
Number of HMOs	-.0002 (0.00)
Household median income	-.000007 (-1.19)
AFDC recipients per doctor	.001 (1.72)
Fringe metropolitan area	.01 (0.00)
Other metropolitan area	-.16 (-1.82)
Non-metropolitan area	-.12 (-.93)
Northeast region	-.34 (-1.18)
West region	.11 (.48)

South region	-.18 (-.75)
Geographic input price index	-.64 (-.98)
Percent non-white	-.003 (-1.07)
Individual Characteristics:	
Female age 14 to 29	-.10 (-.54)
Female	.07 (.78)
Below poverty income	.07 (.83)
Non-white	.10 (.79)
Family size	.004 (0.00)
Poor or fair health	.41* (3.24)
ADL dependency	.43* (2.13)
IADL dependency	.18 (.85)
Serious condition or accident	.06 (.75)
Age less than 1	.26 (1.35)
Age 1 to 5	.30 (1.24)
Age 6 to 13	.03 (.14)
Age 14 to 29	.38 (1.40)
Age 30 to 49	.22 (1.31)
High school (9-12 years of education)	.03 (.24)
College (more than 12 years of education)	-.12 (.70)
Number of conditions	.10 (1.93)
Number of conditions squared	-.004 (-1.06)
Intercept	2.24* (3.68)

* Statistically significant at the .05 level or better

Table 11. Summary of Cost Impacts of a 10% Increase in Physician Fees

Cost Component	Baseline Expenditures ($ in thousands)	Cost Impact in Percent	Cost Impact in Dollars ($ in millions)
	Across-the-board Increase		
Increase in cost per visit	$3,173	10.0%	$317.3
Increase in visits for shifted users	3,173	0.6	19.0
Lower probability of inpatient admission	11,312	-0.2	-22.6
Fewer admissions for shifted inpatient users	11,312	-0.3	-33.9
Total			279.8
	Targeted Increase		
Increase in cost per visit	$3,173	0.1%	$3.2
Increase in visits for shifted users	3,173	0.6	19.0
Lower probability of inpatient admission	11,312	-0.2	-22.6
Fewer admissions for shifted inpatient users	11,312	-0.3	-33.9
Total			-34.3

Source: Medicaid expenditures are from HCFA 2082 data as reported in Chang and Holahan 1989.